APPLICATION OF BEST AVAILABLE TECHNOLOGY TO RECLAMATION DESIGN AND INTEGRATION WITH MINE PLANNING

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Introduction

BRS, Inc. has utilized Carlson's Natural Regrade™ software to design the reclamation and stabilization of abandoned open pit uranium mine spoils, AML Project 16N, located in the Gas Hills Uranium District in central Wyoming. This work was completed for the State of Wyoming's Abandoned Mine Land Program (AML) on pre-SMCRA (Surface Mining Reclamation and Control Act) sites for which no reclamation obligation existed. The project successfully stabilized an eroding spoil dump, enhanced the local view shed, created habitat diversity and provided a significant source of fill material for open pit highwall hazard mitigation efforts. Additionally, the project served to evaluate innovative reclamation design methods, engineering software and grade control technology.

This project was nominated for a National Association of Abandoned Mine Land Programs award by the State of Wyoming. The results of this project will be presented as a case history of the Natural Regrade™ approach to surface mine reclamation.

Based on the successful application of this new mine reclamation technology on the AML 16N Project, reclamation designs for spoils associated with planned underground uranium mine operations at the Velvet Mine in the Lisbon Valley Uranium District of Utah for Uranium One USA, Inc have been prepared and will be presented. Critical elements will be the encapsulation of unsuitable materials, long term hydrologic stability, and sequencing and staging of ore and mine waste for final reclamation surface construction.

The goal of the Uranium One Velvet Project will be to apply best available technology to reclamation planning and fully integrate the reclamation design with the mine planning. Benefits of the approach should include improved public and regulatory perception of the project, facilitate mine permit approvals and the eventual timely release of reclamation bonds, as it is anticipated the stable landform created through this process will result in more rapid stabilization of the site to pre-mine geomorphic conditions.

Natural Regrade™ Case Study

AML Project 16N, D-9 and K Pit Reclamation Project, is located in an intensely disturbed area of the West Gas Hills Uranium Mining District in Fremont County, Wyoming. The overall design calls for the placement of approximately 7 million cubic yards of backfill materials in the D9 and K Pits, imported from adjacent mine spoils including the Central Spoils, and from local highwall excavation. **Figure 1** shows the location of the Central Spoils excavation area, as well as the D9 and K Pits fill area.

Photo 1: K Pit Prior to Reclamation

The entire project is located on public lands administered by the Bureau of Land Management, Lander, Wyoming District Office. No access controls are in place at the abandoned mine sites. The public lands are administered under a multiple use land policy including grazing of range land, public recreation, active mining and exploration, and oil and gas. The project site is located along Fremont County Road No. 5, which is a moderately well traveled road. Reclamation of the numerous and large abandoned open pits in the Gas Hills Uranium District has reduced the risk of death or injury to the public.

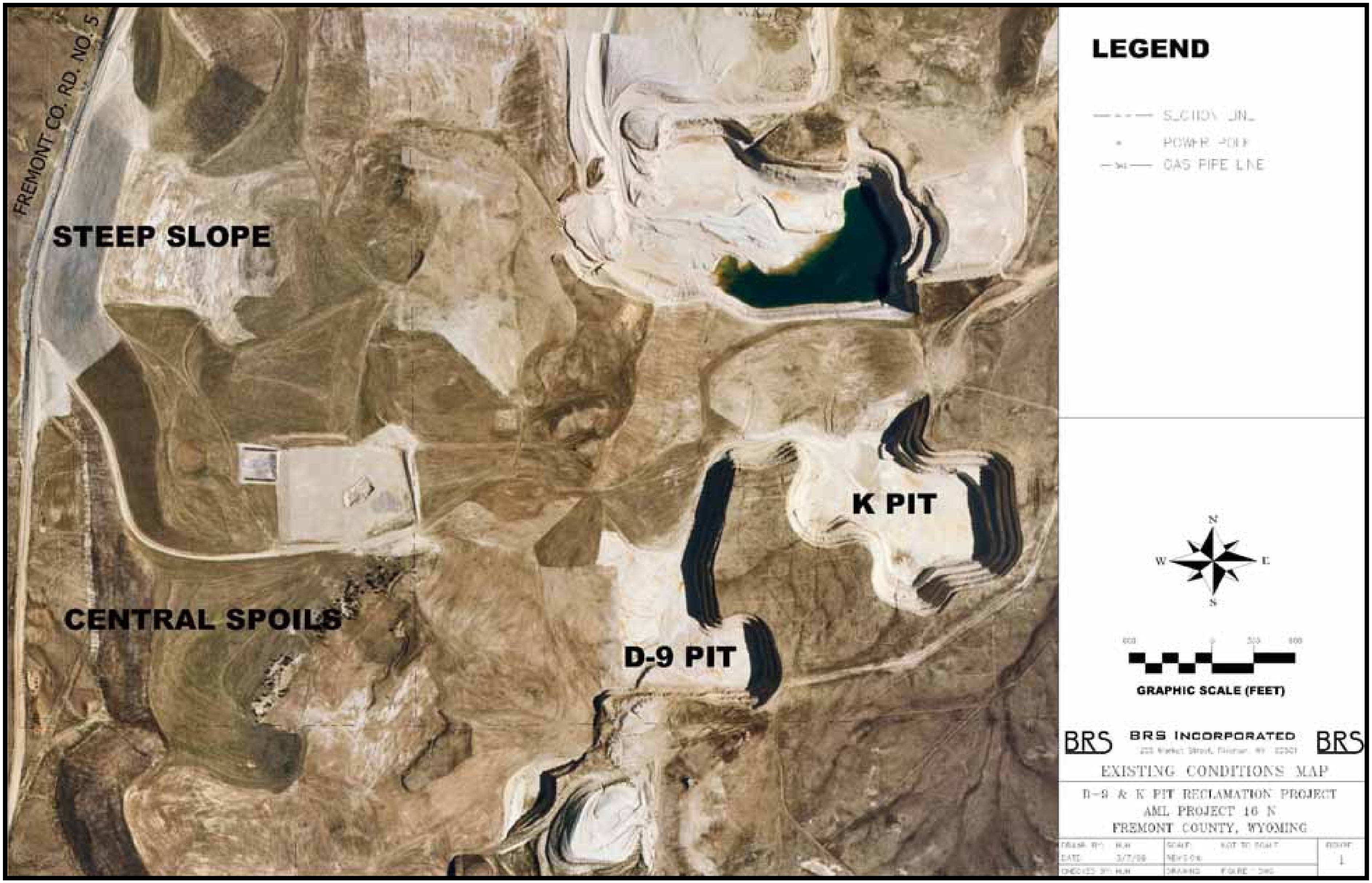


Figure 1: AML 16N Project Site

Site History and Background

The Gas Hills Uranium District was mined by multiple companies during the period from 1955 to 1981. The uranium was hosted in the Wind River formation, a sequence of soft sedimentary layers of interbedded sandstone, clayey shales, and conglomerates. Uranium was precipitated out of ground water in classic roll front deposits, which are found from very near surface to depths greater than 400 feet. Prior to the enactment of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), very little reclamation work was performed when mines were abandoned or closed. The State of Wyoming Abandoned Mine Lands Program has worked to mitigate hazards associated with large open pits, control migration of unsuitable materials and restore watershed functionality of lands in the district. Additional reclamation is being performed by mining companies on bonded lands. **Figure 2,** Gas Hills Uranium District aerial photograph, shows the extent of the mining disturbance in the district.

The purpose of AML Project 16N is to mitigate hazardous conditions and risk to the public associated with open pit highwalls and toxic, acid forming, and /or radioactive mine waste materials. The D9 and K Pits are contiguous open pits characterized by an 8,800 foot long hazardous highwall that averages over 200 feet tall. In addition to the physical hazard presented by the highwall, the project addresses spoils piles in the area which are characterized by unsuitable materials including elevated radiological levels, low pH, and metals (including arsenic and selenium). Reclamation of over 145 acres of barren, severely eroded and disturbed abandoned mine lands will be completed during the ongoing project.

Prior to reclamation, the Central Spoils waste pile consisted of a long, continuous 3:1 pre-law reclamation slope with failed vegetation and severe erosional problems which were causing offsite degradation. Substantial quantities of unsuitable materials existed within the spoils pile, which were disposed of in designated storage areas within the K Pit.

Project Hazards and Concerns

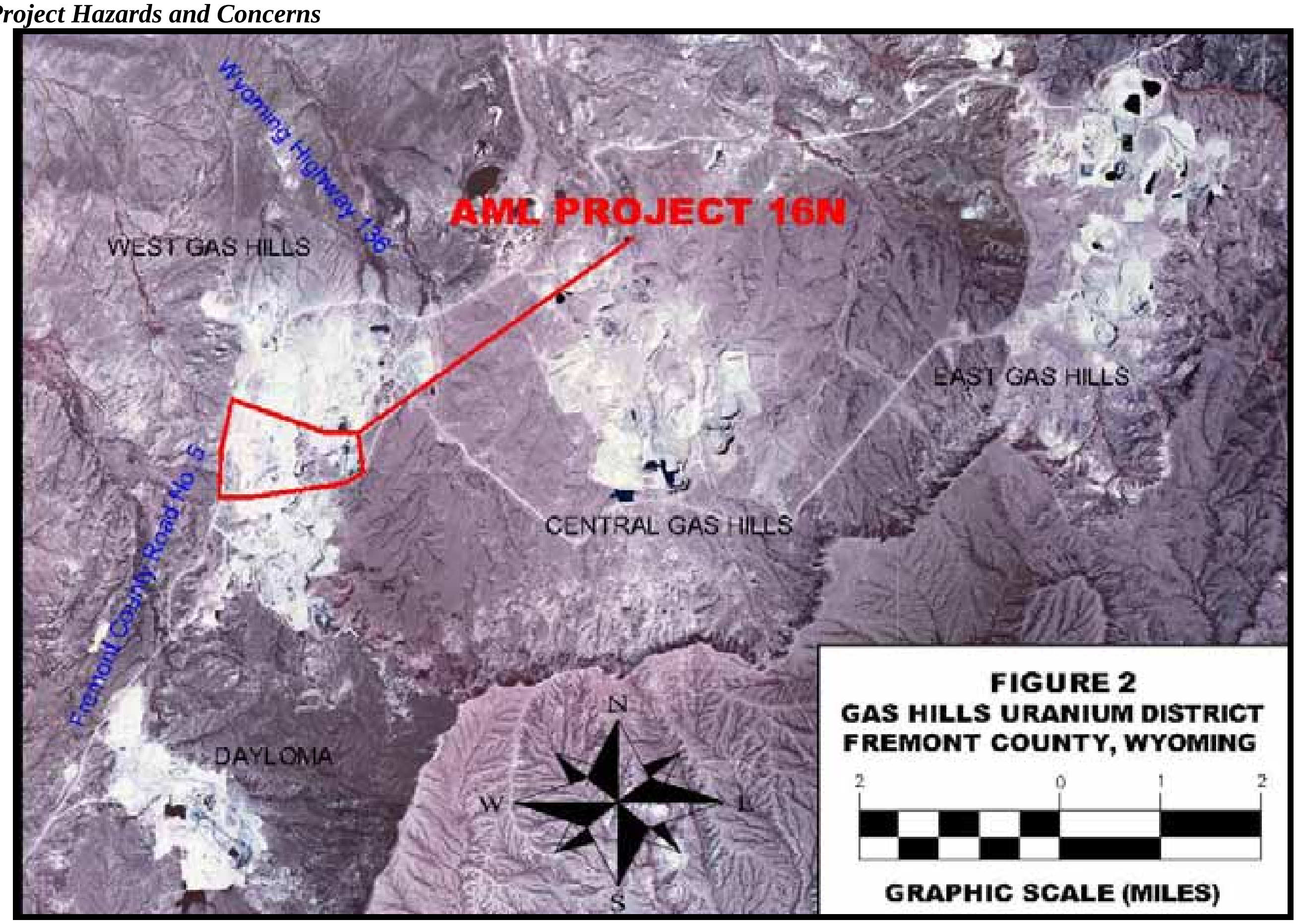


Figure 2: Gas Hills Uranium District

Photo 2: Central Spoils prior to reclamation. Note long, continuous, eroded 3:1 slope

Site Investigation and Engineering Design

BRS, Inc. of Riverton, Wyoming provided engineering and design services to the Wyoming AML program for the project. The first engineering design phase included an investigation of the site including an inventory of the hazards, preparation of existing ground topographical mapping, and completion of a surface and subsurface materials investigation program.

Once the site hazards and materials were identified and classified, BRS created earthworks design plans which incorporated surface water hydrological and geomorphic studies to achieve a stable final reclamation land form. The design called for the placement of approximately 7 million cubic yards of backfill materials in the D9 and K Pits imported from adjacent mine spoils (including the Central Spoils), and from local highwall excavation.

The overall project was planned to be constructed in five phases, following a logical sequence to minimize haulage distances, maximize coversoil salvage, and selectively handle unsuitable materials for proper disposal. Phase 1 - Steep Slope Reduction Project, consisted of removal of material from the Steep Slope spoils pile and placement of this material in the D9 Pit. Phase 2 - Central Spoils Haulage Project, consisted of removal of material from the Central Spoils pile and placement of this material in the K Pit. The subject of this case study, Phase 3 - Central Spoils Completion Project, performed haulage of material from the Central Spoils, as well as completed the Central Spoils area including final grading of a total of 68 acres utilizing the Natural Regrade™ approach. Phases 4 & 5 will complete the highwall reduction and final grading at the pit locations.

Photo 3: Placement of backfill in the K Pit

Utilization of Natural Regrade™ Software

The conceptual reclamation design for the Central Spoils area consisted of the removal of material from the spoils area to construct an off site drainage channel, open up the view shed to include a natural tree covered ridge previously blocked by spoils, and provide aspect diversity to the slopes rather than the long, continuous 3:1 slopes that were present. An additional component of the design was to expose the native, pre-mine surface along the south side of the work area, with the intent of increasing coversoil salvage quantities for site reclamation.

Barry Shelley, Wyoming AML Project Manager, approached BRS about the use of Carlson Natural Regrade™ software, utilizing GeoFluv™ concepts. This relatively new software is designed to create an erosionally stable, topographically diverse, natural appearing landform. This approach is in contrast to more traditional reclamation designs that exhibit long uniform slopes and maintenance intensive runoff control structures such as channel diversions and rip rap drop structures. BRS completed training in the use of the Natural Regrade™ software, and recommended that it be tested on the Central Spoils site. By applying the Natural Regrade™ software to the overall design concept as described above the final product more closely resembles a native surface while retaining the original elements of the design and keeping earthwork quantities similar to the original design amounts. This was essential for the overall earthwork balance on the project. **Figure 3** shows the final design contours and breaklines which define the surface model.

With respect to aesthetics and habitat value, the Natural Regrade™ surface appears to be superior to traditional reclamation landform design. Key aspects of the surface include slopes which transition from convex to concave profiles, concave drainage profiles, a high degree of dissection of the surface by multiple small drainage basins, and meandering channel alignments to increase length with a corresponding decrease in overall gradient. As a result, the design will decrease overall runoff flow quantities and velocities at any given point on the final surface, which should minimize erosional damage to the surface.

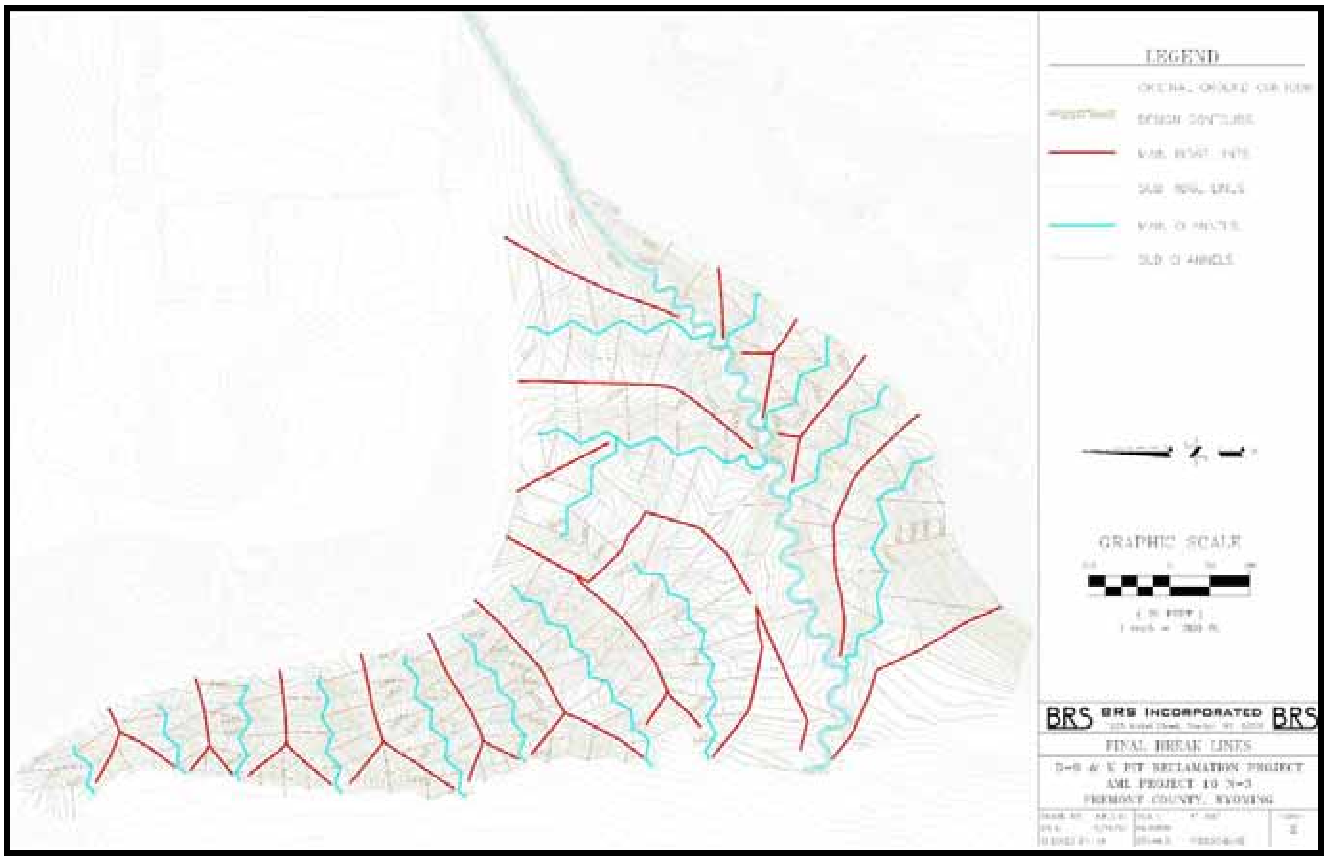


Figure 3: Natural Regrade earthworks design showing contours and breaklines

Construction and Reclamation

Construction began on April 9, 2007. The earthworks contractor was Weeden Construction of Banner, Wyoming. While excavation was measured for payment on the project by the cubic yard, due to the unknown factors associated with constructing the Natural Regrade™ surface, AML agreed to pay all finish grading work on an hourly basis, and made cost adjustments for specific items such as coversoil placement which were anticipated to be more costly than on a traditional reclamation project.

The work had three distinct stages as the project progressed:

- Bulk haulage of material to the K Pit
- Finish grading of the Central Spoils area
- Revegetation.

Bulk Haulage

The bulk haulage consisted of moving 954,525 cubic yards of material from the Central Spoils to the K Pit to continue backfill operations. The haulage distance averaged 8,000 feet one way. While the bulk haulage was being completed, a Komatsu 1250 EX excavator with an 8 cubic yard bucket was utilized to load 6 to 9 Caterpillar 777 end dump trucks which averaged 51 bank cubic yards per load. During the bulk haulage portion of the project, Weeden and BRS worked a double shift, with a weekly schedule of 10 days on, 4 days off, 10 hours per day. Based upon this schedule, the bulk haulage was completed in just 48 days, with daily productivity averaging over 10,000 cubic yards per shift, or 20,000 cubic yards per day.

Photo 4: Bulk Haulage from Central Spoils to the K Pit

Finish Grading

After the bulk haulage to the K Pit was completed, smaller articulated end dump trucks were used to remove the remaining material to the final grades, and to construct a local fill slope within the Natural Regrade work area. During this period, daily productivity was approximately 4,400 cubic yards per day.

The finish grading and grade control, including construction surveying and staking to construct the Natural Regrade landforms, was more difficult than a traditional reclamation project. However, the increased effort was not as large as originally anticipated. Initially, construction stakeout was performed utilizing RTK GPS equipment and wooden lath. While this method works, it requires a large number of stakes to define the complex landforms. After the first month, machine control GPS equipment was installed on a Caterpillar D-9 dozer to be utilized for grade control. During the early stages of the project, the equipment operators had some difficulty understanding what was to be constructed, but after completing a couple of Natural Regrade ridge and drainage sections the work became more routine. The construction of the landforms particularly became faster when machine control GPS equipment was installed on the Caterpillar D-9 dozer.

Photo 5: Dozer equipped with machine control GPS shaping an “A” channel

A total of 981 dozer hours were required for finish work on the Natural Regrade work areas. With respect to surface area, the Natural Regrade work area covered 63 acres. Based upon these figures, it took approximately 15.5 hours per acre to perform the finish work to the design grades.

It is recommended that machine control GPS be a requirement of all future Natural Regrade projects that cover large areas. For smaller projects, traditional stakeout would probably be adequate. However, the use of machine control GPS on a project does not eliminate the need for traditional GPS staking. Traditional staking was still required for the construction of drainages, and for staking the bulk haulage portions of the work. Final ground surveys were more difficult than surveying traditional slopes in that the number of shots had to be increased to achieve an adequate surface for pay quantity verification.

Coversoil was hauled to the slopes utilizing the articulated trucks, and then spread by the dozers. It was found that the additional effort to place coversoil on the Natural Regrade™ slopes was not significantly more difficult than performing the work on a traditional reclamation slope.

Photo 6: Dozer spreading coversoil on ridge line

The total quantity of material moved on the project including the bulk haulage, finish grading, and coversoil placement was 1,162,484 cubic yards. Overall, the project cost came in below the engineer's pre-bid estimate, despite the increases due to the change in plans. Based upon a variety of factors including the cost of GPS machine control equipment, additional finish costs, and additional coversoil placement and revegetation efforts, the increase in earthworks cost could be estimated to be approximately $0.24/cy for a project of this size.

Photo 7: Completed "A" channels and ridges following revegetation

Revegetation

A total of 68 acres were revegetated during the project. Revegetation was completed by 33 Mile Ranch, Inc. Lime amendments were utilized in areas of low soil pH due to acidic mine spoils. A native seed mix approved by the Bureau of Land Management was seeded utilizing the pitting method in the fall of 2007. Revegetation on the Natural Regrade™ surface was slow due to the steep slopes, short runs, and confined working areas. As a result, the cost for the revegetation work on the Natural Regrade™ area was approximately 25% more expensive than the original bid price for revegetation of traditional reclamation slopes.

Case Study Summary

The final product includes an undulating surface which appears natural to the passer-by, and opens up a view of a native tree lined ridge which was previously not visible from the road.

Photo 8: View from the county road of eroding 3:1 slope before reclamation

In addition to being more aesthetically pleasing, it is believed that the site will be more stable than traditional reclamation slopes. Observations based upon the first year of performance on the site including heavy rains received during construction prior to coversoil placement, significant snowmelt runoff during spring 2009 prior to first year revegetation, and flash spring and summer rains including approximately 1" of rain received in June 2009 over a 2 hour period, indicate that the surface will be stable over the long term as little to no erosional damage was noted at the site during ongoing inspections.

Due to the varied landscape created on the project, vegetative diversity will be promoted, creating improved habitat for Wyoming's abundant wildlife and restoring quality grazing lands where once barren spoils and highwalls existed.

Photo 9: View from the county road following reclamation, with view to tree covered ridge. Compare to Photo 8 above.

Photo 10: Aerial view of the completed project with D9 and K Pit highwalls visible in the background

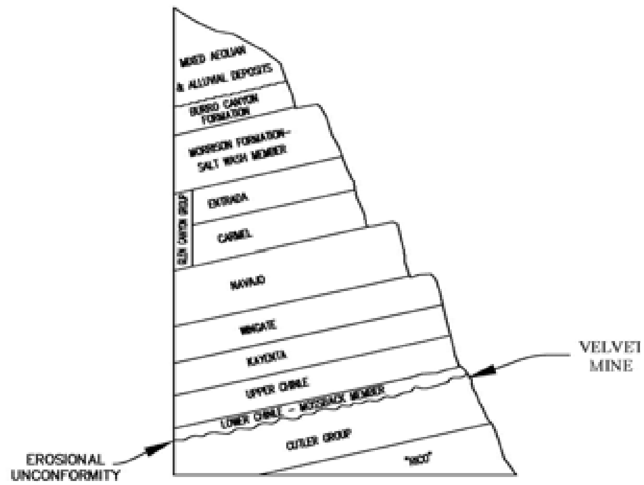
Velvet Mine Project

Uranium One's Velvet Mine Uranium Project is located in San Juan County, Utah in the Lisbon Valley Uranium Mining District in Township 31 South, Range 25 East, Sections 2, 3 and 4 (refer to **Figure 4**, Velvet Mine Location Map). The Velvet ore body was extensively explored during the 1970's with the principal exploratory work and drilling completed by Atlas Minerals with additional drilling completed by Minerals Recovery Corporation (MRC). The drilling was completed adjacent to Atlas Minerals' historic Velvet Mine which was mined in Section 3 up to the property line with Uranium One's current mineral holdings in Section 2. Atlas and MRC conducted extensive drilling on the lands currently held by Uranium One including the delineation of 4 mineralized areas with drilling on a rough grid with approximating 100 foot centers. In addition, verification and exploratory drilling including radiometric and chemical assay data from some 15 drill holes were completed in 2007 and 2008 by Uranium One.

Photo 11: Ore zone core, 2007 drilling program

Velvet Mine Geology

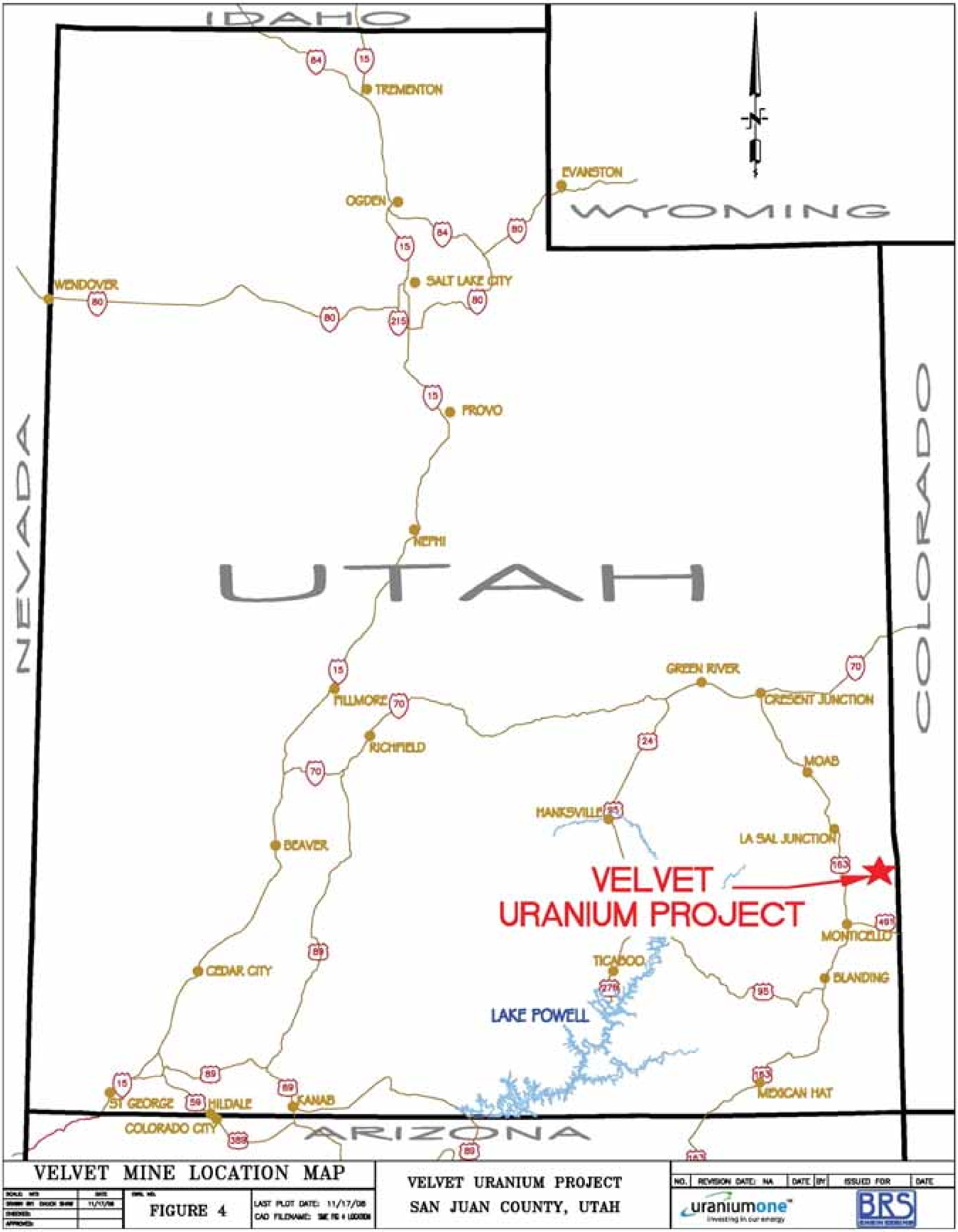
Uranium mineral resources and reserves in the project area are found in the upper Permian Cutler Formation. Many of the other mines in the Lisbon Valley District were located in the basal Moss Back member of the Triassic age Chinle Formation overlying the Cutler Formation. The Lisbon Valley District produced five times as much uranium as any other district in Utah from the period of 1948 through 1988 totaling 77,913,378 pounds U_30_8 at an average grade of 0.30 % U_30_8. [1]



Generalized Stratigraphic Section (after Stokes, 1967)

Within the district there is an erosional unconformity between the Permian and Triassic aged beds, where the Triassic Moenkopi formation was eroded away before the placement of the Moss Back Member of the Chinle Formation. Most of the ore bodies in the Cutler occur within six feet of the unconformity. The deposits appear to be located in channel deposits and troughs in the paleotopography, but no pattern or common orientation is evident. Cutler host rocks consist of alternating beds and lenses of light pink, orange, and buff mudstone, calcareous siltstone, and arkosic sandstone. The sandstone beds are well sorted, are fine to medium grained, and are as much as 50 feet thick. The sandstone is comprised of quartz, feldspar, and biotite, with clay as the predominant binder, but locally calcite may be in the cement. Uraninite is the principal uranium ore mineral, with small amounts of coffinite. In addition, vanadium in the forms of montroseite, doloresite, and vanadium clay and/or hydromica was an important byproduct of the Atlas Minerals historic Velvet Mine. The historic Velvet Mine produced approximately 400,000 tons of ore at grades of 0.46 %U_3O_8 and 0.64 %V_2O_5 (approximately 4 million lbs uranium and 5 million lbs vanadium) during the period 1979-1984. [1]

1. Chenowith, 1990.



IDAHO
WYOMING
NEVADA
COLORADO
UTAH
ARIZONA
TREMENTON
EVANSTON
OGDEN
SALT LAKE CITY
WENDOVER
PROVO
NEPHI
GREEN RIVER
CRESENT JUNCTION
FILLMORE
RICHFIELD
MOAB
HANKSVILLE
LA SAL JUNCTION
BEAVER
VELVET
URANIUM PROJECT
MONTICELLO
TICABOO
CEDAR CITY
BLANDING
LAKE POWELL
ST GEORGE
HILDALE
KANAB
MEXICAN HAT
COLORADO CITY
VELVET MINE LOCATION MAP
FIGURE 4
LAST PLOT DATE: 11/17/08
VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH
NO.
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uraniumone
investing in our energy
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Velvet Mine Existing Site Conditions

The surface topography in the project area is characterized by rugged plateaus and steep canyons. Vegetation is characteristically pinion, cedar, and juniper forest, with some ponderosas in the higher areas. Bare rock with sparse vegetation such as yucca is common, and sagebrush is thick in drainages where soil forms.

Photo 12: Overview of site and drill trails

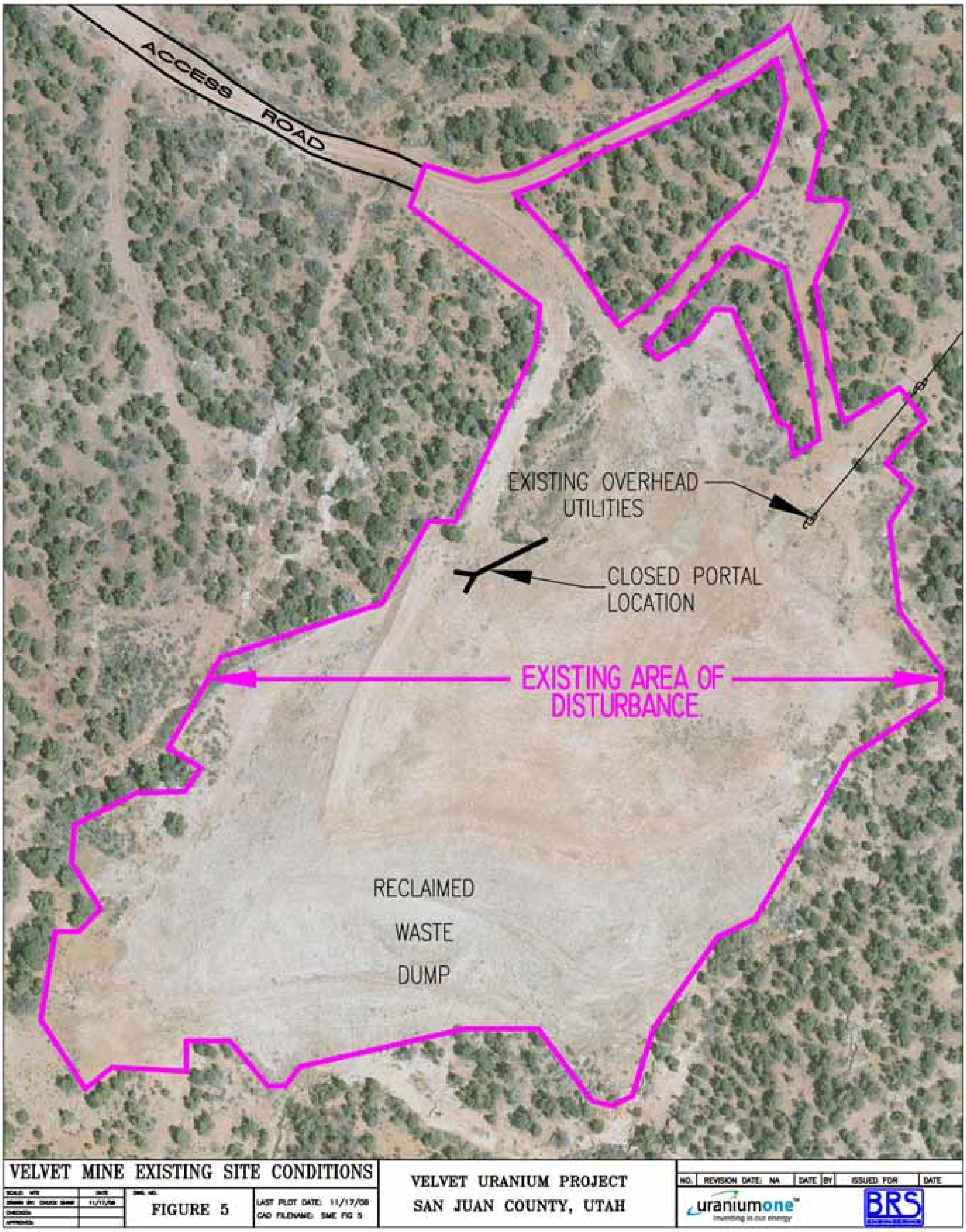
In addition to access roads constructed during the mining of the historic Velvet Mine, some infrastructure is present on the site. The site is accessible over the multiple drill trails covering the area. An active copper mine, Lisbon Valley Copper Mine, is located 3 air miles north of the property. The presence of the copper mine and other industrial facilities in the area is significant in context of mine permitting in that the planned project will be compatible with current land use.

An existing power line terminates at the historic Velvet Mine portal location, which is located in the SE ¼ of Section 3, T 31S, R25E. The historic portal has been closed. Uranium One currently plans to reopen the portal to access the mineralized trends. An existing disturbance of approximately 8.2 acres is located at the historic portal location, which includes the closed portal and a reclaimed waste dump. See **Figure 5**, Velvet Mine Existing Site Conditions. However, the useable area for waste and ore stockpiling at the site is only 2 acres as much of the site is located on reclamation slopes or is related to access roads and other small disturbances.

Photo 13: Historic Velvet Mine Portal

In order to create enough space for the anticipated maximum volumes of waste and ore stockpiles, additional work area will be required. A critical element for the permitting of the project is to not expand the footprint of the existing disturbance. Planning of the surface facilities and stockpiles required efficient layout and maximizing the use of all available space.

Photo 14: Existing reclamation slope at Old Velvet portal


ACCESS ROAD
EXISTING OVERHEAD UTILITIES
CLOSED PORTAL LOCATION
EXISTING AREA OF DISTURBANCE
RECLAIMED WASTE DUMP
VELVET MINE EXISTING SITE CONDITIONS
FIGURE 5
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VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH
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Construction of Decline and Expansion of Site Pad

Prior to site development, any existing coversoil suitable for final site revegetation will be salvaged and stockpiled as shown on **Figure 6**, Velvet Mine Initial Site Development. Any existing elevated materials at the site located during baseline radiometric surveys in 2008 will be separated to prevent contamination of the coversoil materials. The historic Velvet Mine portal will be reopened and corrugated metal pipe will be installed to protect the portal area. The main decline will be extended approximately 2,750 feet to access the Velvet ore body. Two existing ventilation shafts will be rehabilitated and three new vents will be established.

Photo 15: Three detector OHV system utilized for baseline radiometric surveys

An estimated 22,000 bank cubic yards of material will be excavated during the development of the new decline. This material is anticipated to be from clean, non-mineralized stratigraphic units consisting of sandstone, shale, and clay from the Navajo and Chinle and Mossback formations, and will be referred to as unclassified material in this document. During the final reclamation of the site, the unclassified material is designated to be utilized for the final cover of the waste dump, which is anticipated to be unsuitable for near surface placement due to elevated radiometric levels, acidity, and / or heavy metals concentrations.

The unclassified material from the decline will be separated from unsuitable waste and will be utilized to expand the useable work area of the existing site disturbance. This will be accomplished by placing the approximately 28,000 cubic yards loose unclassified materials over the existing 3:1 and 4:1 reclamation slopes, and steepening them to 1.5:1 slopes. See **Figure 6**, Velvet Mine Initial Site Development. It is anticipated that the unclassified material will be characterized by broken angular sandstone block ranging from 6 to 12 inches in diameter, which will be able to stand at the planned 1.5:1 slopes or steeper, and be stable with respect to erosion during the mining cycle. An existing cross slope erosion control ditch located on the southern reclamation slope will be left in place to prevent the unclassified material from rolling into Dry Wash located below the site as it is placed. The construction of the steeper slopes will expand the useable work area to approximately 4.3 acres, which will provide adequate space for the planned ore and waste stockpiles to their maximum potential dimensions, as well as segregate the unclassified material for use during final reclamation.

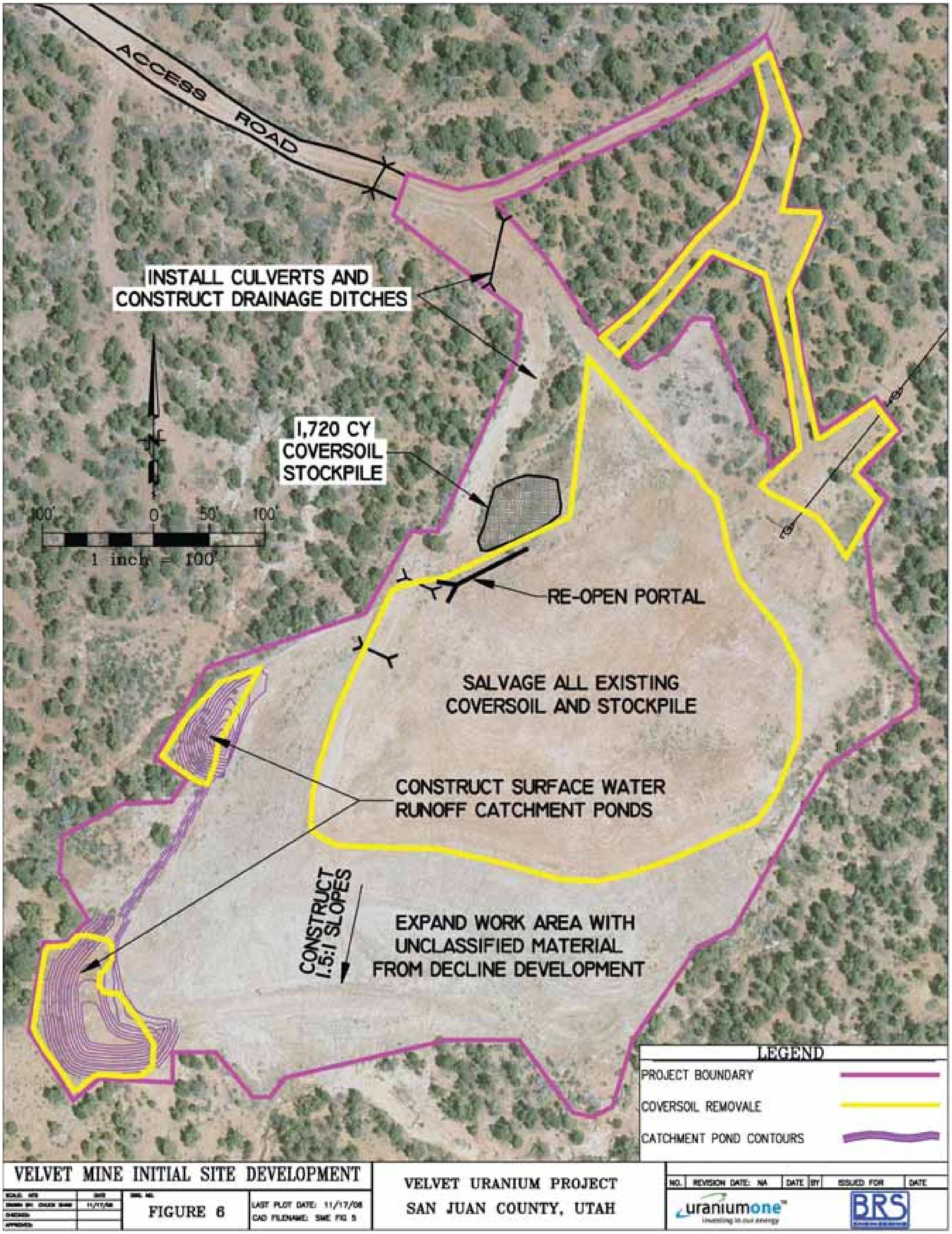
A safety berm in compliance with state mining laws will be constructed around the crest of the 1.5:1 slopes to prevent mine traffic from rollovers on the slope. In addition, the surface of the expanded work area will be graded to drain within the boundary of the safety berm. The drainage will be directed towards storm water catchment ponds, to prevent excursions of runoff which may have come in contact with the ore and waste stockpiles which may include heavy metals and/or low pH.

Surface Facilities

The surface facilities planned for the Velvet Mine project include an office/employee facility, parking, a maintenance shop, materials lay down area, water supply, septic tank and leach field, and fuel storage. See **Figure 7**, Velvet Mine Surface Facilities. In order to maximize the available space for the ore and waste stockpiles, it was necessary to locate the facilities along the existing roads and smaller disturbance areas, leaving the majority of the disturbed area available for stockpiling. In no case will any surface facilities or stockpile areas be located above the decline to the mine.

A 36'x60' triple wide mobile structure will be located on an existing small disturbance on the north side of the main access road and mine portal for the mine office and employee facility. This structure will include lunch/meeting areas, toilet and shower facilities, and laundry area. Miners will be required to shower at the end of each shift, and laundry services will be provided to limit liability related to charges of contaminants being carried from the project site to the general public. An industrial septic tank and leach field utilizing high capacity leaching chambers in a mounded system will be located down gradient from the site and fenced to prevent traffic on the leaching chambers. Employee parking will be located south of the employee facility near the fuel storage area. Vendors and site visitors will be stopped with signage and a gate located on the main access road, directed to the office, and provided with site specific safety training prior to entering the site.

Dewatering facilities will utilize the historic Velvet Mine vent and associated disturbance footprint in Section 3. Mine water will be treated on site and discharged. Based on historical requirements it is anticipated that to meet


ACCESS ROAD
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CONSTRUCT DRAINAGE DITCHES
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1 inch = 100'
RE-OPEN PORTAL
SALVAGE ALL EXISTING
COVERSOIL AND STOCKPILE
CONSTRUCT SURFACE WATER
RUNOFF CATCHMENT PONDS
CONSTRUCT
1.5:1 SLOPES
EXPAND WORK AREA WITH
UNCLASSIFIED MATERIAL
FROM DECLINE DEVELOPMENT
LEGEND
PROJECT BOUNDARY
COVERSOIL REMOVALE
CATCHMENT POND CONTOURS
VELVET MINE INITIAL SITE DEVELOPMENT
FIGURE 6
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VELVET URANIUM PROJECT
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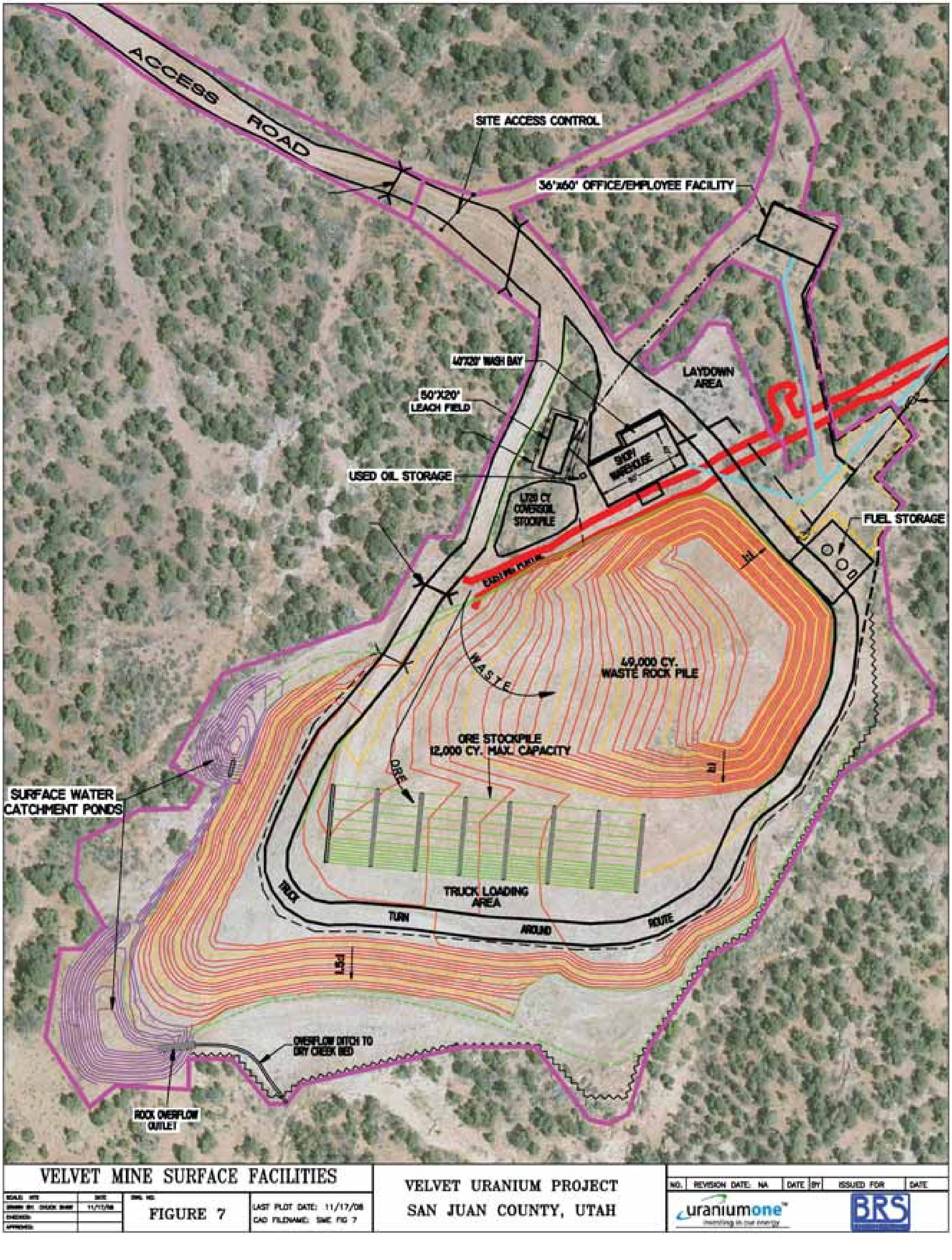
ACCESS ROAD
SITE ACCESS CONTROL
36'x60' OFFICE/EMPLOYEE FACILITY
LAYDOWN AREA
50'X20' LEACH FIELD
USED OIL STORAGE
SHOP WAREHOUSE
FUEL STORAGE
WASTE
49,000 CY. WASTE ROCK PILE
ORE STOCKPILE 12,000 CY. MAX. CAPACITY
ORE
SURFACE WATER CATCHMENT PONDS
TRUCK TURN AROUND ROUTE
TRUCK LOADING AREA
OVERFLOW DITCH TO DRY CREEK BED
ROCK OVERFLOW OUTLET
VELVET MINE SURFACE FACILITIES
FIGURE 7
LAST PLOT DATE: 11/17/08
VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH
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discharge requirements, treatment will include pH adjustment and removal of radium using barium chloride. Current testing shows radium and uranium levels at or near the regulatory discharge limits. As dewatering occurs, the radium and uranium levels will likely increase to levels which require treatment. Initial mine dewatering rates (4 to 6 month period) will be approximately 250 gallons per minute to remove water stored in the mine. Once the initial mine dewatering is completed, it is anticipated based on historical records that the rates to sustain the dewatering will be approximately 25 gpm.

It is proposed that clean treated water from the mine dewatering activities be utilized for the non-potable water utilized for dust control. Domestic water will be pumped from a well to an elevated tank, from which water will flow by gravity to the employee facility. Drinking water will be brought in from an approved municipal source.

The 40’x80’ maintenance shop will be a steel structure constructed across the main access road from the employee facilities. A reinforced concrete slab will be poured within the structure. The shop will be fully outfitted to perform all necessary mechanical maintenance of the mine equipment and will include a separate compressor shack to minimize noise exposure in the work space. A materials lay down area will be located adjacent to the shop for bulk materials storage.

Fuel storage facilities will be located along the main access road, and will be lined and bermed to contain the entire contents of the fuel tanks in case of leakage. In addition, the liner will be extended beneath the area machines will be fueled upon, to catch any spillage and simplify final site cleanup.

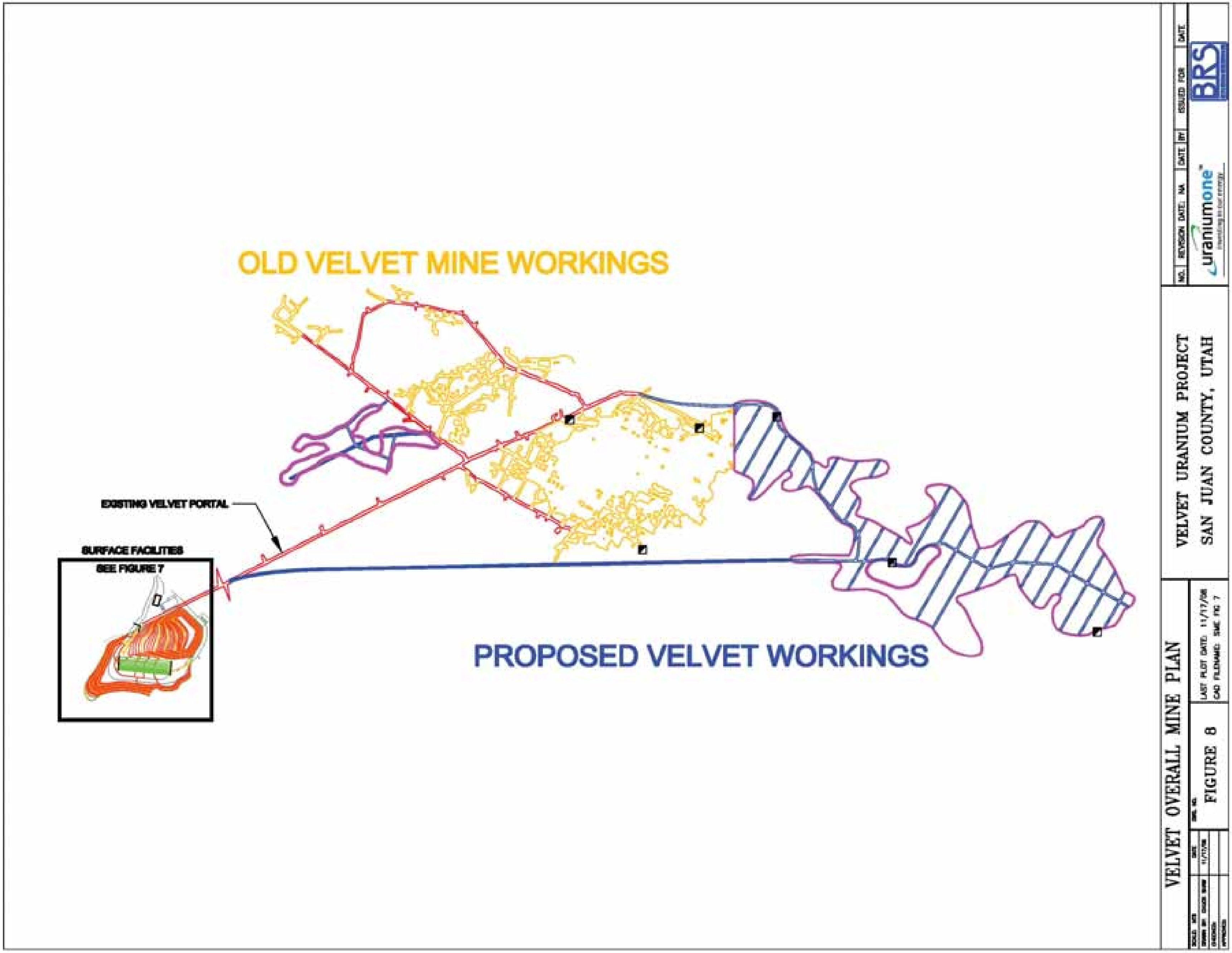
Mining Operations

The mine will be developed to ultimately support an ore production rate of approximately 400 tons per day with an average waste to ore ratio of 0.2 tons of waste for each 1 ton of ore mined. Upon completion main haulages and ventilation shafts, laterals will be driven along strike. The laterals will be driven through known ore-bearing zones to provide access for production mining. The laterals also provide access for geologic mapping, long-hole drilling, rib scanning and collecting samples. This geologic data will be used to develop detailed mine planning and stope development for each lateral. Mining will generally proceed from the laterals up dip, beginning at the farthest extents of the mine and retreating back to the main decline.

The ore will be mined using a modified room-and-pillar system and retreat mining. **Figure 8**, Velvet Overall Mine Plan shows a conceptual underground mine plan for the room-and-pillar operations. This mining method is a common method for mining in uranium-bearing sandstone and is designed to follow the irregular configuration of the individual ore bodies. When possible, mined-out areas will be backstowed with waste from adjacent mining operations. Once a room is fully mined and backstowing is unpractical or unsafe, the roof will be collapsed to relieve stress on adjacent rooms and haulages. The ore zone varies in height but averages approximately equivalent to the full face mining height of 7 feet. The minimum mining thickness including dilution is 4 feet. In instances with lower mine thicknesses, split shooting methods will be employed. The mine will be operated using 2, 10 hour shifts and will consists of 2 mining crews and 1 utility crew. Personnel requirements are summarized in **Table 1**.

Table 1: Velvet Mine Personnel Requirements

Salary Personnel	# Personnel	Hourly Personnel	# Personnel
Mine Manager/ Chief Engineer	1	Jumbo Miner	6
Mine Foreman	1	Jumbo Helper	6
Foreman/Shifter		Utility Miner	6
Engineer	1	Underground Laborer	6
Surveyor	1	LHD Driver	6
Senor Geologist	1	Truck Driver	6
Geologist	2	Dozer Operator	3
Safety/Personnel Manager	1	Exploration Driller	2
Maintenance Superintendant	1	Electrician	3
Draftsman/IT	1	Mechanic	3
Technician	2	Control Room Operator	3
Accountant/Purchasing Agent	1	Surface Laborer	1


OLD VELVET MINE WORKINGS
EXISTING VELVET PORTAL
SURFACE FACILITIES
SEE FIGURE 7
PROPOSED VELVET WORKINGS
VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH
VELVET OVERALL MINE PLAN
FIGURE 8
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Jumbo drills operating on compressed air will be utilized to drill the blast holes and rock-bolt holes in the declines and laterals. All blasting operations will be conducted in accordance with MSHA regulations (30 CFR Parts 56 and 57). Blast holes will be loaded with an electric blasting cap, chemical booster, and a mixture of ammonium nitrate and fuel oil (ANFO) prills. The blasts will be initiated electronically with the hole pattern, firing sequence and delays designed to allow for optimum breakage. Explosives and detonators will be stored in underground magazines and transported from the magazines to the working face in accordance with MSHA regulations (30 CFR Part 56 and 27 CFR Part 55).

The ore and waste rock will be mucked out using 2 cubic yard low-profile diesel loaders (LHD's). Ore will be hauled to the surface using low-profile diesel haul trucks with capacities of ten tons.

Photo 16: Uranium One's 10 ton trucks

During initial decline and lateral development, the waste rock will be hauled to the surface and placed in the waste rock disposal area. Waste produced during subsequent development and production will be disposed of both on the surface and underground in mined out areas.

Roof support will consist of metal roof mats anchored into the roof using five to eight-foot-long mechanical split-set roof bolts. Bolting will be performed as necessary with the spacing varying according to roof conditions and the size of the opening. The size of the mine openings will depend on roof conditions, but will typically be 14-feet or less in width based on the experience of similar mining operations conducted in the same formation. Ten-foot-long mats will be installed diagonally on the ribs when additional rib support is required. The underground area will also include maintenance and storage areas. Routine maintenance and minor repairs will generally be done underground with more extensive repairs and maintenance completed in the surface shop. Roof support materials, blasting supplies, lubricants and the smaller and more commonly used equipment parts will be stored in designated locations underground. These locations are expected to change as the mine workings are advanced. The anticipated equipment list for the underground operations is presented in **Table 2.**

Table 2: Equipment Requirements

Equipment Description	**Quantity**
Development Jumbo - single boom	2
Drifter, Hydraulic	3
Drifter Feeds	3
Jackleg drills w/ legs	4
Compressor 350 cfm	2
LHD 2 cy	2
Trucks 10 ton	3
Dewatering Pumps	1
ANFO Loaders	3
Service Vehicles	1
Scissor Lift Truck	1
Main Ventilation Fans	4

Ore and Waste Stockpiling

Figure 7, Velvet Mine Surface Facilities shows the maximum proposed extents of the waste and ore stockpiles and the surface and underground equipment haulage routes. It is anticipated that a maximum of 50,000 loose cubic yards of mine waste may be generated during the mining process. While it is assumed that much of the mine waste material may be backstowed in the mine rooms as discussed above, the waste pile configuration as shown was designed for the estimated maximum quantity generated during mining for conservative site planning and cost estimation purposes. The general configuration of the waste stockpile is planned to slope upward from the portal at a 15% grade, which is slightly flatter than the 17% decline grade. The waste dump will be constructed in lifts, beginning with the maximum overall footprint. End dumping underground mine trucks as listed in the tables above will exit the portal, and run a right handed traffic pattern, dumping each lift from the east edge to the west. Following completion of each lift, it will be leveled and the next lift begun until the pile is completed.

Uranium ore will be stockpiled on site, and trucked to Uranium One's Mill in Ticaboo, Utah or Dennison Mines Corporation's White Mesa Mill in Blanding, Utah utilizing over the road trucks with side dump trailers and pups. The ore stockpile site is located on the opposite side of the waste pile from the surface facilities to minimize any windblown dust and radiometric materials exposure. The ore stockpile site will be constructed as a rectangular bin and lined to prevent loss and downward leaching of the uranium contained in the ore. 2'x2'x6' interlocking concrete superblocks will be utilized to construct 14' maximum height walls on poured concrete footings across each of the long sides of the ore bin creating 7 bins for grade segregation of ore. The superblocks can be moved and stacked using on site equipment to adjust access and support as needed as the size of the ore stockpile varies with production and haulage rates. As the mine access road includes 6 miles of unpaved road, there is a potential that over the road ore haulage operations may be interrupted during winter months. In order to continue mining operations in the event that haulage operations are difficult, the ore stockpile is sized to accept up to 12,000 cubic yards of material, which is one month's anticipated ore production from the mine.

During operations, the end dump underground mine trucks will dump at the base of the ore stockpile on the north side. A Caterpillar 973C Tracked Loader will be utilized for loading the trucks and for stacking ore dumped from the underground mine trucks on the pile.

Photo 17: Caterpillar 973C tracked loader

The configuration of the ore stockpile at maximum capacity includes a 4:1 slope constructed during the stacking operations, and a loading face on the south side. The tracked loader is a multipurpose machine, which can function as a dozer as well as a loader and works well in confined spaces. The tracked machine will not compact the ore material as it is placed in the stockpile, allowing loading of the face without great effort. During normal operations, it is anticipated that four to five truckloads of ore will be loaded per shift for delivery to the mill.

The ore haulage road is laid out such a way that it passes west of the portal, so that over the road traffic does not intermingle with underground mine traffic. A single row of super blocks will be placed along the right hand side of the ore haul road to separate the over the road traffic from the mine traffic for safety purposes. As discussed above, safety berms and surface water runoff control will be incorporated into the ore haulage road.

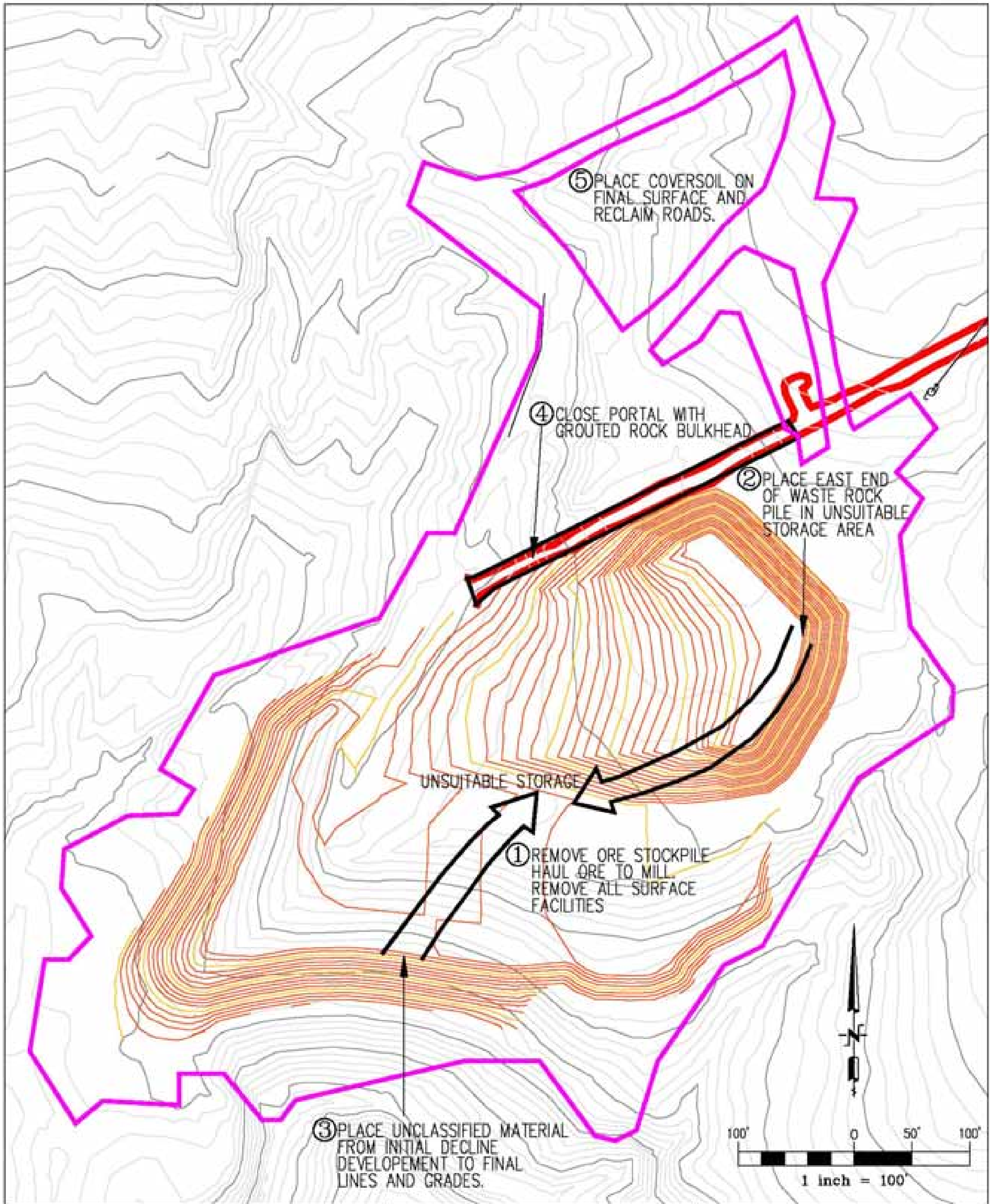
Site Reclamation

Following the completion of mining, a grouted rock bulkhead will be constructed in the decline at a location where a sufficient thickness of competent roof rock exists to prevent future subsidence of the mine void which may report to the surface. The remaining decline upslope of the bulkhead will be shot down and the surface regraded.

Photo 18: Typical grouted rock bulkhead installation

All ore stockpiled on site will be hauled to the mill, the superblocks cleaned and removed from the site and the liner and concrete footer will be encapsulated in the unsuitable storage area located along the southern toe of the waste stockpile. The eastern edge of the waste stockpile will be removed, and placed along the southern toe of the waste stockpile as shown in **Figure 9**, Velvet Mine Site Reclamation Sequence. The waste stockpile will be graded to elevations approximately 8 feet below the anticipated final reclamation surface. The unclassified materials from the initial decline development, previously utilized to expand the work area pad, will then be placed to the lines and grades shown in **Figure 10**, Velvet Mine Final Reclamation Plan.

Rock materials will be preferentially placed in the channel locations as discussed below in the hydrology section for increased geomorphic stability. Coversoil material will be brought to the site from the water treatment facility area to augment the existing coversoil stockpiled during initial site development, and placed on the reclaimed surface in a minimum 12 inch thick layer. Revegetation of the site will be completed utilizing an approved seed mixture containing drought resistant native plant species.

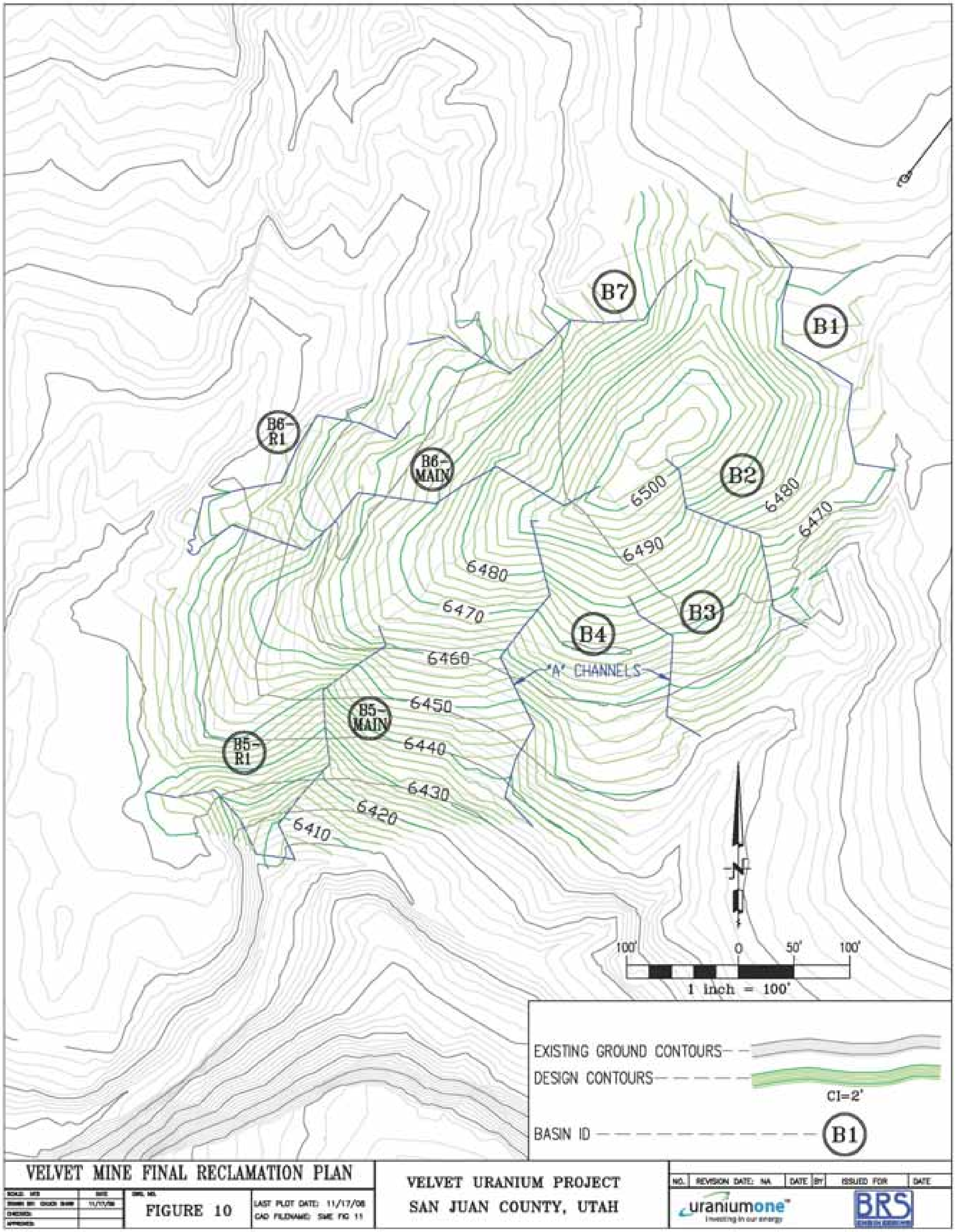


VELVET MINE SITE RECLAMATION SEQUENCE

FIGURE 9

LAST PLOT DATE: 11/17/06
CAD FILENAME: SME FIG 10

VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH


B7
B1
B6-R1
B6-MAIN
B2
6500
6480
6470
6490
6480
6470
B3
B4
6460
'A' CHANNELS
6450
B5-MAIN
B5-R1
6440
6430
6420
6410
N
100'
0
50'
100'
1 inch = 100'
EXISTING GROUND CONTOURS
DESIGN CONTOURS
CI=2'
BASIN ID
B1
VELVET MINE FINAL RECLAMATION PLAN
FIGURE 10
LAST PLOT DATE: 11/17/08
CAD FILENAME: SME FIG 11
VELVET URANIUM PROJECT
SAN JUAN COUNTY, UTAH
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Final Reclamation Surface Hydrologic Parameters

Reclamation design contours and basins are shown on **Figure 10**, Velvet Mine Final Reclamation Plan. The final regraded surface was designed to be geomorphically stable utilizing a Natural Regrade™ design. The final reclamation surface as shown is based upon the estimated maximum volume of waste brought to the surface without backstowing as described in the discussion of ore and waste stockpiling above. The reclamation design presented herein is based on the maximum height and steepest likely slopes on site, yet is geomorphically stable utilizing conservative hydrologic parameters. As it is anticipated that a certain amount of the waste materials can be safely stowed underground, the actual final reclamation surface is anticipated to be lower and flatter than the current design, thus inherently more stable. The maximum allowable design slopes are 3:1, with average slopes being 4:1 or flatter.

The reclamation design was created utilizing Natural Regrade™ software as described in the case study included in this report. A total of 7 individual basins were created to drain the reclaimed surface. The average basin size is 1.04 acre, with an average drainage density of 300 ft/ac. **Table 3** shows the physical properties of the 7 basins as included in the reclamation plan.

The design inputs utilized for precipitation frequency based upon the software's precipitation tables are 0.59" for the 2 year, 1 hour event and 2.20" for the 50 year, 6 hour event. These are conservative values, as they exceed the upper bound of the 90% confidence interval provided by the NOAA Atlas 14 of 0.56 and 2.03 for the respective storm events.

Maximum velocity for site runoff was set at 4.5 ft/sec for erosional stability, and a conservative runoff coefficient of 0.89 was utilized for the reclaimed surface. The design parameter used to analyze the erosional stability of the surface was the Shields Shear Stress, which is a measure of the tractive force applied during runoff. The design criteria applied was a maximum of 1.5 psf under flood prone conditions (equated to a 50 year, 6 hour storm event), and 1.0 psf under bankfull conditions (equated to a 2 year, 1 hour storm event). In practical terms, a Shields Shear Stress of 1.0 provides the critical shear required to initiate movement of grains less than 3.25 inches, and a Shields Shear Stress of 1.5 provides the critical shear required to initiate movement of grains less than 6 inches. As shown in **Table 4** below, the design maximum Shield Shear Stresses calculated for the design drainages are below the criteria as defined above. Rock materials exceeding a D50 of 6 inches will be placed in the drainage channels on the reclamation surface to ensure that the surface will remain non-erosive. This will prevent exposure and potential off-site transportation of the mine waste and associated unsuitable materials encapsulated by the reclamation surface.

Table 3: Velvet Reclamation Basin Physical Properties

Basin Name	basin area (ac.)	valley length (ft.)	drainage density (ft./ac.)	head elev (ft.)	base elev (ft.)	total relief (ft.)	head slope	base slope
B1	1.44	296.96	315.55	6485.53	6470.00	15.53	8%	6%
B2	0.57	198.68	348.75	6504.00	6456.00	48.00	30%	6%
B3	0.53	141.71	266.49	6481.87	6450.94	30.94	25%	7%
B4	1.11	279.86	252.27	6494.52	6436.01	58.51	30%	7%
B5-Main	0.76	229.89	501.49	6465.35	6406.20	59.15	32%	6%
B5-R1	0.21	149.07	724.94	6430.20	6406.27	23.93	15%	13%
B6-Main	1.48	379.04	418.98	6501.23	6436.31	64.92	20%	3%
B6-R1	0.25	240.46	949.08	6457.94	6436.38	21.56	12%	3%
B7	0.96	275.51	286.78	6488.64	6454.20	34.44	15%	7%
TOTAL	**7.30**	**2191.19**	**299.97 (avg)**			**39.7 (avg)**		

Table 4: Velvet Reclamation Basin Design Runoff Parameters

Basin Name	*Bankfull Conditions**				*Flood Prone Conditions***			
	width range (ft.)	**depth range (ft.)**	**Shields shear stress (psf)**	**Qpk (cfs)**	**width range (ft.)**	**depth range (ft.)**	**Shields shear stress (psf)**	**Qpk (cfs)**
B1	0.1 to 1.4	0.01 to 0.11	0.37	0.76	0.1 to 3.2	0.01 to 0.37	0.56	2.85
B2	0.2 to 0.9	0.02 to 0.07	0.78	0.30	0.6 to 2.0	0.07 to 0.23	1.18	1.12
B3	0.3 to 0.9	0.03 to 0.07	0.56	0.28	0.7 to 1.9	0.08 to 0.22	0.94	1.05
B4	0.1 to 1.3	0.01 to 0.10	0.90	0.59	0.1 to 2.8	0.01 to 0.32	1.36	2.19
B5-Main	0.1 to 0.9	0.00 to 0.07	0.81	0.40	0.1 to 2.3	0.00 to 0.26	1.22	1.49
B5-R1	0.2 to 0.5	0.02 to 0.05	0.42	0.11	0.5 to 1.2	0.06 to 0.14	0.63	0.41
B6-Main	0.1 to 1.3	0.01 to 0.11	0.93	0.78	0.2 to 2.9	0.02 to 0.33	1.41	2.92
B6-R1	0.2 to 0.6	0.02 to 0.05	0.19	0.13	0.6 to 1.3	0.07 to 0.15	0.31	0.50
B7	0.1 to 1.2	0.01 to 0.09	0.52	0.51	0.2 to 2.6	0.02 to 0.30	0.79	1.90
		Stability Criteria	**<1.0**			**Stability Criteria**	**<1.5**	

*2 year, 1 hour precipitation event
*50 year, 6 hour precipitation event

Reclamation Cost Estimate

Table 5 includes reclamation cost estimates based upon the maximum size of the waste rock stockpile as described above. The likely configuration of the waste rock pile will be smaller than estimated here, based upon planned backstowing of materials underground.

Table 5: Reclamation Cost Estimate

Description	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**
Fuel, Oil, and Chemical Storage				
Removal of used/unused petroleum products	GAL	1,000	$1.00	$1,000.00
Removal of fuel tanks				*
Removal of fuel liner	CY	1,600	$1.50	$2,400.00
Disposal of fuel liner	CY	1,600	$1.50	$2,400.00
Removal of solvents and solvent station	GAL	100	$1.00	$100.00
Removal of road stabilization products	GAL	100	$1.00	$100.00
Concrete Demolition	HR	6	$200.00	$1,200.00
Total				$7,200.00
Mine Vent and Portal Closure				
5 Vents using excavator w/ concrete breaker	HR	30	$200.00	$6,000.00
Conical grouted rock caps	EACH	5	$2,000.00	$10,000.00
Sub-grade welded steel plate	EACH	5	$4,000.00	$20,000.00
Portal Backfill	CY	600	$1.50	$900.00
Bulkhead construction	CY	600	$30.00	$18,000.00
Total				$54,900.00

Office and Maintenance Buildings				
Office/Employee facility removal				*
Prefabricated building disassembly				*
Concrete foundation and pad demolition	HR	20	$200.00	$4,000.00
Total				$4,000.00
Ore and Waste Storage Facility				
Earthworks mob/demob**	LS	1	$50,000.00	$50,000.00
Ore bin removal**	HR	10	$200.00	$2,000.00
Place liner and broken concrete in unsuitable storage area**	HR	10	$150.00	$1,500.00
Dust Control Water**	GAL	1,000	$15.00	$15,000.00
Excavation**	CY	70,000	$1.50	$105,000.00
Coversoil Placement**	CY	15,000	$1.70	$25,500.00
Force Account**	$50,000	1	$50,000.00	$50,000.00
Final Grading**	AC	8	$1,000.00	$8,000.00
Access Road Reclamation**	LF	5,280	$10.00	$52,800.00
Culvert Removal**	LF	50	$25.00	$1,250.00
Agricultural Lime**	TON	100	$45.00	$4,500.00
Lime Haulage**	TON	170	$25.00	$4,250.00
Sediment Control Fence***	LF	500	$5.00	$2,500.00
Total				$322,300.00
Plantsite Facilities				
Air compressor station removal				*
Communication line removal & disposal	LF	5,000	$2.00	$10,000.00
Electrical transformer and substation removal				*
Emergency generator removal				*
Fencing removal & disposal	LF	300	$10.00	$3,000.00
Gate removal & disposal	LF	20	$10.00	$200.00
Propane heating system removal				*
Sediment fencing removal & disposal	LF	1,200	$4.00	$4,800.00
Septic system removal				*
Solid waste system removal & disposal***	LS	1	$75.00	$75.00
Waterline corridor removal & disposal	LF	1,000	$5.00	$5,000.00
Water supply system & disposal	LF	1,000	$5.00	$5,000.00
Total				$28,075.00
Revegetation				
Mobilization/demobilization	LS	1	$5,000.00	$5,000.00
Fertilizer	AC	20	$200.00	$4,000.00
Agricultural Ripping	AC	20	$100.00	$2,000.00
Agricultural Discing	AC	20	$150.00	$3,000.00
Drill Seeding	AC	20	$500.00	$10,000.00
Total				$24,000.00

Roads				
Access Road Reclamation	LF	5,280	$10.00	$52,800.00
Total				$52,800.00
Water Treatment Facility				
Water treatment pond mass excavation	CY	13,440	$1.50	$20,160.00
Total				$20,160.00
Grand Total				**$513,435.00**

* Assume salvaged resale or reuse will offset removal costs

** Cost Estimates from 2008 Wyoming AML Competitive Bids

*** Cost Estimates from Vendor Quotes

Summary

Geomorphic reclamation is quickly becoming recognized by industry and regulators as a superior method for mine site reclamation compared to traditional, constant slope reclamation with cross slope ditching, terraces, rock erosion control structures, and trapezoidal channels. Properly done, geomorphic reclamation produces aesthetically pleasing, stable final surfaces which encourage vegetative diversity, improved habitat, and decreased maintenance.

Integrating reclamation planning with mine planning, Uranium One anticipates lower cost of operation and streamlined permitting of the Velvet Mine Uranium Project. By segregating mine waste materials as they are removed from the mine into unclassified and unsuitable stockpiles, proper use of various materials will be simplified during the reclamation process, resulting in encapsulation of unsuitable materials and placement of the best quality materials for vegetative success on the final geomorphic reclamation surface. With application of the best available technology to mine site reclamation, reclamation efforts will be successful and sustainable over the long term, and it is hoped that improved public and regulatory perception of the mining cycle will result.

Acknowledgements

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