ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Energy West Mining Company
P. O. Box 310
15 No Main Street
Huntington, Utah 84528

January 29, 2015

Electronically Submitted

Utah Coal Program
Utah Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

C/015/0009
Received 1/30/15
Task ID #4790

Subj: Amendment to Trail Mountain MRP to Add the Cottonwood/Wilberg Waste Rock Site to the Mine Permit Area, Pacificorp, Trail Mountain Mine, C/015/0009, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company (Energy West) as mine operator, hereby submits an amendment to add the Cottonwood waste rock site to the Trail Mountain Mine permit area. The waste rock site was removed from the Cottonwood/Wilber Mine MRP as Volume 10 and is being added to the Trail Mountain MRP as Volume 4. In doing so, the name of the waste rock site will be changed to Trail Mountain Waste Rock Facility.

As mentioned in the amendment submittal for the Cottonwood/Wilberg Mine, PacifiCorp is in the process of selling of a portion of its mining assets. The Cottonwood waste rock site and the Trail Mountain Mine are two of the assets involved in the sale package. The Trail Mountain Mine is adjacent to unmined reserves that will be accessed through the existing Trail Mountain Mine. It is being proposed that the Cottonwood waste rock site be transferred to the Trail Mountain mining and reclamation plan so as to provide a site for the storage of coal waste materials from the mine.

In developing a straightforward process for this transfer, Energy West is constructing three amendments. The first amendment will be to Permit # C/015/0019 to remove the Cottonwood waste rock site from its MRP. The second amendment will be to Permit # C/015/0009 to add the waste rock site to its MRP. And the third amendment will be to the Legal and financial Volume to amend the all text and appendices affected by the transfer of the site from one permit to another. The three amendments are being submitted simultaneously.

With this submittal, one electronic copy of the amended sections of the Trail Mountain MRP is being submitted for Division review. C1/C2 forms are included. Please refer to the C2 form to review the changes made to the Trail Mountain MPR and the Waste Rock Site Volume. Upon approval, Energy West will provide two (2) clean copies of all amended documentation for insertion into the permit. If you have any questions concerning this action, please contact Dennis Oakley at 435-687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Cc: file

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: PacifiCorp

Mine: Trail Mountain Mine **Permit Number:** C/015/0009

Title: Amendment to Trail Mountain MRP to Add the Cottonwood/Wilberg Waste Rock Site to the Mine Permit Area, Pacificorp, Trail Mountain Mine, C/015/0009, Emery County, Utah

Description, Include reason for application and timing required to implement:

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☒ Yes ☐ No 1. Change in the size of the Permit Area? Acres: 25.85 ☒ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☒ Yes ☐ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☒ Yes ☐ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☒ Yes ☐ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes ☒ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☒ Yes ☐ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Kenneth Fleck — Print Name

Kenneth S. Fleck — Sign Name, Position, Date — Manager of Environmental Affairs JAN 29, 2015

Subscribed and sworn to before me this 29 day of January, 20 15

Chris M Christensen
Notary Public

My commission Expires: April 24, 2015

Attest: State of Utah } ss:
County of Emery

NOTARY PUBLIC
CHRIS M CHRISTENSEN
607905
COMMISSION EXPIRES
APRIL 24, 2015
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: PacifiCorp
Mine: Trail Mountain Mine **Permit Number:** C/019/0009
Title: Amendment to Trail Mountain MRP to Add the Cottonwood/Wilberg Waste Rock Site to the Mine Permit Area, Pacificorp, Trail Mountain Mine, C/015/0009, Emery County, Utah

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Volume 1, Chapter 1, replace pages 1-2 thru 1-5 with 1-2 thru 1-4
☐ Add	☒ Replace	☐ Remove	Volume 1, Chapter 2, replace page 2-1
☐ Add	☒ Replace	☐ Remove	Volume 1, Chapter 3, replace pages 3-10, 12, 34, 35, 53, 54, 65, and 72
☐ Add	☒ Replace	☐ Remove	Volume 1, Chapter 3, Appendix 1, replace summary page
☒ Add	☐ Replace	☐ Remove	Volume 1, Chapter 3, Appendix 1, add bond estimate (5 pages)
☐ Add	☒ Replace	☐ Remove	Volume 1, Chapter 4, replace entire chapter
☐ Add	☒ Replace	☐ Remove	Volume 2, Chapter 7, replace page 7-26
☐ Add	☒ Replace	☐ Remove	Volume 3, Maps, replace maps TMS1680C, TMS1454C, TMS1458C, TMS1450C, TMS1684C
☒ Add	☐ Replace	☐ Remove	Volume 4, Trail Mountain Mine, Waste Rock Site, Grimes Wash Facility (note: this volume contains redline/strike out text to show changes from CTW to TM transfer)
☐ Add	☒ Replace	☐ Remove	Appendix Volume, Appendix 7-1, Water Monitoring Program, Replace Table
☐ Add	☒ Replace	☐ Remove	Appendix Volume, Appendix 7-1, Replace Monitoring Location Map
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**

1.1 INTRODUCTION

PacifiCorp's Trail Mountain Mine is located in Cottonwood Canyon, 12 miles west of Orangeville, Utah (See Figure 1-1). A mining and reclamation permit, ACT/015/009, which incorporates the Office of Surface Mining (OSM) permit UT-0017, was issued by the State of Utah, Division of Oil, Gas and Mining (DOGM) to Trail Mountain Coal Company on February 19, 1985. The subsequent permit, ACT/015/009-1, was modified to include the Tract II area on April 30, 1987. A permit transfer from Arch Minerals (Trail Mountain Coal Co.) to Beaver Creek Coal Company (Trail Mountain No. 9 Mine) was approved by DOGM on 11/23/87. A permit transfer from Beaver Creek Coal Company (Trail Mountain No. 9 Mine) to PacifiCorp (Trail Mountain Mine) was approved on 11/13/92. As of this writing, the most up to date permit issued by DOGM (C/015/0009) was issued February 21, 2015.

PacifiCorp notified the Division of temporary cessation of coal mining operations at the Trail Mountain Mine effective May 4, 2001. Coal mining at the Trail Mountain Mine ceased as of March 15, 2001. In preparation of temporary cessation, all mining equipment including; production (longwall and continuous miner), belt haulage and electrical were removed from the mine. Verification of equipment removal was conducted on April 6, 2001 with Bureau of Land Management (Steve Falk) and Division of Oil, Gas and Mining (Pete Hess) participating in the review. A plan to construct permanent seals was submitted to and approved by Mine Safety Health Administration. Sealing of the mine portals was completed on May 1, 2001.

The following Permit Application will focus on the entire mine which from this time forth will be referred to as the Trail Mountain Mine.

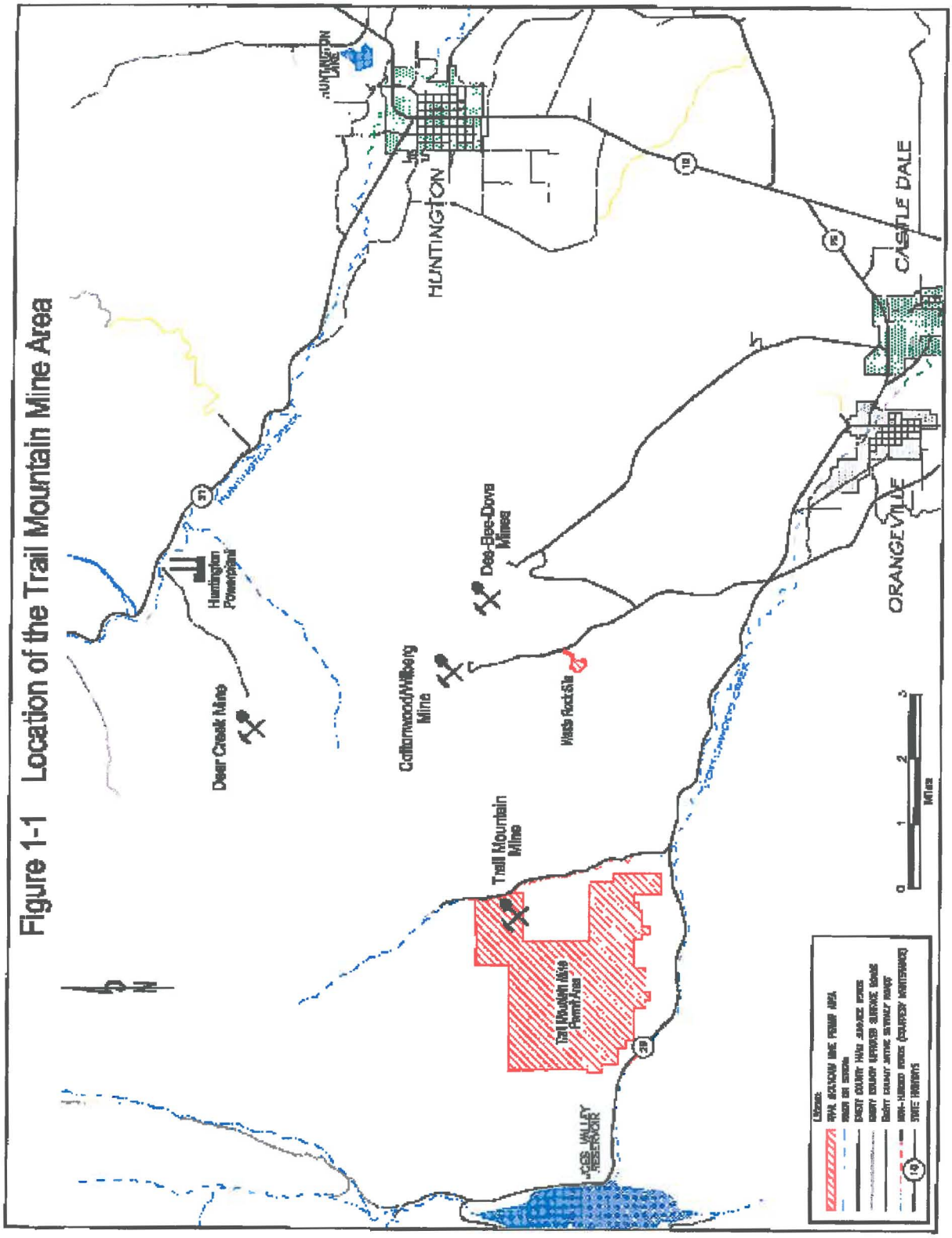

Figure 1-1 Location of the Trail Mountain Mine Area

1.3 SCOPE OF OPERATON

The Trail Mountain Mine is an underground coal operation. These operations have historically extended throughout ~~located in~~ Sections 25, 26, 27, 34, ~~and~~ 35, and 36 in Township 17 South, Range 6 East; and Sections 1, 2, and 3 in Township 18 South, Range 6 East; and Section 6 in Township 18 South, Range 7 East, Salt Lake Base and Meridian, Emery County, Utah. The ~~mine is located on~~ underground working covered an area of approximately ~~3538.98~~ 773.50 acres of Federal leases and fee coal lands. For the current permit and adjacent area acreages and descriptions, refer to the Legal and Financial Volume. ~~Annual production of the mine is approximately 3,500,000 to 5,000,000 tons per year.~~

Underground mining ~~is occurring~~ occurs in the Hiawatha seam of the Blackhawk Formation. Surface facilities, including the offices, bathhouse, shop, storage facilities and tipple are located at the intersection of the coal seam and the canyon floor. Surface facilities occupy approximately ~~10.02~~ 10.39 acres. The waste rock site disturbance adds an additional 15.82 acres.

1.4 SUMMARY OF ENVIRONMENTAL IMPACTS

Similar to many other coal operations along the east front of the Wasatch Plateau, the Trail Mountain Mine is located in a steep walled canyon. Vegetation, soils, geology, hydrology, and wildlife of the mine plan area are typical of the general area.

As mining has been conducted in the area for over 50 years with rather minimal impact to the environmental resources, it is expected that continued operation of the Trail Mountain Mine will also have minimal impact. Impacts are expected to be minimal due to implementation of mining practices which incorporate sound and practical engineering and environmental considerations in the mine planning process.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine MRP

Volume 1: Chapter 2

Replace page 2-1

PacifiCorp
Energy West Mining Company
TRAIL MOUNTAIN MINE
Legal and Financial Information

This application for a mining and/or reclamation permit is submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining, in accordance with the Utah Coal Mining and Reclamation Act, Title 40, Chapter 10, U.C.A., 1953 (as amended); the applicable rules and regulations adopted thereunder; the Surface Mining Control & Reclamation Act of 1977, and applicable regulations adopted thereunder (30 CFR 770, et seq.), the Cooperative Agreement between the State of Utah and the United States Secretary of Interior, and other applicable laws and regulations.

R645-301-100 GENERAL CONTENTS

All Legal and Financial Information pertaining to the Trail Mountain Mine is located in the Supplemental Volume entitled:

PacifiCorp Legal and Financial Volume

Cottonwood Mine C/015/19

Deer Creek Mine C/015/18

~~Des-Bee-Dove Mine C/015/017~~

Trail Mountain Mine C/015/009

PacifiCorp

Energy West Mining Company

Trail Mountain Mine MRP

Volume 1: Chapter 3

Replace pages 3-10, 3-12, 3-34, 3-35, 3-53, 3-65, 3-72

3.2.7 Sewage System (This system is no longer exists)

The septic system for the Trail Mountain Facility was approved by the Division of Water Quality on March 17, 1995. The system is somewhat unique in that the grey-water portion of the sewage is separated and eventually enters the Cottonwood Mine sewage system and leach field for final disposal.

The sewage enters one of three septic tanks, depending on location, removing the majority of solids from the sewage. The grey-water then flows, via an 8 inch line, to the collection/pumping station, located south of the rock dust silo. The collection/pumping station contains a 10,000 gallon holding tank and two pumps. From this station, the grey-water is pumped under the county road and into the Cottonwood Mine belt entry, through a 4 inch buried line. The 4 inch line follows an underground workings route to the Cottonwood Mine sewage system and leach field.

In the case of emergencies, the system can dispose of the sewage grey-water at the collection/pumping station by haulage truck to the Cottonwood Mine sewage system or to another facility licensed to accept septic tank waste. For short term emergencies, the storage capacity of the collection tank can handle more than the 24 hour sewage waste generation of the mine.

3.2.8 Water Diversion Structures

Three water diversion structures are maintained at the Trail Mountain Mine. A concrete curb and gutter running north-south through the facilities area diverts water from the disturbed area into the sediment pond. A 66 inch culvert that has been placed in Cottonwood Creek has allowed the facilities pad area to be extended, and also allow Cottonwood Creek to flow beneath the mining operation. The length of this culvert is approximately 1,900 feet, extending from below the sedimentation pond to the property boundary north of the bathhouse (see Chapter 7).

All roads are constructed and maintained to minimize disturbance and adverse impacts on fish, wildlife and related environmental values. Roads will be maintained to meet applicable design standards throughout their use, by blading, watering and resurfacing as necessary. Roads are also located, designed, constructed, reconstructed, used, maintained, and will be reclaimed so as to prevent or control damage to public or private property; using non-acid or non-toxic forming substances in surfacing; and will have a static safety factor of 1.3 for all embankments.

The mining operation is conducted within 100 feet of a public (county owned) road. The requirements of R645-103-234 and protection of the public interests are met in the following ways:

(1) This is a pre-law operation, and has always been located adjacent to the public road which provides access to the public and private lands in and beyond Cottonwood Canyon;

(2) The road has been upgraded and paved through cooperation of the Mine, Emery County Road Department, and the US Forest Service;

(3) Necessary approvals for the road have been obtained from the authorities with jurisdiction over the public road through the cooperative effort of upgrading and paving of the road to the mine site. Necessary encroachment permits have been obtained from Emery County for accesses to and from the public road.

(4) Required public notices concerning the operation have been posted in local newspapers for Permit Approvals, Permit Renewals and Permit Transfers.

3.2.11 Total Area for Surface Disturbance During the Permit Term

The total area of present surface disturbance ~~at~~ within the Trail Mountain Mine ~~plan~~ permit area, including all compliance activities (sediment pond, upper and lower culvert installation, borrow area, portal areas, and surface pad extension), is ~~10.69~~ 10.39 acres (see Plate 3-1 in Volume 3). Other disturbed areas include the waste rock site area which covers 15.82 acres of disturbance (refer to Plate 4-1 in Volume 4).

3.3.7 Mine Plan Area

The mine plan area of the Trail Mountain Mine is outlined in Figure 3-10. A total of ~~3,538.98~~ 773.50 acres are included in the mine plan area.

3.3.7.1 Projected Mining By Year

The mine development and projected mining schedule are shown on Plate 3-2. As shown, additional permit terms will be required.

3.3.7.2 Acreage and Delineation

As described in ~~Chapter II~~ the Legal and Financial Volume, the mine plan area consists of approximately ~~3538.98~~ 773.50 acres of fee and federal land. Federal land consists of three leases totaling ~~3485.48~~ 720.00 acres. The remainder of the mine plan area (53.50 acres) is fee land held by PacifiCorp. The waste rock site in Grimes adds an additional 25.85 acres.

3.4 ENVIRONMENTAL PROTECTION

This section addresses the environmental concerns and impact of the mining operation. The aspects of land-use, cultural resources, hydrology, soils, vegetation, fish and wildlife, air quality, subsidence, and waste disposal are addressed. Each aspect is addressed in terms of projected impacts and control measures. For those aspects that warrant it (hydrology, vegetation, fish and wildlife, air quality, and subsidence) a discussion of monitoring procedures are also included.

3.4.1 Preservation of Land Use

The post-mining land-uses of the Trail Mountain Mine, owned by PacifiCorp, are anticipated to remain the same as the pre-mining land-uses of grazing, wildlife habitat and recreation. A full discussion of these uses area found in Chapter ~~IV~~ 4.

Following completion of the mining operations, the mine site will be reclaimed and revegetated. The area will be graded, scarified, and seeded before the next growing season. The seed mixtures to be used are discussed in Chapter 9 and Section 3.5 of this Chapter.

The site will receive treatments of fertilizer and additional seedings until it is determined stable for the bond release period.

During low run off, the stream diversion culvert will be removed and the stream channel will be restored. No reclamation work is contemplated on the access road to the site. This road has varied ownership (county, federal and private) and provides access for Forest Service and private land up Cottonwood Canyon.

Lands held by PacifiCorp are classified by Emery County, the US Forest Service, and the State of Utah as a recreation, forestry and mining area.

3.4.1.1 Projected Impacts of Mining on Current and Future Land Use

Within the permit area, approximately ~~10.69~~ 10.39 acres has been disturbed by surface facilities of the mine. This disturbance has affected the soils and vegetation of the area. The effect on vegetation is temporary and will be eliminated by revegetation of the disturbed area. Wildlife loss of habitat in the riparian community has occurred. The acreage is small; however, the riparian area is considered to be of critical value to the overall density of terrestrial wildlife. Continued operation of the surface facilities will have no significant impact on the local wildlife. A full discussion can be found in Chapter 10.

For a full discussion of the projected impacts on the area occupied by the waste rock site, see Volume 4. Disturbance in this area is approximately 15.82 acres.

3.4.1.2 Control Measures to Mitigate Impacts

Careful planning of the reclamation activities will help to minimize the impact of the Trail Mountain Mine on land-use. Return of the mine site to the premining land-use of grazing,

3.4.9 Waste Disposal

PacifiCorp has contracted with local firms to handle and remove all non-coal wastes from the mine site. Non-coal wastes and materials that constitute a potential fire hazard are hauled by a licensed contractor to a state approved waste disposal area.

Waste oil is collected in drums in a designated storage area at the site. A licensed contractor will pick up this material on a regular basis and remove it for recycling purposes.

It should be noted that during a spoils survey, it was pointed out that there was no evidence of toxic materials at this mine site (Mr. George Cook, SCS). Prior to reclamation, all spoil material will be re-sampled in a comprehensive random method and retested in accordance to UDOGM guidelines for acid and/or toxic forming potential. Sampling will be conducted per Appendix 9-1, Attachment C.

Sediment pond waste is removed from the site and disposed of in the ~~Cottonwood/Wilberg~~ Waste Rock Site in Grimes Wash in accordance with the Division's "Sediment Pond Clean out Procedural Guidelines". The Division will be notified and procedures will be approved prior to the start of pond cleaning activities. Previous analyses of this material have shown it to be non-toxic and non-acid forming. The sediment material will be sampled and tested according to Division "Title V Coal, Program Policy for Disposal of Sediment Pond Waste".

Underground development waste is kept underground as allowed by MSHA regulations. In the event this material must be brought out of the mine, it will be hauled to the Cottonwood/Wilberg Waste Rock Site and disposed of in an approved manner.

3.5.5.1 Soil Preparation

With special handling, the disturbed land fill should provide a suitable seed bed for revegetation. Soil sampling will be conducted per Appendix 9-1, Attachment C. Special handling will include removal of contaminated material and large coarse rock fragments (greater than 18 inches). The large rock fragments will be used as rip-rap in channel restoration, buried with the fill, or randomly placed on the reclaimed surface. The mine coal pad areas will be removed and all coal/refuse associated with the pads will be hauled to the ~~Cottonwood~~ Waste Rock Site for disposal.

Contaminated soil material which contains greater than 50 percent coal fines, will be disposed of at the ~~Cottonwood~~ Waste Rock Site in Grimes Wash. Soil contaminated with oil and grease will be disposed of at an approved site. This will be determined by visual inspection, and any material with visible oil or grease contamination will be removed. The volume of such material cannot be accurately estimated; however, it will likely be less than two percent of total volume. Material with less than 50 percent coal fines will be buried against the cut banks and covered with a minimum of four feet of incombustible material. There are no acid-or toxic-forming materials known to exist at this site. Any of these materials discovered will be disposed of on-site and covered with 4' of material or removed to the ~~Cottonwood~~ Waste Rock Site in Grimes Wash. Salt contamination may also be a problem in soils used for reclamation.

If visible salty areas or analyzed salty areas are found, the soils will be buried along the cut banks or other available sites to a minimum depth of 48".

Non-coal waste will be separated from the soils, loaded into trucks and hauled to an approved landfill for final disposal. All pad areas will be ripped for 12 to 24 inches to loosen the fill profile using the rippers on the dozer, and pulverized if a cloddy surface exists. Once backfilled and graded, the surface will be scarified with the teeth on the backhoe, or using the tracks of the

3.5.7 Cost Estimate for Reclamation

The 1979 Act "Regulation of Coal Mining and Reclamation Operations" requires the operator of a coal mine to file with the Utah Division of Oil, Gas and Mining (DOGM) a bond in the amount equal to the estimated cost of completing the work described in the operator's reclamation plan. The bond is to ensure the State of Utah that in the event of the operator being financially unable to reclaim the disturbed areas, such areas can and will be restored by the DOGM at no cost to state residents.

The strata characteristics above the coal seam, the slow and uniform rate of subsidence will not affect the surface terrain to such an extent that reclamation will be necessary. As such, a reclamation bond is not required for the surface lands over the underground workings.

An estimate of the cost of reclamation of the Trail Mountain Mine site, including the waste rock site, is shown in ~~on the following pages, in Table 3-4~~ Appendix 1. ~~This table reflects the required bond increase from all additions.~~ The cost estimate is summarized as direct and indirect costs for demolition, backfilling and grading, revegetation for the mine site and waste rock site. Supporting cost calculations for each major reclamation step is also presented. ~~The amount of the bond posted for this operation is broken down on the final page in Table 3-5~~ .

Earthwork estimates for final reclamation are summarized in the Mass Balance Table 3-~~6~~4. The quantities are taken from cross-sectional areas shown on Plate 3-6. Cross section locations are shown on Plates 3-1 and 3-5. Estimates indicate a cut volume of 38,579 cubic yards and a required fill volume of 39,719 cubic yards for final mine site reclamation.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine MRP

Volume 1: Chapter 3, Appendix 1

Replace bond summary page

Direct Costs

Trail Mountain Mine Site (2012 Costs)		
Subtotal Demolition and Removal	$369,084.77	
Subtotal Backfilling and Grading	$203,096.83	
Subtotal Revegetation	$38,547.16	
Subtotal Direct Costs	$610,728.76	
Waste Rock Site (2011 Costs)		
Demolition	$10,618.49	
Earthwork	$231,606.96	
Rip Rap	$24,151.09	
Revegetation	$33,342.25	
Subtotal	$299,718.79	
Waste Rock Site (2012 Costs)	$ 304,813.79	

Indirect Costs

Mob/Demob	$91,554.26	10.0%
Contingency	$45,777.13	5.0%
Engineering Redesign	$22,888.56	2.5%
Main Office Expense	$62,256.89	6.8%
Project Mainagement Fee	$22,888.56	2.5%
Subtotal Indirect Costs	$245,365.40	26.8%
Total Cost 2012 Dollars	**$1,160,907.95**	
Number of years		5
Escalation to 2017		0.012
Escalation Dollars	$71,346.37	
Escalated Reclamation Cost to 2017	**$1,232,254.32**	
Reclamation Cost (rounded to nearest $1,000)	**$1,232,000.00**	

PacifiCorp

Energy West Mining Company

Trail Mountain Mine MRP

Volume 1: Chapter 3, Appendix 1

Add Waste Rock Site bond estimate after last page of the existing appendix

Trail Mountain Mine
Waste Rock Site
C/015/0009

Revised March 2012

Waste Rock Site Cost Summary	
Description	**Cost**
Demolition	$ 10,618.49
Earthwork	$ 231,606.96
Riprap	$ 24,151.09
Revegetation	$ 33,342.25
Total	$ 299,718.79

Total Cost (2011 Dollars)	$ 299,718.79	
Escalation factor		0.017
Number of years		1
Escalation	$ 5,095.00	
Bond Amount (2012 Dollars)	$ 304,813.79	

Waste Rock Site											
Description Waste Rock Site	Means Reference Number (2011 Heavy Construction Cost Data)	Equipment	Labor	Quantity (number)	Volume (cy)	Weight (tons)	Time (hr)	Unit	Cost	Total Cost	Ref.
Steel Demolition Cost						5					
	Foreman Average, Outside		Foreman	1			8.0	hr	$ 71.20	$ 569.60	
	Common Building Labor		CLAB	2			8.0	hr	$ 52.70	$ 843.20	
	01 54 33 20 0300	Excavator - 2.0 CY		1			8.0	hr	$ 153.00	$ 1,224.00	
	Equipment Operator, Medium Equipment		Eqmd	1			8.0	hr	$ 67.75	$ 542.00	
	01 54 33 40 7200	Pickup Truck - 3/4 ton 4x4		1			8.0	hr	$ 13.08	$ 104.64	1
Concrete Demolition Cost											2, 3
Transportation Costs	01 54 33 40 6500	Trailer, platform, flush deck, 2 axle, 25 ton		1			1.0	hr	$ 13.90	$ 13.90	5
	01 54 33 40 7300	Tractor, 4x2, 220hp		1			1.0	hr	$ 34.90	$ 34.90	
	Truck Driver, Heavy		Drhv	1			1.0	hr	$ 52.25	$ 52.25	
Miscellaneous											
Disposal Fee - Metal	02 41 19.23 0950					5		ton	$ 90.00	$ 450.00	
Net Fence Removal[4]	02 41 13.60 1600		CLAB	2			64.0	hr	$ 52.70	$ 6,745.60	
	01 54 33 40 6410	Toilet, portable chemical		1			24.0	hr	$ 1.60	$ 38.40	
Total										$ 10,618.49	

Reference Information
1 - From Nielson Construction services contract with Energy West Mining - Includes 3/4 ton 4x4 truck, metal tool box, acetylene kit, rack for oxygen and acetylene, 1/2" electric drill, 71/4 " circular saw, 9" grinder.
2 - Concrete rubble disposed of as fill or permanently backfilled inside portals.
3 - Base on a concrete demolition production of 200 cubic yards per 8 hour shift. (Reference: http://www.indeco-breakers.com).
4 - Net Fence, 3500 linear feet. Demolition production rate is 430/day
5 - For haul of steel demolition material to Nielsen's landfill. Distance is approximately 11.0 miles one-way. Time estimate is 1.0 hours for one round trip.

Waste Rock Site Dozer/Track-Hoe Work - Phase 1

Means Reference Number	Station Location/Type Equipment	Hourly Equipment Cost	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
01 54 33 20 4360	Dozer - 410hp	$ 263.13	$ 67.75	$ 330.88	1	$ 330.88	$/HR	54,500.0	CY	158.0	CY/HR	344.9	HR	$ 114,120.51
01 54 33 20 0320	Excavator - 2.5 CY	$ 201.63	$ 67.75	$ 269.38	1	$ 269.38	$/HR			(see note)		172.45	HR	$ 46,454.58
	Sub-Totals													$ 160,575.09
Miscellaneous														
	Foreman Average, Outside			$ 71.20	1	$ 71.20	$/HR					344.9	HR	$ 24,557.00
01 54 33 40 7200	Pickup Truck - 3/4 ton 4x4			$ 13.08	1	$ 13.08	$/HR					344.9	HR	$ 4,511.00
	Total Phase 1 Earthwork													$ 189,643.09

Waste Rock Site Dozer/Track-Hoe Work - Phase 2

Means Reference Number	Station Location/Type Equipment	Hourly Equipment Cost	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
01 54 33 20 4360	Dozer - 410hp	$ 263.13	$ 67.75	$ 330.88	1	$ 330.88	$/HR	6,233.0	CY	158.0	CY/HR	39.4	HR	$ 13,036.67
01 54 33 20 0320	Excavator - 2.5 CY	$ 201.63	$ 67.75	$ 269.38	1	$ 269.38	$/HR			(see note)		19.7	HR	$ 5,306.79
	Sub-Totals													$ 18,343.46
Miscellaneous														
	Foreman Average, Outside			$ 71.20	1	$ 71.20	$/HR					39.4	HR	$ 2,805.00
01 54 33 40 7200	Pickup Truck - 3/4 ton 4x4			$ 13.08	1	$ 13.08	$/HR					39.4	HR	$ 515.00
	Total Phase 2 Earthwork													$ 21,663.46

Waste Rock Site Dozer/Track-Hoe Work - Access Road

Means Reference Number	Station Location/Type Equipment	Hourly Equipment Cost	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
01 54 33 20 0320	Excavator - 2.5 CY	$ 201.63	$ 67.75	$ 269.38	1	269.38	$/HR	1,435.0	LF	200	LF/day	57.40	HR	$ 15,462.41
	Sub-Totals													$ 15,462.41
Miscellaneous														
	Foreman Average, Outside			$ 71.20	1	$ 71.20	$/HR					57.4	HR	$ 4,087.00
01 54 33 40 7200	Pickup Truck - 3/4 ton 4x4			$ 13.08	1	$ 13.08	$/HR					57.4	HR	$ 751.00
	Total Access Road Earthwork													$ 20,300.41
													Total Cost	$ 231,606.96

Note: Track-hoe is utilized to support Dozer activities. Usage is dictated by 1/2 Dozer hours.

Riprap Channels	Means Reference Number	Equipment Rental (hr) (Includes O & P)[A]	Operator's Hourly Wage RateA	Material Cost	Labor Hourly Cost [A]	Number	Length (LF)	Quantity	Units	Production Rate	Units	Time	Units	Cost
							660			50	LF/Hr	13.2	Hr	
3/4" Rock*				$ 27.00				216	Tons					$ 5,832.00
6" Rock*				$ 22.00				459.0	Tons					$ 10,098.00
Loader - 5.5 CY	01 54 33 20 4760	$ 116.68	$ 67.75			1								$ 2,434.48
Dump Truck - 4 axle, 18 CY	01 54 33 20 5310	$ 82.60	$ 50.75			1								$ 1,760.22
Excavator, 2 CY	01 54 33 20 0300	$ 153.00	$ 67.75			1								$ 2,913.90
Foreman Average, Outside	Foreman				$ 71.20	1								$ 939.84
Pickup Truck - 3/4 ton 4x4	01 54 33 40 7200	$ 13.08				1								$ 172.66
Total														**$ 24,151.09**

* Based on Nielson's Construction current (1/2012) prices.

[A] RSMeans Heavy Construction Cost Data 2011 - Refer to Wage and Rate Sheet

Pocking	Equipment Rental (hr) (Includes O & P)[A]	Operator's Hourly Wage RateA	Material Cost	Labor Hourly Cost [A]	Number	Area (AC)	Quantity	Units	Production Rate	Units	Time	Units	Cost
						18		AC					
Volume							6120.0	CY	340	CY/AC			
Excavator, 2 CY	$ 153.00	$ 67.75			1				180	CY/HR	34.0	HR	$ 7,505.50
Subtotal													$ 7,505.50
Seeding*/Planting**													
Final Reclamation Seed Mix			$ 823.23	$ 52.70		18	810	lbs	1	Acre/HR	18		$ 1,771.83
Subtotal													$ 1,771.83
Mulching													
Hay			$ 100.00				18	AC	0.67	AC/HR	26.9		
Hay Quantity***							2000	LBS/AC					$ 1,800.00
Mulcher, Diesel powered	$ 34.75				1						26.9	HR	$ 933.58
Flat Bed Truck	$ 23.75	$ 50.75			1						26.9	HR	$ 2,001.49
CLAB				52.70	2						26.9	HR	$ 2,831.64
Hydromulch							18	AC	0.67	AC/HR			
Truck 4 x 2, 220hp	$ 34.90	$ 52.70			1						26.9	HR	$ 2,353.43
Hydromulcher, 3000 gal	$ 34.75	$ 52.25			1						26.9	HR	$ 2,337.31
Wood Fiber Mulch****			$ 10.50	per 50 lb. bag			2000	LBS/AC					$ 7,560.00
CLAB				52.70	3						26.9	HR	$ 4,247.46
Subtotal													$ 24,064.93
Total													$ 33,342.25

* Seedmix prices based on Stevenson Intermountain Seed Prices quoted in February 2011. See attached.
** Seedling tree prices based on Lone Peak Conservation Nursery (now contracted to High Mountain Nursery) Prices in February 2011 (http://www.highmtnnursery.com/servlet/StoreFront).
*** Cost of Hay is based on local prices of $100/ton (Personal Communication).
**** Current (1/2012) price for woodfiber mulch from Granite Seed, Lehi, Utah. Phone contact.
[A] RSMeans Heavy Construction Cost Data 2011 - Refer to Wage and Rate Sheet

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Volume 1: Chapter 4

Replace entire chapter

CHAPTER 4

LAND STATUS, LAND USE, AND POST MINING LAND USE

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4.1 SCOPE

This chapter of the mining and reclamation plan describes the status of lands in and adjacent to the mine plan permit and adjacent areas. Present and post-mining land-uses will also be discussed with emphasis on how mining can be integrated in the multiple land-use of the area.

4.2 METHODOLOGY

Information used in preparing this chapter of the mining and reclamation plan has been gathered from published sources and from discussions with the relevant land-management agencies.

4.3 LAND STATUS

4.3.1 Mine Plan Area Surface Land Status

Land status within the Trail Mountain mine plan area is separated into two areas: private, and federal (~~See Figure 4-1~~ Refer to Plate 4-1 in Volume 3).

4.3.1.1 Ownership

PacifiCorp owns ~~53.35~~ 53.50 acres of private land surrounded by federal land of the Manti-LaSal National Forest. Ownership of land was obtained by Beaver Creek Coal Company in October, 1987, through purchase of the mine from the Arch Minerals Company of St. Louis, MO. A legal description of the extent of the property is given below. Also refer to the Legal and Financial Volume for more details:

Beginning point SW corner of NW1/4 SE1/4, Sec. 25, T17S, R6E, SLB&M, thence North 160 rods, thence East 44 rods to center Cottonwood Creek, Southward along creek to a point 76 rods East of the beginning, thence West 76 Rods to the point of beginning.

~~Figure 4-1 Coal Ownership in the Vicinity of the Trail Mountain Mine~~

4.3.1.2 Surface Managing Authorities

~~The remainder of~~ Historically and/or presently, the surface lands of the mine plan area ~~are~~ have been or are currently managed by the State of Utah, Division of State Lands and United States of America, US Forest Service. Section 36, Township 17 South, Range 6 East, no longer part of the mine plan area, ~~is~~ was managed by the Utah Division of State Lands (relinquishment for ML-22603 effective 01/31/1996). Areas within Township 17 South, Range 6 East, Sections 25, 26, 27, 34 and 35, Township 18 South, Range 6 East, Sections 1, 2, and 3, and Township 18 South, Range 7 East are ~~East 1/2 of the East 1/2 of the Southwest 1/4 and Southwest 1/4 of the Southwest 1/4 is~~ managed by the Manti-LaSal National Forest, US Forest Service. The majority of these lands have been mined out and relinquished. Refer to Legal and Financial Volume for lease area, permit area, and adjacent area details.

4.3.1.3 Special Use Permits and Leases

~~The US Forest Service Manti-LaSal National Forest has issued a special use permit to the Trail Mountain Mine for a right-of-way to the mine property. As discussed previously, the Trail Mountain Mine is surrounded by Forest Service land; therefore, the special use permit was required. A copy of the permit can be found in Appendix 4-1.~~

The Bureau of Land Management issued a right-of-way for the area established for the waste rock site. This area is located in Township 17 South, Range 7 East, Section 34. Refer to the Legal and Financial Volume for complete description of this area.

4.3.2 Mineral Ownership

4.3.2.1 Coal Ownership and Mines

The Trail Mountain Mine is located in an area of intermixed state (relinquished), federal, and fee coal. ~~Figure~~ Plate 4-1 shows the ownership of the area

surrounding the mine plan area. Those areas not outlined are unleased federal coal. The only operating mine in the area is the Trail Mountain Mine.

4.3.2.2 Coal Leases

PacifiCorp has been granted federal coal lease U-082996 for 80 acres, U-49332 for 641.47 acres (partial relinquishment of 261.47 acres accepted as of 01/09/09) and lease U-64375 for 2,630.81 acres (partial relinquishment of 2,504.01 acres accepted as of 01/09/09). These mineable leases are located in:

Township 17 South, Range 6 East, SLB&M Section 25, (80 acres); T17S. R6E, Sections 25, 26 and 35 (~~641.47~~ 380.00 acres), T17S. R6E, Sections 26, 27~~, 34 and 35~~ (260.00 acres); ~~T18S. R6E, Sections 1, 2 and 3, and T18S. R7E, Section 6 (2,630.81 acres)~~. ~~Copies~~ Descriptions of the leases are found in ~~Appendix 4-2~~ the Legal and Financial Volume, Appendix C.

4.3.2.3 Mineral Ownership

Ownership of ~~53.35~~ 53.50 acres of surface and mineral rights is held by PacifiCorp. A description of the extent of the mineral ownership is given below:

> "Beginning point SW corner of NW1/4, SE1/4, Section 25, T17S, R6E, SLB&M, Thence North 160 rods, thence East 44 rods, to center of Cottonwood Creek, southward along creek to a point 76 rods east of the beginning, thence West 76 rods to the point of beginning."

4.3.2.4 Mineral Leases

A copy of the lease agreements ~~is~~ can be reviewed at the Energy West Main Office in Huntington, Utah ~~found in Appendix 4-2~~.

4.3.2.5 Oil and Gas Wells

No oil and gas wells have been or are presently being drilled on or adjacent to the mine plan area.

4.3.2.6 Oil and Gas Leases

Oil and gas lease are held on the mine plan area. A state lease ML-31104 is held by Placid Oil Company, filed in September, 1974. Leases held on federal land are shown in Table 4-1.

Table 4-1: Oil and Gas Lease Ownership Information.

Location	Ownership	Lease
T 17 S, Section 24		**U-15200**
Southland Royalty Company	25%	
Enterprise Gas Company	37½ %	
El Paso Exploration Company	37½ %	
T 17 S, Section 25		**U-24355**
Hawthorn Oil Company		
T17 S Sections 26 & 35		**U-15197**
Southland Royalty Company	25 %	
Enterprise Gas Company	37½ %	
El Paso Exploration Company	37½ %	
T 18 S, R 6 E, Section 1		**U-23208**
Edward Mike Davis	47½ %	
T 18 S, R 6 E, Section 2		**U-15195**
El Paso Exploration Company	37½ %	
Southland Royalty Company	25 %	
Enterprise Gas Company	37½ %	

4.4 LAND USE

4.4.1 Regional Land Use

Traditionally land use in the Wasatch Plateau has been mining, grazing, recreation, wildlife habitat and timber harvesting. Generally land management of the plateau has been controlled by the Manti-LaSal National Forest due to the large portion of the plateau within the forest boundaries.

4.4.2 Mine Plan Area Land Use

4.4.2.1 Existing Use

Existing land uses of the Trail Mountain Mine plan and adjacent areas consist of grazing, wild life habitat and recreation. No commercial forest uses have existed on the privately owned or National Forest lands within the mine plan areas. No farming has or is being done on the mine plan or adjacent areas.

Grazing - The National Forest land within the mine plan area is considered as unsuitable range (Niebergall, 1981). Since 1981 when John Niebergall made the preceding statement, lease U-64375 was added to the mine plan area. Much of this lease, issued in 1990 (2,504.01 acres relinquished effective 01/09/09), is used as rangeland for both domestic livestock and wildlife. Section 36 (relinquished 01/31/1996), owned by the State of Utah, is leased by Emile Luke. Eight cows are allowed on the property from June 21 through September 20 (24 AUM's). The actual land within this section utilized for grazing is probably limited to 120 acres or less in the west portion of the section. The remainder of the mine plan area is unsuitable for range due to the cliff-like nature of the area. A map showing the US Forest Service grazing allotments is provided (see Figure 4-4). Livestock are also trailed on the road in Cottonwood Canyon (Niebergall, 1981). Cattle are moved to summer range at the higher elevations above the mine plan area.

It should be noted, that PacifiCorp has provided for the US Forest Service and the Trail Mountain Cattleman's Association, fences and gates at the

Roan Canyon location and the adjacent Cottonwood Canyon location. The company has provided a cattle guard and a stock corral at the Cottonwood Canyon location, (see Figure 4-4) to aid the cattlemen in their efforts to trail cattle to and from summer ranges above the Trail Mountain Mine permit areas.

Recreation - Recreational use of the ~~mine plan~~ area consists primarily of sightseeing by people traveling up Cottonwood Canyon to the Upper Joes Valley area. Limited hunting also occurs on the small section of the mine plan area on the plateau. Most of the area is characterized by steep and extremely rugged cliffs which are not conductive to recreational uses (Niebergall, 1981). There is no fishing in the canyon near the mine (Niebergall, 1981).

Access to the mine plan area is by the ~~gravel~~ paved road in Cottonwood Canyon. ~~or by a~~ Jeep trails allow access to the mine plan or adjacent areas on the high plateau ~~which comes southeast of~~ above the Trail Mountain Mine. Access is gained via road on the upper end of Trail Mountain.

Farming - Farming is not practical ~~on~~ within the permit or adjacent ~~to the mine plan~~ area. Farming is impractical due to the steep and rocky terrain, and therefore, no future farm use is expected within the permit or adjacent ~~to the mine plan~~ area.

4.4.2.2 Previous Mining

Underground Mined Areas - The Johnson mines, located ~~a short distance up~~ across the canyon from the Trail Mountain Mine facilities ~~(in the southwest quarter of the southwest quarter to the northeast quarter of Section 25 of T17S and R6E)~~, were active from 1909 to 1948. The Cottonwood Canyon prospects are located across Cottonwood Canyon from the Trail Mountain Mine. The Cottonwood Canyon prospects were active from 1946 to 1948. No other known

minerals of value have been mined within the permit or adjacent ~~to the mine plan~~ area.

Production ~~of~~ from the earlier mines was from the Hiawatha seam by room and pillar mining. An estimated production of 96,000 tons is reported by Doelling (1972) for all mining in the area. Of this, the Cottonwood Canyon mines produced approximately 54,000 tons.

Surface Mined Areas - There have been no previous surface mines located within the mine plan or adjacent areas.

4.4.3 Land Use During Operations

Land use in the area has not changed greatly in the past 20 to 50 years. The following section will look at the potential effects of the operation on the use of the land. At the present time, Applicant has no plans to disturb any additional surface area during the mining permit term.

4.4.3.1 Effect of Operation on Land Use

The Trail Mountain Mine has operated in the Cottonwood Canyon since 1946. Land use in the canyon has adapted to the existence of the mining operation. As described previously, the majority of the mine plan area is not suitable for grazing or forestry. The uses affected are wildlife habitat and recreation. Recreationalists and ranchers use the canyon for access to the upper parts of Cottonwood Canyon and the top of the plateau. Sightseeing and seasonal cattle drives are the only major activity, other than mining, in the lower canyon.

Access up the canyon is not obstructed by the mining operation and facilities. Traffic on the county access road is not a problem. In 1987, three miles of the Cottonwood Canyon road from Highway 29 to the Trail Mountain Mine site was surfaced with six inches of asphalt.

4.4.3.2 Mitigation of Effects of Operation

The realignment and surfacing of the access road has greatly facilitated traffic flow and has mitigated any erosion or fugitive dust pollution problems.

The ~~Tract 2~~ mine plan area due to its ~~totally~~ underground nature will have no adverse impacts other than those which may result through subsidence. Should subsidence occur and alter springs, ~~and~~ seeps, or ponds that is used as a watering source for wildlife or cattle, PacifiCorp will commit to mitigating the loss of seeps and springs with the installation of 2000 gallon guzzlers. These guzzlers will be fenced with pole fencing to a maximum height of 42 inches with 14 inch spacings between poles to keep out cattle and allow wildlife in. Guzzlers will provide a water supply for wildlife. These guzzlers are fenced to keep cattle out because cattle would de-water guzzlers in a very short time. Man-made and natural stock ponds are provided on the Trail Mountain area as a source of water for grazing cattle. These ponds are supplied by snow runoff or springs. There are several developed springs in the allotment areas that have watering troughs. If subsidence affects any ponds, ponds will be rebuilt with equipment and a bentonite liner will be placed in the affected pond. Water could be diverted due to subsidence. Should subsidence alter a seep or spring that is supplying a water source to livestock, PacifiCorp will, after consulting with the Forest Service and DOGM, commit to replace or relocate the trough or pond to a suitable range area. PacifiCorp has implemented a subsidence and hydrologic monitoring program whereby, the extent and the effects of subsidence to water resources can be studied, identified, and the appropriate mitigating action taken.

4.5 POST MINING LAND USE

4.5.1 Mine Plan Area

Land use following mining will remain essentially the same on a regional basis. A combination of coal mining, grazing, wildlife habitat and recreation will tend to be the typical uses. These uses will be, as previously described, strongly influenced if not controlled by the Manti-LaSal National Forest.

The post mining use of the mine plan areas is proposed as a multiple use of grazing, wildlife habitat, hunting and recreation. All of these uses are compatible with the surrounding area.

4.5.2 Mine Site

The mine site will be reclaimed to a grazing, wildlife habitat, and recreational use. Rehabilitation of the site will include removal of all buildings and facilities, regarding the tipple pad and sediment pond, removal of the bypass culvert, and reestablishment of stream, soil preparation, and revegetation of the site.

Use of the site will probably be recreational during late spring, summer, and fall and for wildlife grazing during the winter and early spring. In this area, the recreational use should not interfere with the wildlife use due to limited access during the winter months. This will allow for protection of the deer during the crucial period while on their winter range.

4.5.3 Final Surface Configuration

The graded surface of the mine site will blend existing slopes into the surrounding terrain. The slopes will be stabilized with vegetation, and the erosion hazard reduced. (See Chapter 3.)

4.6 BIBLIOGRAPHY

US Forest Service, 1979. Land Management Plan. Ferron-Price Planning Unit, Manti-LaSal National Forest, Price, Utah.

Niebergall, John-US Forest Service, District Ranger, Manti-LaSal National Forest, Ferron, Utah - Range Improvement and Allotment Description.

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Replace page 26

deposits has been limited and the level of groundwater has been reduced to a point below the elevation of the Cottonwood Spring. To verify the extent of the alluvial deposits and to define the hydrologic characteristics, PacifiCorp conducted a hydrologic research project in 1992 which included a series of resistivity lines and the drilling of three surface sites (~~see Deer Creek/Cottonwood/Des Bee Dove Permit, Volume 9 - Appendix F~~ ~~refer to Appendix 7-17~~ for complete details). At each of the surface sites two wells were completed ~~(except for CCCW-2, see Plate 6-2 for well locations)~~, one in the alluvial deposits and one in the Spring Canyon member of the Star Point Sandstone Formation. Wells completed in the alluvial deposits will be utilized to compare the well hydrographs to those of Cottonwood Canyon Creek and the Star Point Sandstone. Monitoring data will be included in future Annual Hydrologic Monitoring Reports.

Surface water-quality data collected from Cottonwood Canyon Creek by PacifiCorp indicate that the dominant ions are: calcium, magnesium, and bicarbonate. Water quality and quantity data collected during the year are presented in the Annual Report. Total dissolved solids concentrations in the stream vary from about 250 to 300 milligrams per liter in the mine area, with the lower concentrations normally occurring during the high-flow season. Slight variations have been noted between stations located upstream and downstream from the permit area (SW-1, SW-2 and SW-3).
As expected, total suspended solids concentrations in Cottonwood Canyon Creek tend to vary inversely with the flow rate. Concentrations have varied during the period of record from less than 1 milligram per liter to greater than 1000 milligrams per liter.

Topography in the area is very rugged, with elevation varying from 6800 to over 9000 feet above sea level. Slopes within the mine plan area vary from near vertical cliffs to less than 4 percent (2 degrees) on Trail Mountain. Major escarpments occur to the east and south of the mine plan area.

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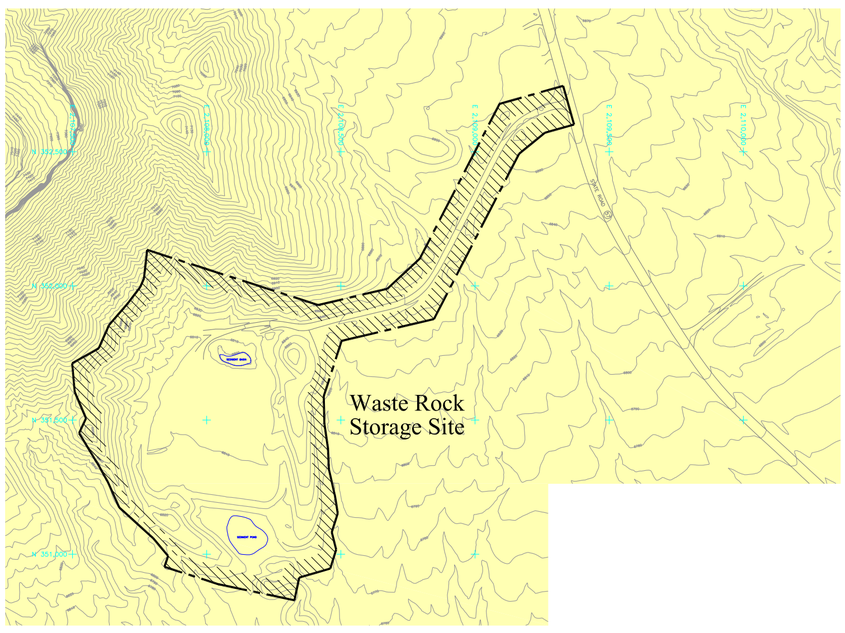
Trail Mountain Mine MRP

Volume 3: Maps

Replace maps: TMS1680C, TMS1454C, TMS1458C, TMS1450C, TMS1684C

LEGEND

TRAIL MOUNTAIN MINE PERMIT BOUNDARY
UNLEASED FEDERAL COAL
STATE COAL LEASE
UTU-64375 FEDERAL COAL LEASE



Coal Ownership
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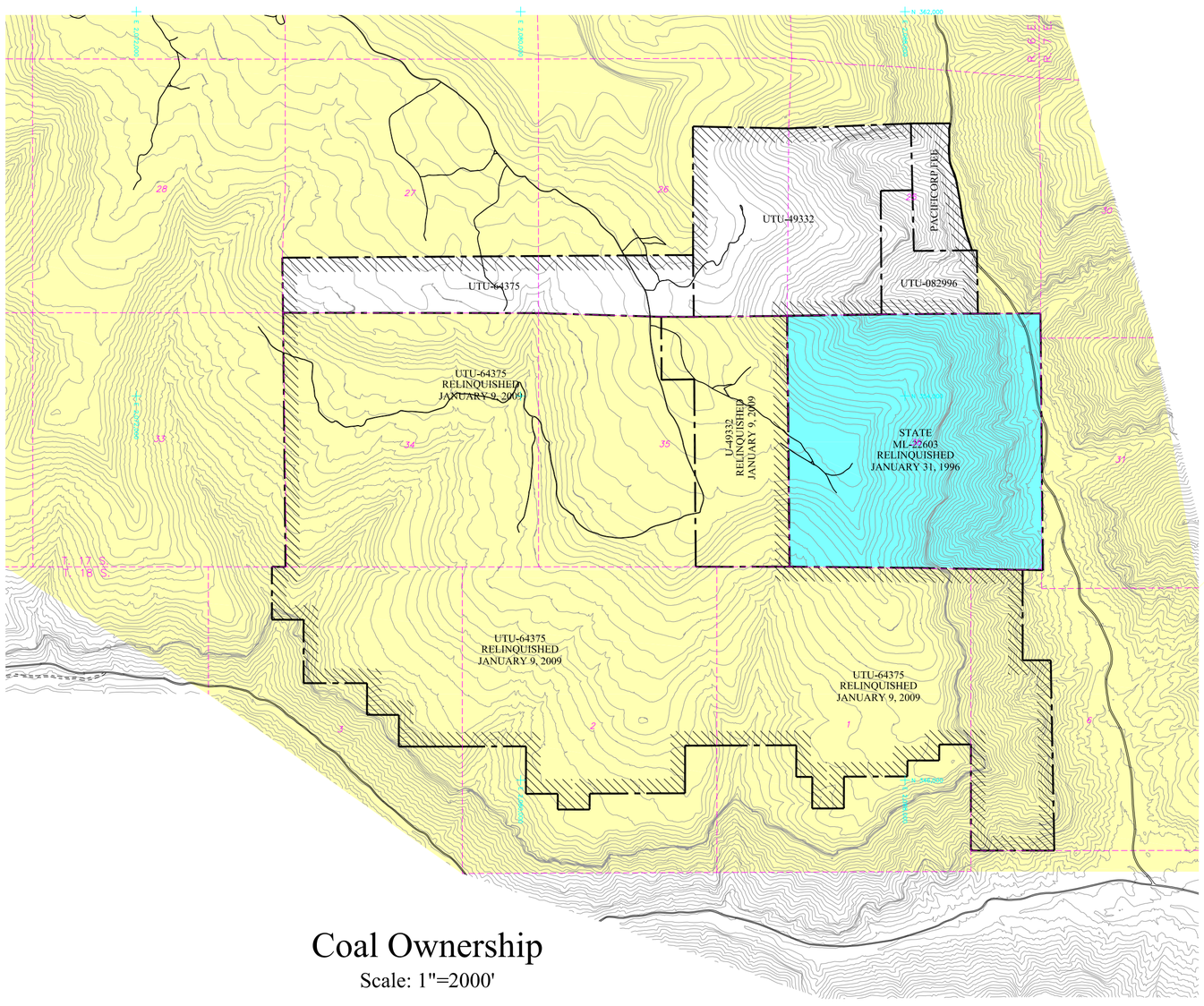

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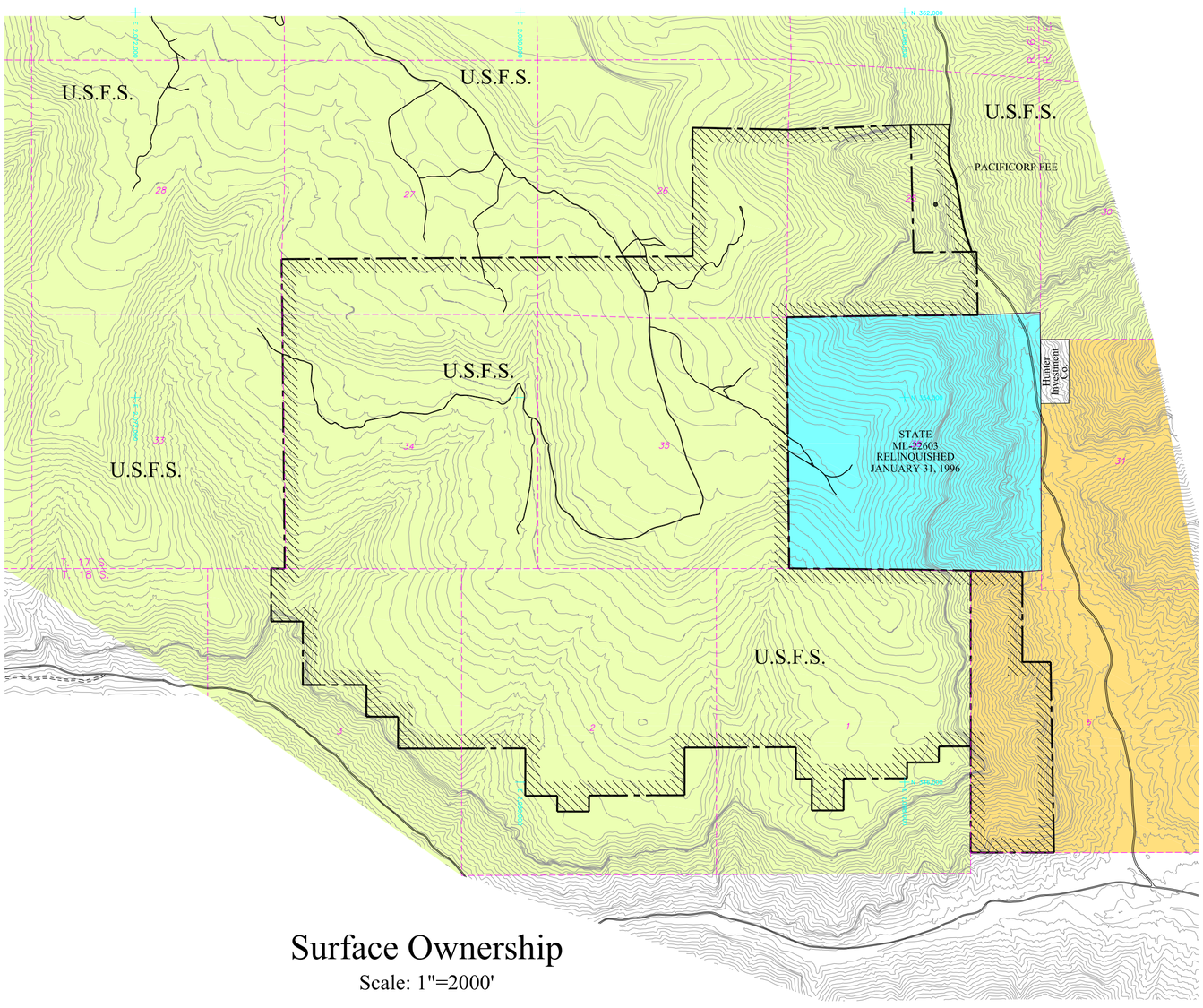
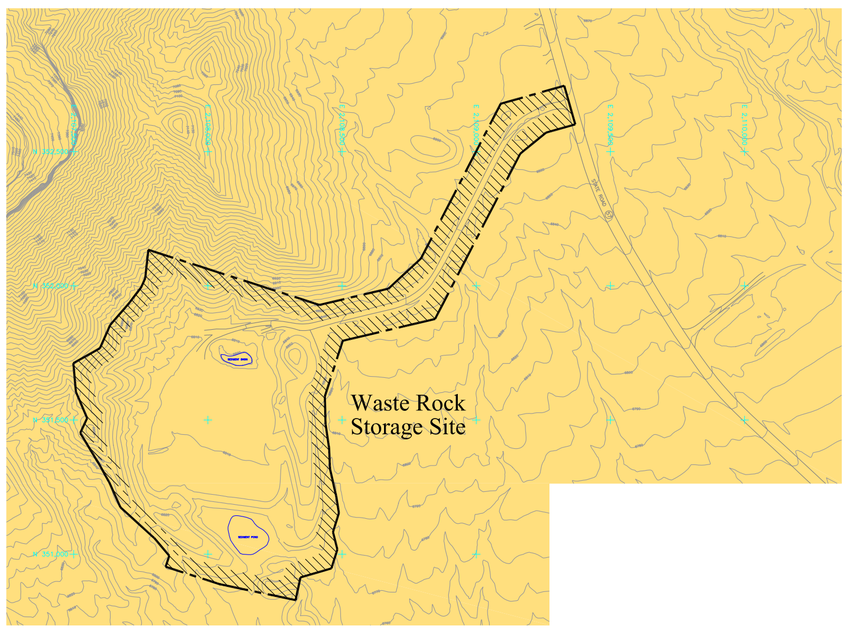


Surface Ownership
Scale: 1"=2000'

LEGEND

TRAIL MOUNTAIN MINE PERMIT BOUNDARY
U.S. NATIONAL FOREST
NATIONAL RESOURCE LAND
STATE COAL LEASE



Surface Ownership
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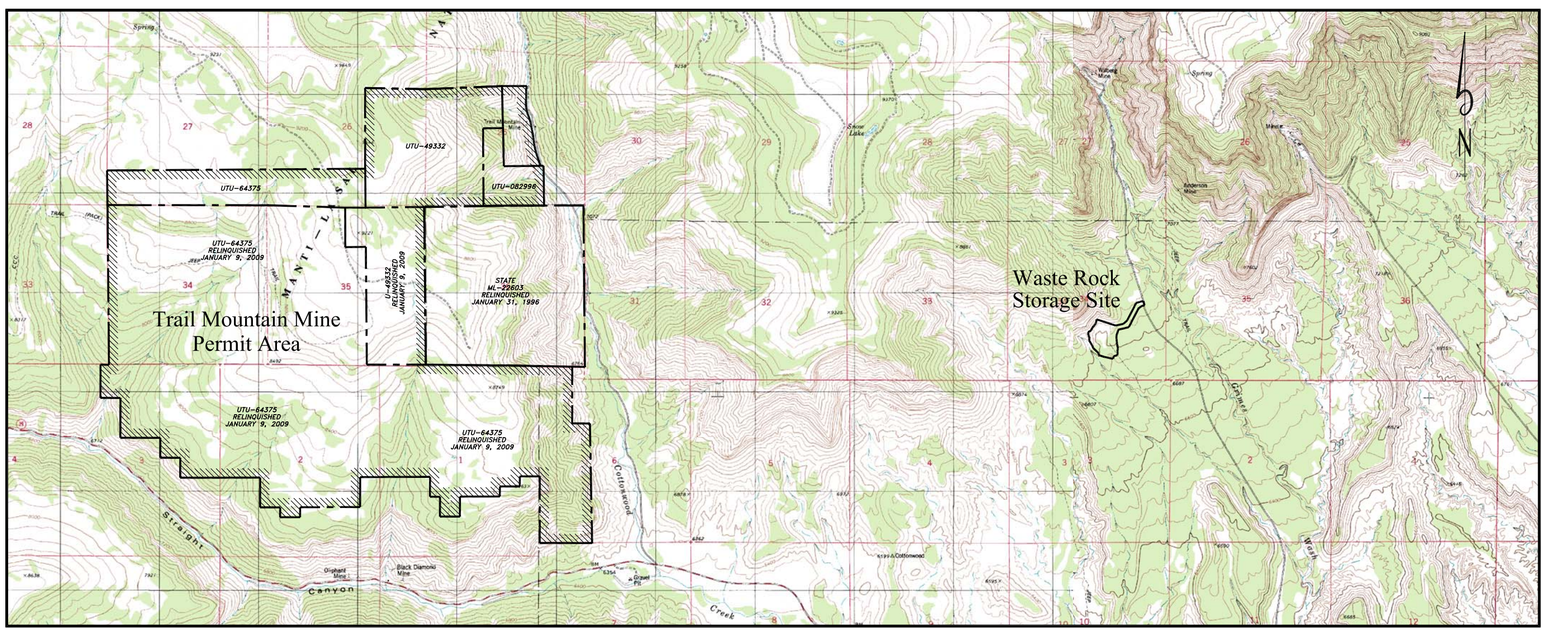
General Location Map
Scale: 1"=3000'



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CAD FILE NAME/DISK#: TMS1454C

1-1

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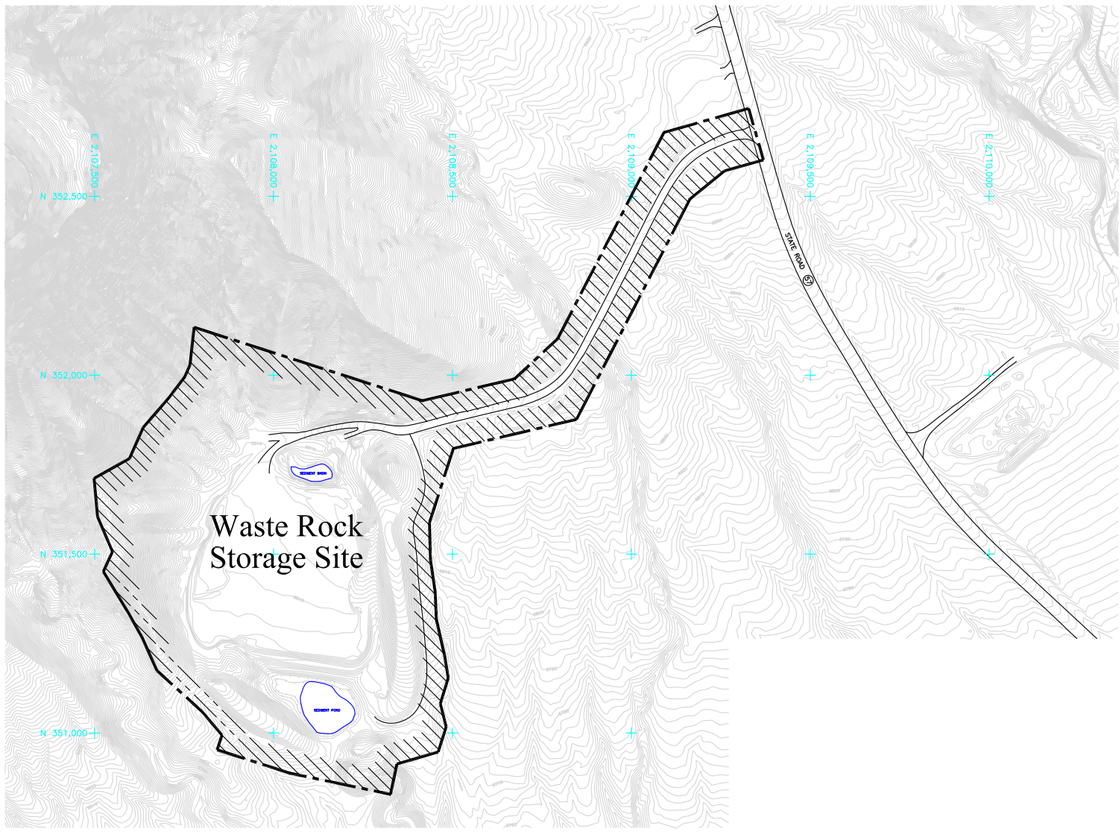
TRAIL MOUNTAIN MINE
SURFACE & COAL OWNERSHIP MAP

DRAWN BY:	K. LARSEN	TMS1454D	
SCALE:	AS NOTED	DRAWING #:	
DATE:	JANUARY 29, 2015	SHEET 1 OF 1	REV. ___



Waste Rock Storage Site

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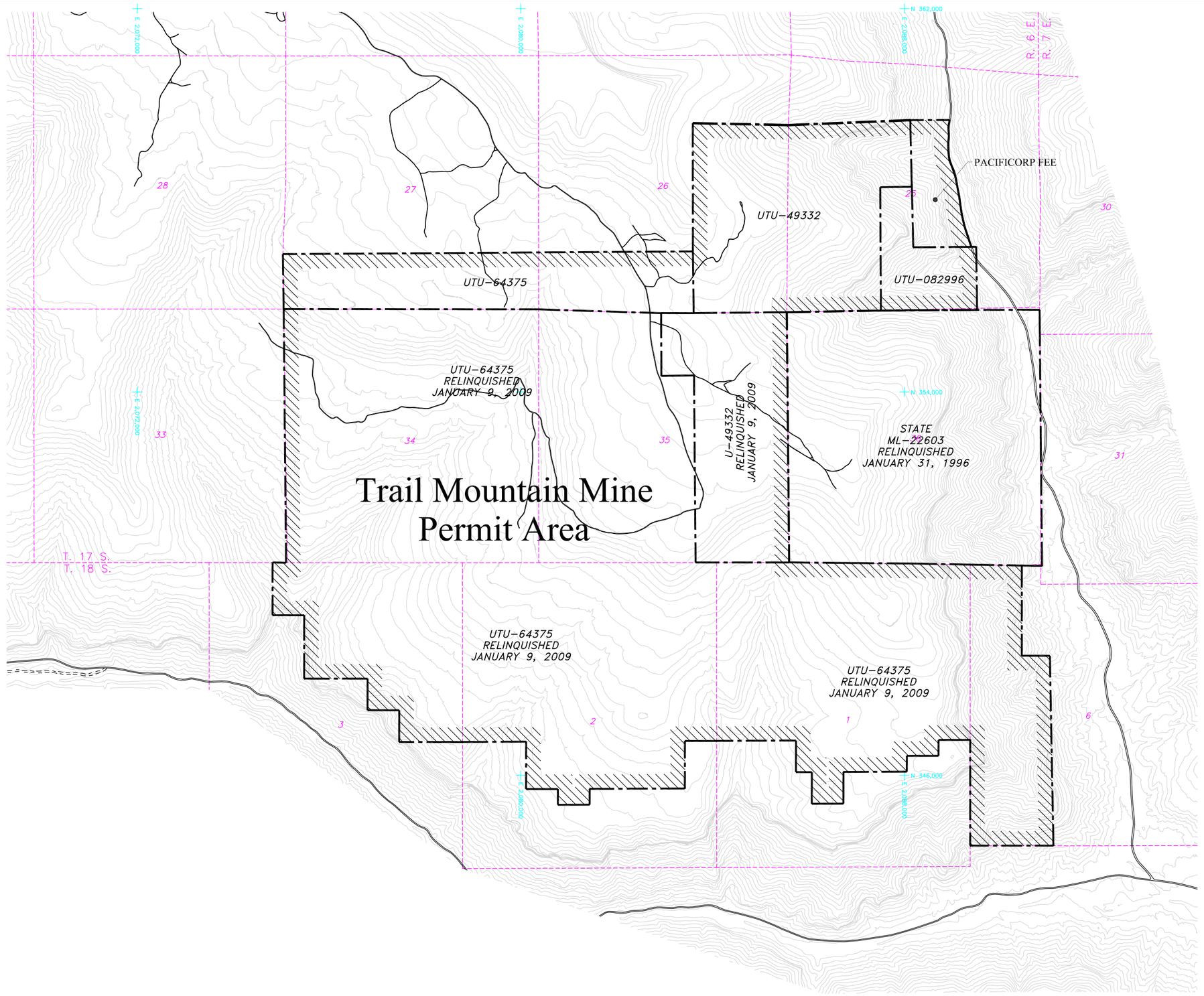

Trail Mountain Mine Permit Area

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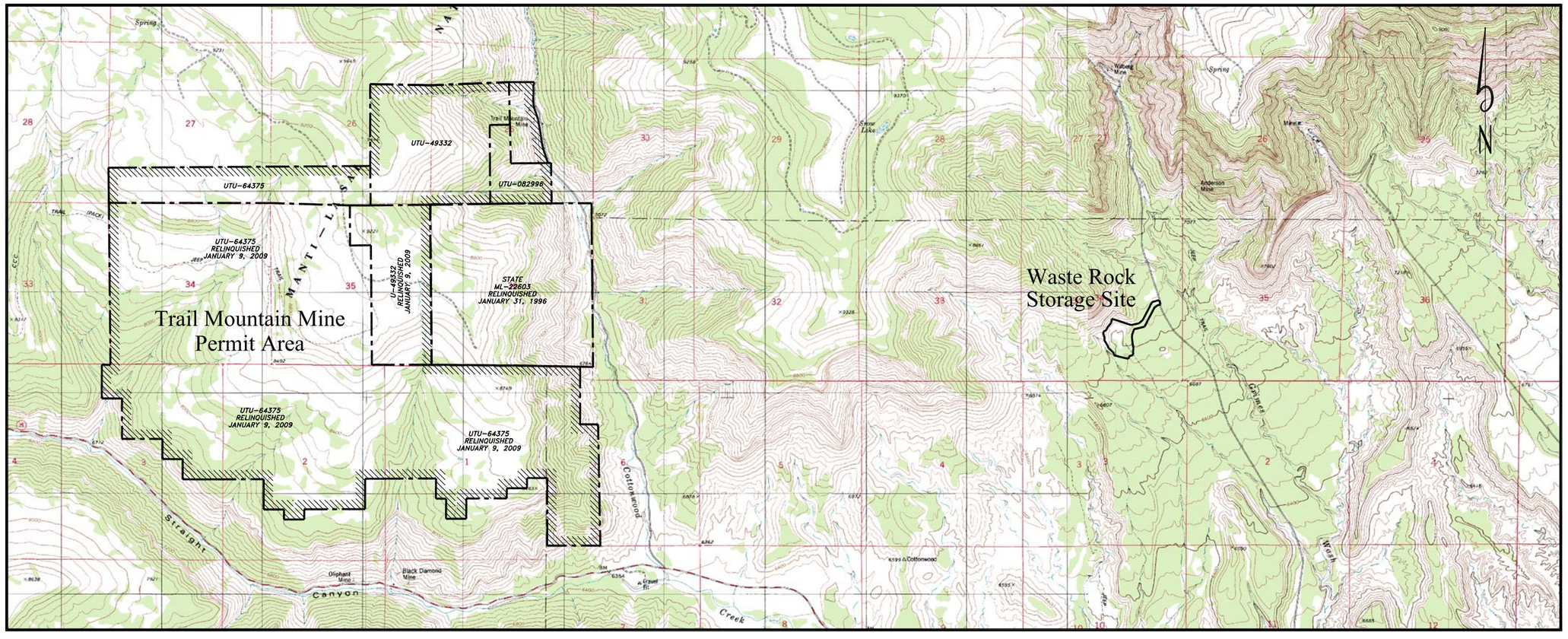
General Location Map

Scale: 1"=3000'



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3-4

CAD FILE NAME/DISK#: TMS1680C

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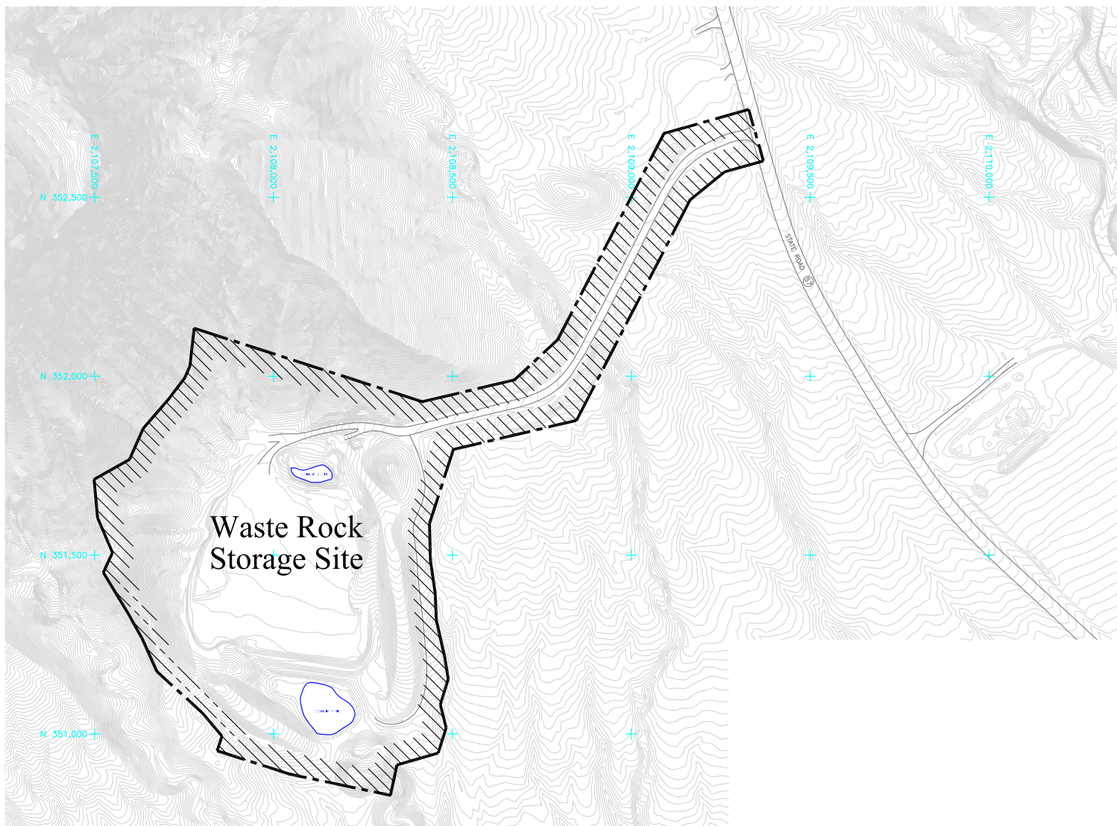
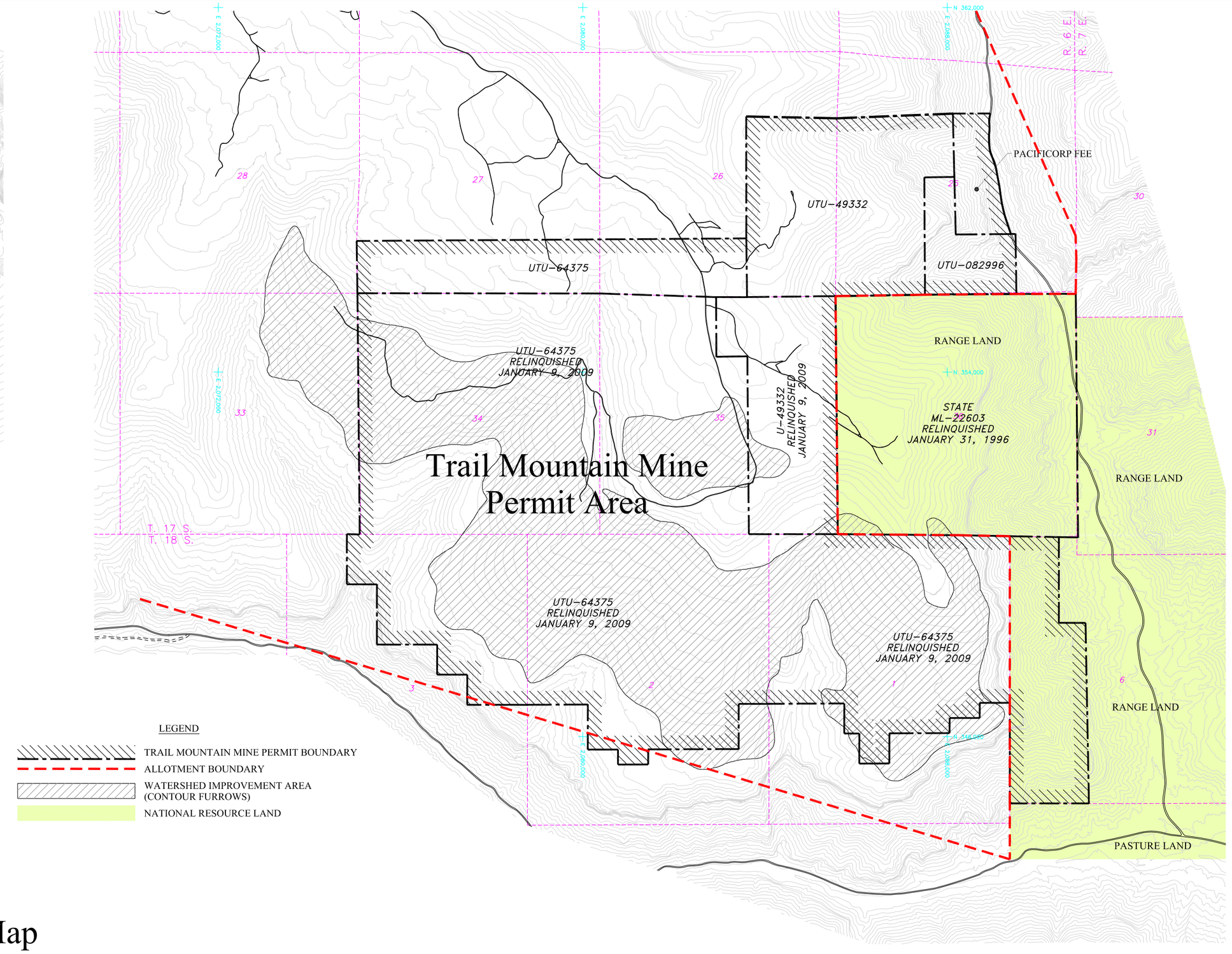
TRAIL MOUNTAIN MINE
PERMIT AREA MAP

DRAWN BY:	K. LARSEN	TMS1680C	
SCALE:	AS NOTED	DRAWING #:	
DATE:	JANUARY 22, 2015	SHEET 1 OF 1	REV.



Waste Rock Storage Site

Scale: 1"=400'

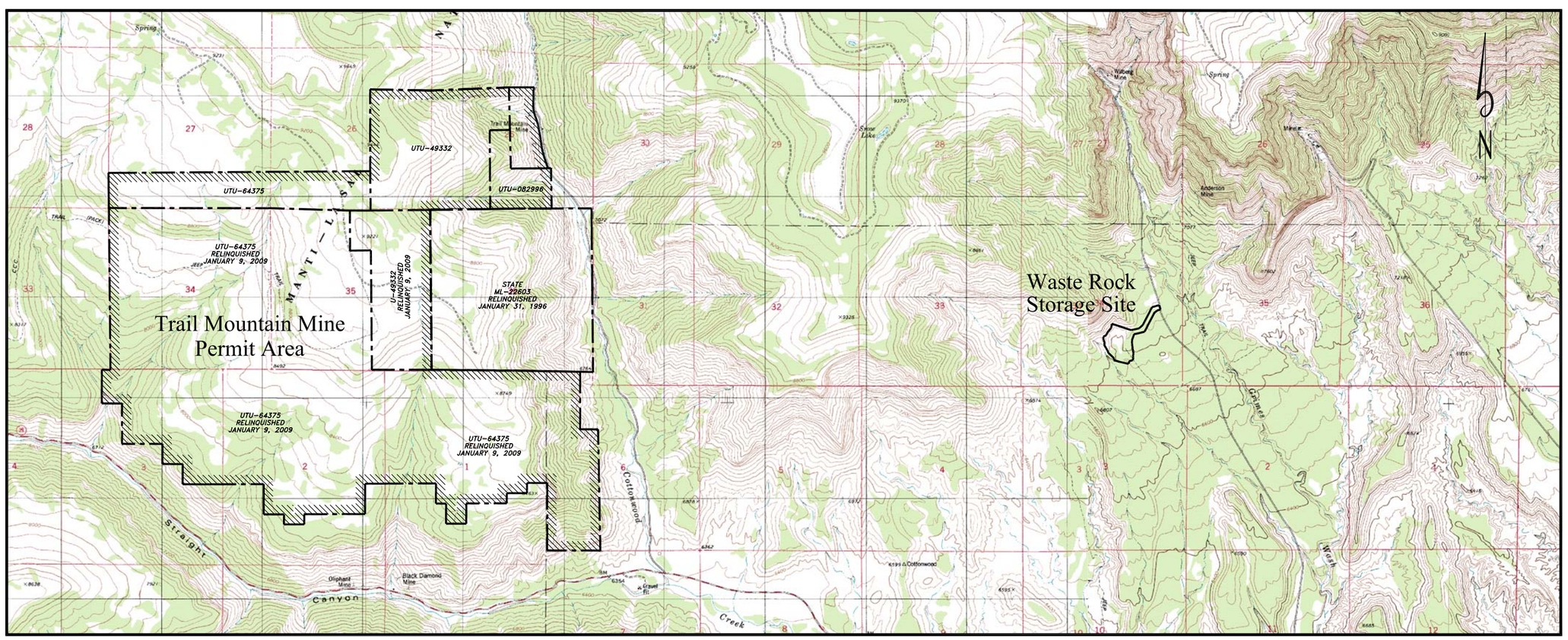


Trail Mountain Mine Permit Area

Scale: 1"=2000'

General Location Map

Scale: 1"=3000'



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MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: TMS1454C

4-3

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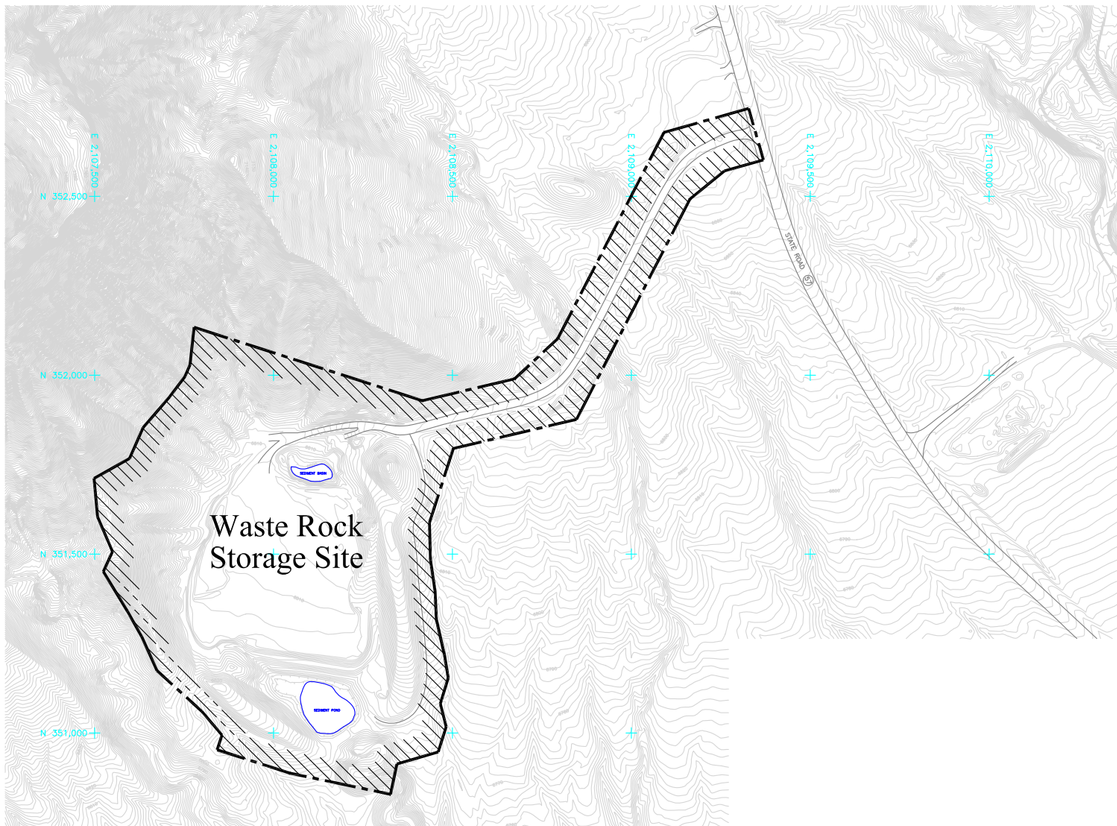
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

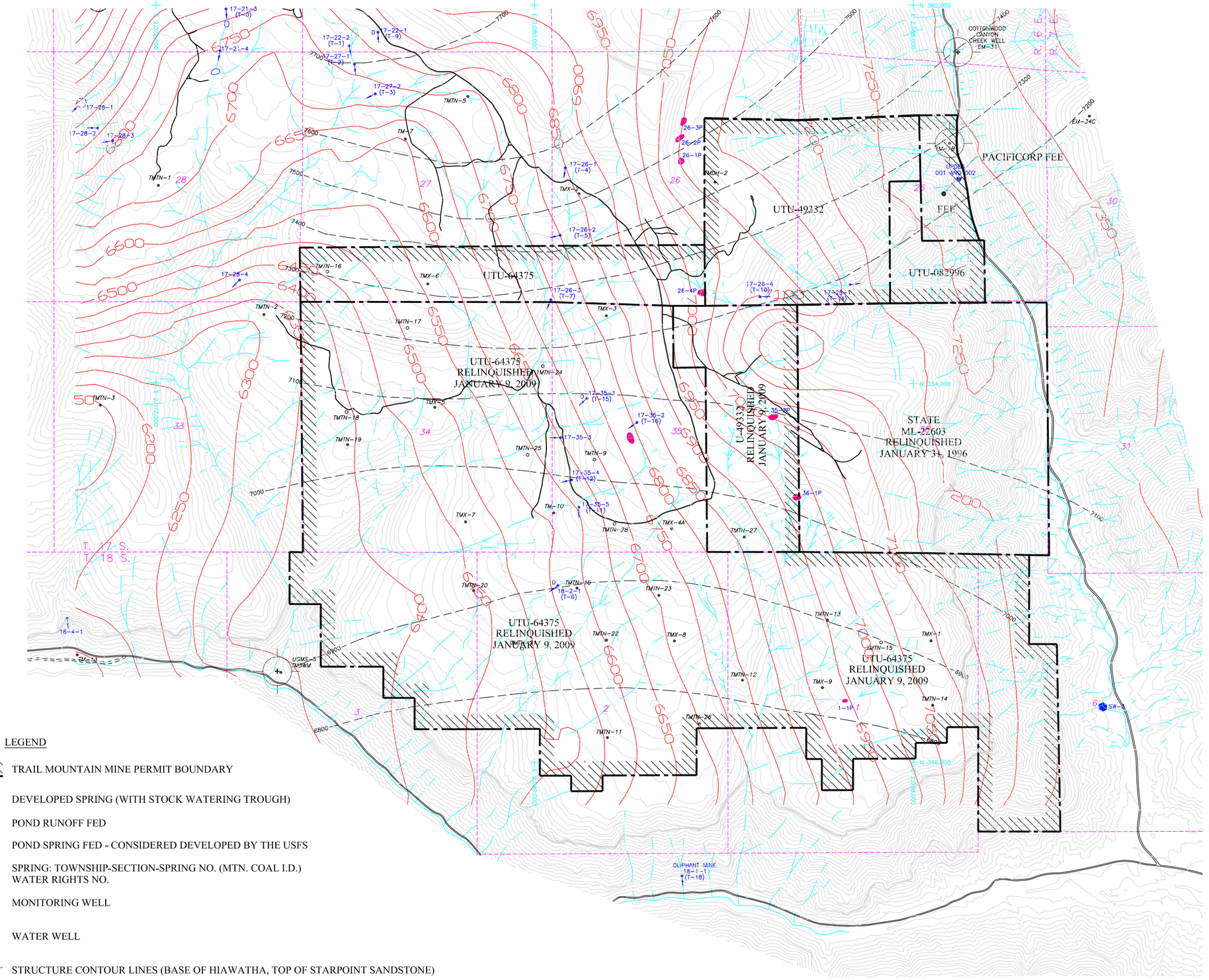
TRAIL MOUNTAIN MINE
LAND USE MAP

DRAWN BY:	K. LARSEN	TMS1458C	
SCALE:	1" =2000'	DRAWING #:	
DATE:	JANUARY 22, 2015	SHEET 1 OF 1	REV. ___



Waste Rock Storage Site

Scale: 1"=400'



LEGEND

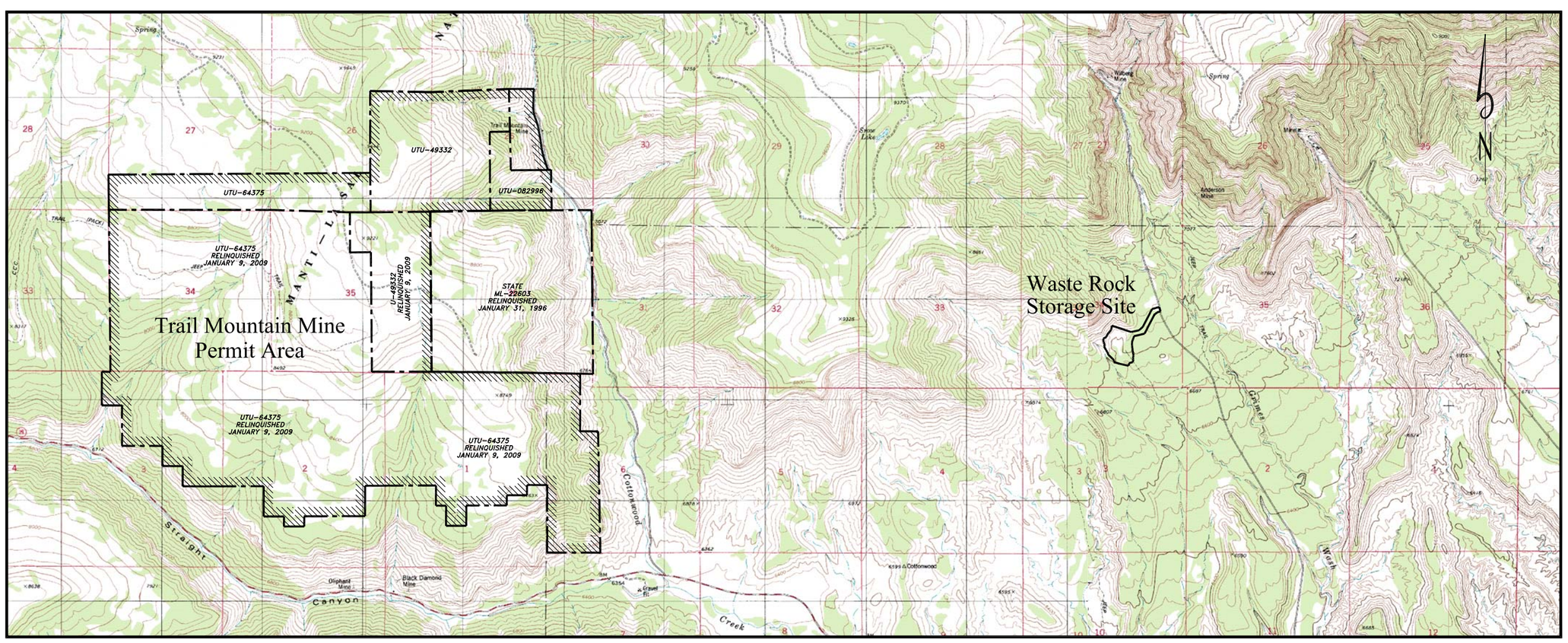
- TRAIL MOUNTAIN MINE PERMIT BOUNDARY
- DEVELOPED SPRING (WITH STOCK WATERING TROUGH)
- POND RUNOFF FED
- POND SPRING FED - CONSIDERED DEVELOPED BY THE USFS
- 17-35-1 (T-15) WR 93 685 — SPRING: TOWNSHIP-SECTION-SPRING NO. (MTN. COAL I.D.) WATER RIGHTS NO.
- P-1 — MONITORING WELL
- WATER WELL
- 6850 — STRUCTURE CONTOUR LINES (BASE OF HIAWATHA, TOP OF STARPOINT SANDSTONE)

Trail Mountain Mine Permit Area

Scale: 1"=2000'

General Location Map

Scale: 1"=3000'



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7-1

CAD FILE NAME/DISK#: TMS1684C

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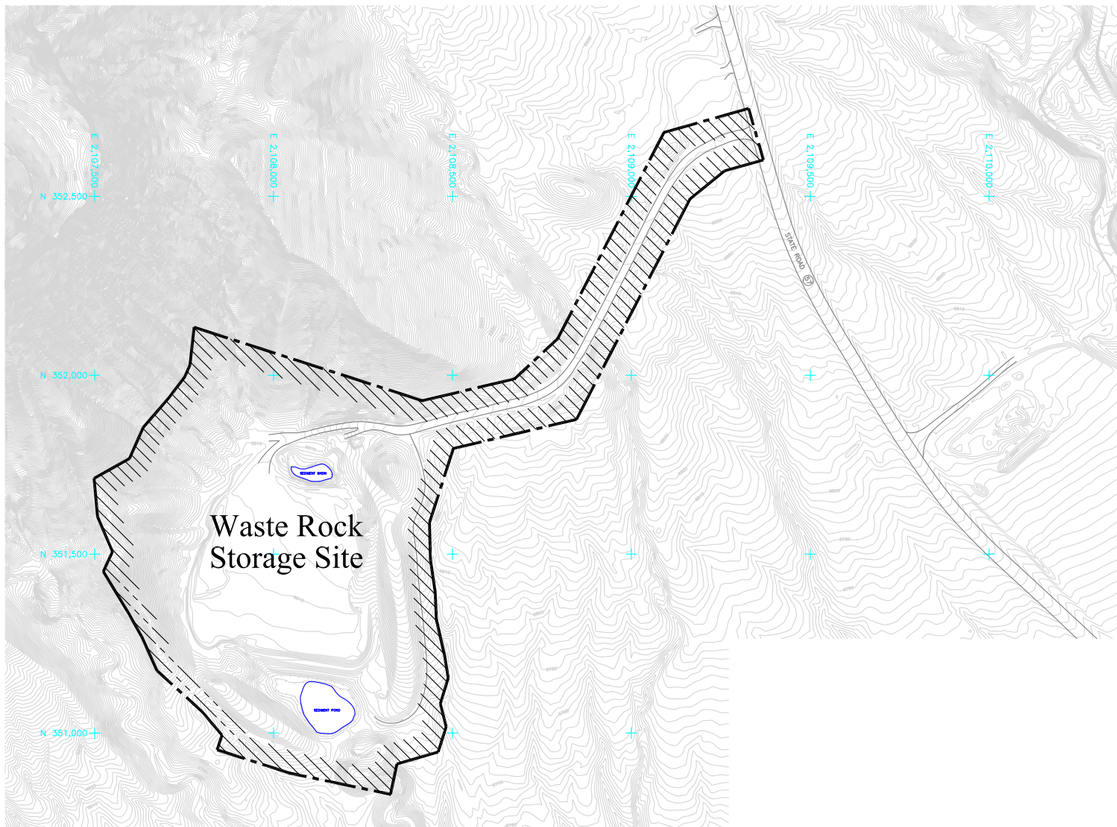
A SUBSIDIARY OF PACIFICORP

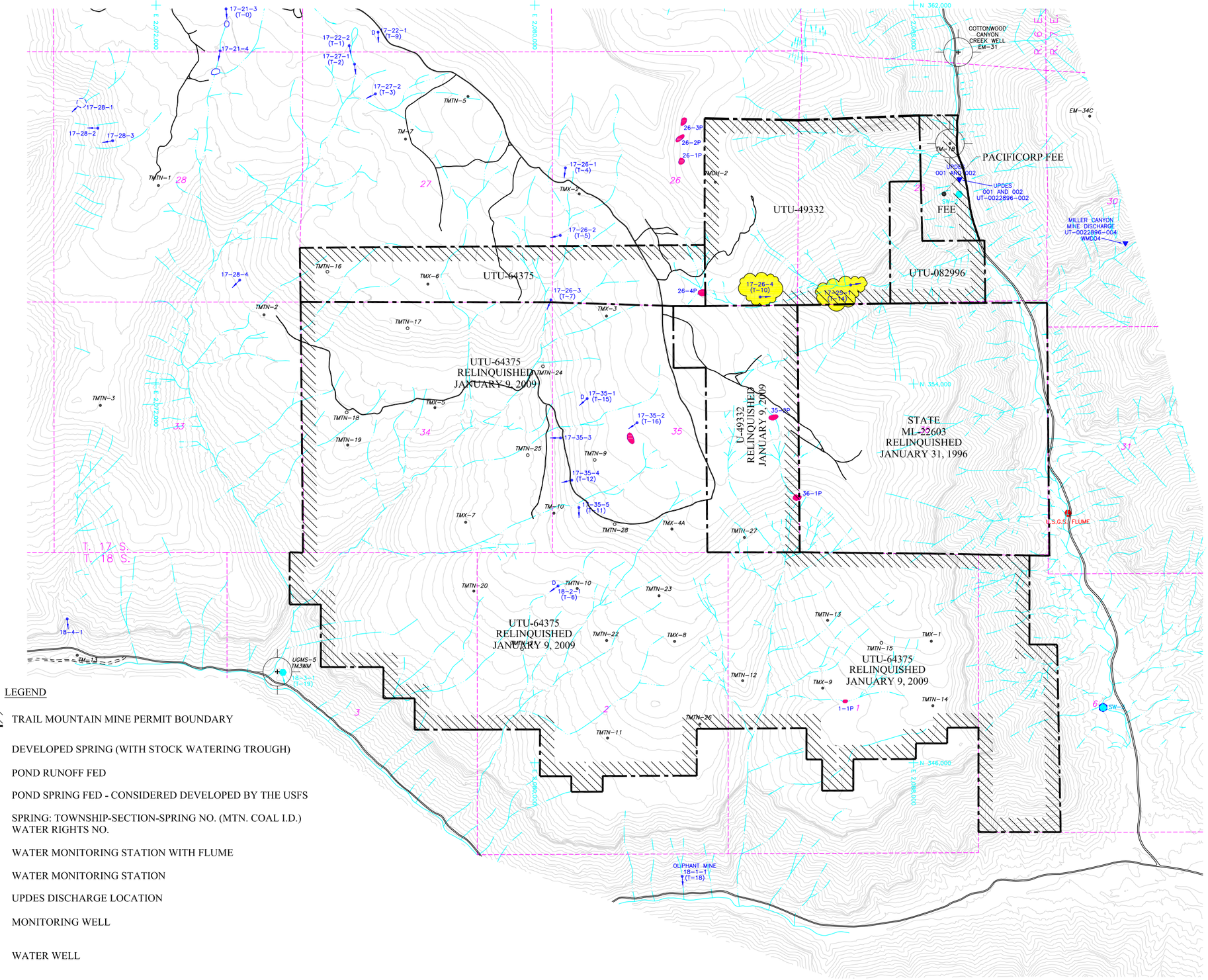
TRAIL MOUNTAIN MINE
LOCATION OF SEEPS & SPRINGS/RELATIONSHIP OF THE BLACKWAWK-STARPOINT AQUIFER TO PROPOSED MINE WORKINGS

DRAWN BY:	K. LARSEN	TMS1684C	
SCALE:	AS NOTED	DRAWING #:	
DATE:	JANUARY 23, 2015	SHEET 1 OF 1	REV.



Waste Rock Storage Site

Scale: 1"=400'



LEGEND

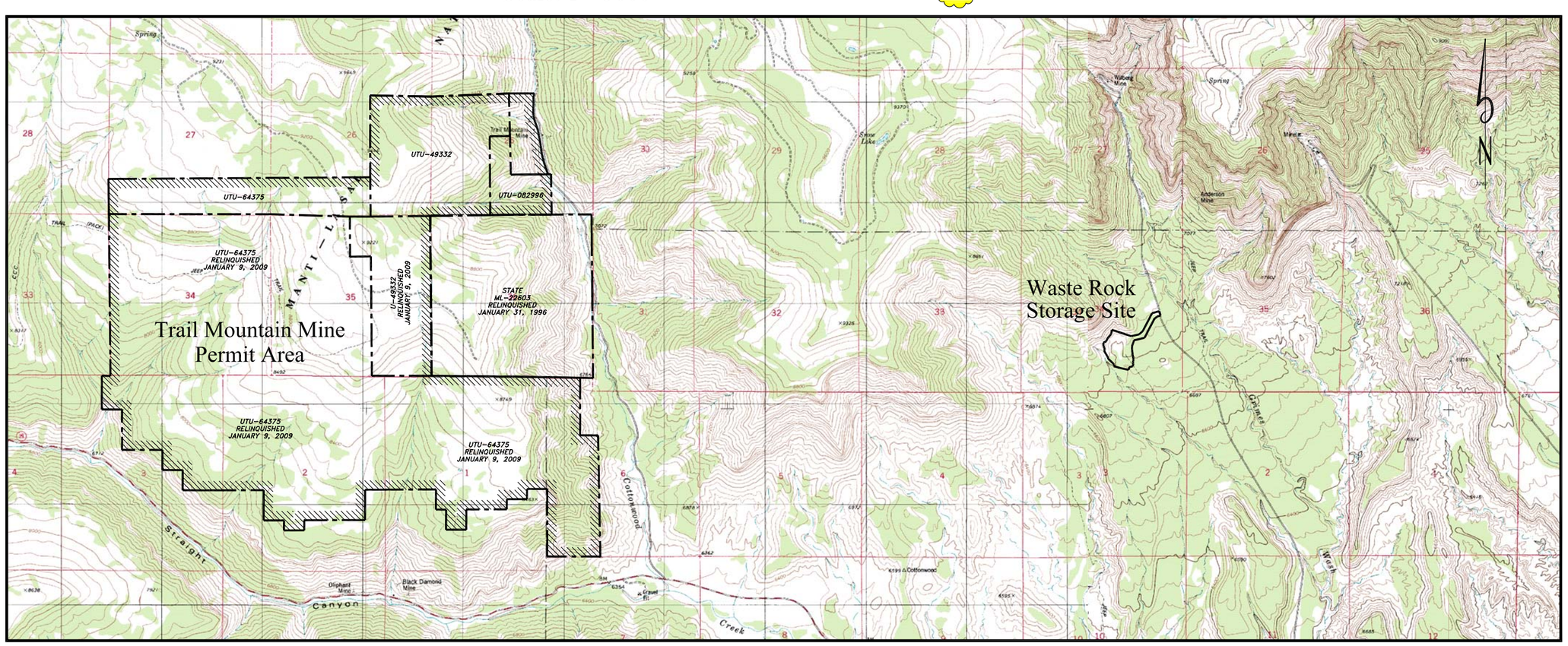
- TRAIL MOUNTAIN MINE PERMIT BOUNDARY
- DEVELOPED SPRING (WITH STOCK WATERING TROUGH)
- POND RUNOFF FED
- POND SPRING FED - CONSIDERED DEVELOPED BY THE USFS
- 17-35-1 (T-15) WR 93 685 — SPRING: TOWNSHIP-SECTION-SPRING NO. (MTN. COAL I.D.) WATER RIGHTS NO.
- WATER MONITORING STATION WITH FLUME
- WATER MONITORING STATION
- UT-0022896-004 — UPDES DISCHARGE LOCATION
- P-1 — MONITORING WELL
- WATER WELL
- SPRING (REQUIRES MONITORING)

Trail Mountain Mine Permit Area

Scale: 1"=2000'

General Location Map

Scale: 1"=3000'



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CAD FILE NAME/DISK#: TMS1450C

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ENERGY WEST MINING COMPANY
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TRAIL MOUNTAIN MINE
WATER MONITORING LOCATIONS
DISCHARGE LOCATIONS

DRAWN BY:	K. LARSEN	TMS1450C	
SCALE:	AS NOTED	DRAWING #:	
DATE:	JANUARY 22, 2015	SHEET 1 OF 1	REV.

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Trail Mountain Mine MRP

Volume 4:

Add Waste Rock Site Volume

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Trail Mountain Mine Waste Rock Site

Volume 4

Grimes Wash Facility

INTRODUCTION

The original Cottonwood/Wilberg Waste Rock Storage Area (BLM right-of-way UTU-37642) was filled to design capacity thus making it necessary to construct a new storage facility to handle the on-going disposal needs of the Cottonwood, Des-Bee-Dove and Trail Mountain mines. Calculations have been made, based on past history, the rate and amount of waste rock generated during mining operations, these quantities have been used to formulate the design of the new facility.

The area selected for the "new" Waste Rock Storage Facility is located on public land managed by the US Department of Interior, Bureau of Land Management. The area is located in the southeast quarter of Section 34, Township 17 South, Range 7 East, west of the coal haul road used for the Cottonwood/Wilberg Coal Mine facility. The area was selected because it is close to the mine facilities and has the required capacity to contain all the waste rock generated at the Cottonwood/Wilberg, Des Bee Dove and Trial Mountain mines for the anticipated life of each mine. Since the Cottonwood/Wilberg is being reclaimed and the Des Bee Dove Mine has been reclaimed, the site is used specifically for the refuse disposal for the Trail Mountain Mine.

The Waste Rock Storage Facility is designed to fit into the existing topography of the area with as little disturbance as is possible to the existing drainage system. Only one ephemeral drainage channel will require a permanent diversion for the construction and operation at the Waste Rock Storage Facility. When the site is completed, only 15.82 acres will have been disturbed. A sediment pond designed as part of the Waste Rock Storage Facility will catch and treat all the runoff from the site before releasing it back into the natural channel. This volume (Volume ~~10~~ 4 of the ~~Cottonwood/Wilberg~~ Trail Mountain Mine Permit) includes detailed construction, operation and reclamation plans for the Waste Rock Storage Facility.

NOTE: This site's name has changed from Cottonwood/Wilberg waste rock site to Trail Mountain waste rock site as of January 2015. Any references found in this document of the site's former name should be construed to indicate the Trail Mountain waste rock site or facility.

RIGHT OF ENTRY

PacifiCorp was granted a BLM right-of-way for the additional permit area (BLM Right-of-Way Grant UTU-65027). This 25.85 acre site was permitted to replace the "old" Waste Rock Storage Area: UTU-37642 which reached designed capacity. The Right-of-Way grant was issued by the BLM on June 8, 1990. The Right-of-Way has been modified to accommodate coal bed methane well sites constructed by Texaco Inc. and to reflect as-built conditions. Listed below is a list of the acreage descriptions for the Right-of-Way including original grant, modifications and disturbance associated with the Waste Rock Storage Facility:

BLM Right-of-Way UTU-65027

Original Grant: 6/8/90	**25.49 acres**
Amendment: 8/15/90 (Staging Area)	**1.78 acres**
Subtotal	**27.27 acres**
1999 Relinquishment (Texaco Well 34-80) Staging Area	**- 1.78 acres**
As-Built Addition (1999)	**0.36 acres**
TOTAL RIGHT-OF-WAY UTU-65027	**25.85 acres**
Disturbed Area (Total Project Life)	**15.82 acres**

During the 1999 Texaco well assessment project, PacifiCorp re-surveyed the disturbed and permit boundaries associated the R/W UTU-65027. Two small areas of disturbance were located outside the original metes and bounds permit boundary description. To rectify this situation, PacifiCorp has revised the R/W description to include all areas of disturbance associated with the Waste Rock Storage Facility. The 1999 relinquished area referred to as the "staging area", was previously disturbed by oil & gas drilling activities in 1956. PacifiCorp retained access to State Highway 57 and has installed permit and disturbed boundary signs as indicated on map 4-1 (CM-10826). Texaco will re-disturb the staging area with development of well 34-80 and will assume reclamation liabilities.

RIGHT-OF-WAY LEGAL DESCRIPTION

BLM Right-of-Way UTU-65027, issued to PacifiCorp, provides right of entry for the Waste Rock Storage Facility. An updated description is found in the PacifiCorp/Energy West Mining Company, Legal and Financial Volume, Appendix G.

RIGHT-OF-WAY PERMIT TERM

Right-of-Way UTU-65027 will terminate on June 7,2025, thirty five (35) years from its effective date unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this grant or of any applicable Federal law or regulation.

MAPS - GENERAL REQUIREMENTS

Land Ownership drawings number ~~CM-10519-WB~~ TMS1454D (Plate 1-1) ~~and~~ ~~CM-10520-WB~~ found in ~~Volume 3~~ this volume show all boundaries of lands and names of present owners of record of those lands, both surface and subsurface, included in or contiguous to the Waste Rock Storage Facility permitted area.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Volume 4

R645-301-200: Soils

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R645-301-240 Reclamation Plan 4
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R645-301-243 Soil Nutrients and Amendments 5
R645-301-244 Soil Stabilization 6
R645-301-250 Performance Standards 6

Appendix A Soils Report

Appendix B Prime Farmland Statement

R645-301-200: Soils

R645-301-210 Introduction

An on-site soil survey was conducted at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility by T.H. Furst in July 1989 (refer to Appendix A). The survey identified that the site correlated well with the Strych soil series and Rockland. The Strych soil series is classified as an Ustollic Calciorthid, loamy-skeletal, mixed, mesic family. This series is a very stony loam, dry, 3-30% slopes, as described in the Carbon-Emery Area Soil Survey, 1970.

The Rockland is comparable to the Badland-Rubbleland-Rock Outcrop complex as described in the Carbon Area Soil Survey of 1970. Refer to the full report of the soils of the Cottonwood/Wilberg Waste Rock Storage Facility in Appendix A.

R645-301-220 Environmental Descriptions

R645-301-221 Prime Farmland Investigation

A prime farmland investigation has been made by the State Agricultural Agent, Dennis Worwood. The results of the investigation found that the land of the Waste Rock Storage Facility shall not be considered prime farmland in that the land:

1. Has not been historically used as cropland.
2. The slope of the land is 10% or greater.
3. The land is not irrigated.
4. Has a very rocky surface,
5. The land has no soil map units that have been designated prime farmland.

Refer to Appendix B for letters from the Utah State Extension and Soil Conservation Service (now Natural Resource Conservation Service).

R645-301-221 Soil Survey

As mentioned above, a complete soil survey conducted by T.H. Furst can be found in Appendix A.

R645-301-222.100

Map CM-10818-WB delineates the different soil types in the area of the Waste Rock Storage Facility. Refer to this map in the Maps Section.

R645-301-230 Operation Plan

The following sections describe the methods for the removal and storage of topsoil and subsoil from the Waste Rock Storage Facility. The construction sequence covers approximately 17 acres that required the removal of topsoil. Subsoil within this area was also removed and stored. The location of the topsoil and subsoil storage areas is found on Plates 4-4 and 4-5 in the Maps Section.

Greater details to the construction and reclamation of the Waste Rock Storage Facility are given in R645-301-500 Engineering.

R645-301-231.100 Methods for Removing and Storing Topsoil and Subsoil

The initial construction of the facility included the construction of the sediment pond, stripping and stockpiling of the topsoil and subsoil, and construction of the initial diversion ditch on the west side of the valley

Topsoil
After the vegetative material was removed from the site the topsoil was stripped and stockpiled as shown on Plates 4-4 and 7-2. Stripping areas and depths were staked to facilitate topsoil excavation. Care was taken to avoid unnecessary compaction of the topsoil material. Following soil placement, the stockpiles were planted with an interim seed mix. Refer to R645-301-300 Vegetation.

Subsoil
Following removal of the topsoil material the remaining material needed for the subsoil stockpile was excavated to the lines and grades specified on the cross-sections. The material was placed, leveled, and compacted in 12" maximum lifts. Rocks larger than the lift thickness were worked into the fill to avoid forming voids. Those rocks that made good rip-rap were separated and hauled and stored for use as rip-rap. Any acid or toxic forming material found was segregated from the stockpile construction and placed on the bottom of the Waste Rock Storage Facility.

R645-301-234 Topsoil Storage

Construction of the Waste Rock Storage Facility commenced as soon as the permit was issued. Sediment control measures were put in place to minimize the effects of the initial construction. Straw bales and silt fences were erected in the natural drainages to treat any runoff during the

initial construction period. Interim revegetation was used on the bare slopes of the soil stockpiles and along the roadway to stabilize and prevent erosion. The topsoil stockpiles have been marked as such. Drainage structures have been constructed and will be maintained to ensure that they are in good repair and capable of handling the design flow rates. Silt fences have been constructed at the base of the soil stockpiles outside slopes. These silt fences will also be monitored and repaired as needed to ensure they are in good working order.

R645-301-240 Reclamation Plan

Construction of the refuse pile will incorporate a plan to allow contemporaneous reclamation of the outside slopes of the pile. Refuse material will be used to construct a berm, approximately 10 feet high, to contain the waste material to be deposited.

Prior to contemporaneously reclaiming the slopes, quality sampling shall be conducted as outlined in R645-536 Coal Mine Wastes. Prior to covering the top surface of the waste pile, quality sampling shall be conducted as outlined in R645-541 Reclamation Plan. These sampling procedures shall be conducted to identify any acid-forming and/or toxic-forming materials within the top four (4) feet of the proposed reclaimed surface. The top four (4) feet consists of 1 foot of waste material and 3 feet of soil cover.

R645-301-242 Soil Redistribution

As reclamation commences of the waste pile slopes, 24 inches of subsoil and 12 inches of topsoil will be placed on the outside slope of the berm and revegetation of the slope. Successive berms will be constructed on top of the previous berms as the level of the waste material rises. There will be a two to three foot offset of the toe of the upper berm to provide a small terrace to reduce runoff velocities. (See Exhibit XXI in Exhibits Section) Once the waste pile construction is complete, the top surface of the pile will be graded for proper drainage and covered with subsoil and topsoil (24 and 12 inches, respectively), then revegetated.

When the final berm is constructed, contemporaneous reclamation will be conducted as explained above on the outside slope. The outside slope will be revegetated with the approved seed mix as outlined in R645-301-341.200.

The remaining subsoil will be stored at the north side of the waste rock pile (refer to Plate 4-7) and seeded. The original subsoil storage will then be covered with approximately 1’ of topsoil, pocked and seeded. The remaining topsoil will then be relocated next to the subsoil pile on the

north end of the site as shown on Plate 4-7. The original topsoil storage area will be pocked and seeded for final reclamation.

The access road to the waste rock pile will be re-routed for a north access to an east access from the pond access road. At this time, the two year time clock (as required by R645-301-763.100 of the Utah Coal Regulations) for sediment pond removal will commence as the remaining waste rock site is filled to the top level of the berm.

When the waste rock pile has been filled to capacity, the subsoil and topsoil stored at the north side of the waste rock pile shall be used to cover the top surface of the pile. The volumes of these piles are ~~sss~~ 5,050 cubic for subsoil, and ~~ttt~~ 2,525 cubic yards for topsoil. This volume will cover the top of the pile with two feet of subsoil and one foot of topsoil. Pocks will be constructed as a means for alternative sediment control for this area. This surface shall be seeded utilizing the seed mix found in R645-301-341.200.

At the end of the two year time clock (mentioned above), the sediment pond and remaining access roads shall be removed to the lines and grades as shown on Plates 4-8 and 4-10. The areas will be pocked and seeded according to the plan in R645-301-700 and R645-301-300. Topsoil stored along the main access road shall be used to cover this regraded area.

R645-301-243 Soil Nutrients and Amendments

The procedure for seed bed preparation for all reclaimed slopes of the Waste Rock Storage Facility site is given in R645-301-300 Biology. All reclaimed areas have been or will be fertilized, mulched and seeded to establish a successful vegetative cover.

Additional nutrients may be needed to improve the physical, chemical, and water holding capacity of the soils. Determining nutritional requirements of the replaced soils shall require sampling of the topsoil material. Sampling shall occur prior to roughening of the surface. Analytical methods for nutrient characterization shall follow the parameters and recommended methods as outlined in Table 3 of the Division's *Guidelines for Management of Topsoil and Overburden (Jan. 2008)*. Soil nutrient application rates shall follow the laboratory recommendations or the stated application rates outlined in R645-301-341.200 Description of Seeding Methods. Samples shall be collected at a rate of two samples per acre to a depth of 1 foot.

R645-301-244 Soil Stabilization

Various sized rocks and boulders (litter) will be randomly placed on slopes of reclaimed areas to control slope slippage, promote microhabitats, and provide a natural aesthetic appearance. Where it is deemed necessary, especially on slopes greater than 20%, a soil tackifier (refer to R645-301-300: Biology, Seeding Techniques) will be used during the reclamation process to stabilize soil material.

Rills and gullies which develop in areas that have been regraded and topsoiled and which either; 1) disrupt the approved postmining land use or the reestablishment of the vegetative cover, or 2) cause or contribute to the violation of water quality standards for receiving streams will be filled, regraded, or otherwise stabilized.

R645-301-250 Performance Standards

All topsoil and subsoil will be removed, maintained and redistributed according to the plan given under R645-301-230 and R645-301-240.

All stockpiled topsoil and subsoil will be located, maintained and redistributed according to plans given under R645-301-230 and R645-301-240.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine Waste Rock Site

A Report of the Soils of the Waste Rock Site - 1989

Volume 4

R645-301-200: Soils – Appendix A

R645-301-200: Soils

Appendix A

A Report on the Soils of the Wilberg Waste Rock Site
1989

FINAL REPORT

A REPORT ON THE SOILS OF THE

WILBERG

WASTE ROCK SITE

A soil survey, and physical and chemical

characterization of soils

for

Utah Power and Light Company

Huntington, Utah

by

T. H. Furst, Soils Consultant
649 Southwest Street
Logan, UT 84321
(801) 752-0403

15 September 1989

Revised 09/15/89
7-2

Tables

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Table 2: Particle size and available water percentage of soil materials from the waste rock site. .4
Table 3: Color, organic carbon, total nitrogen, sodium bicarbonate extractible phosphorus and potassium, rock volume, and water retention difference of soil materials at the waste rock site. 5
Table 4: pH, electrical conductivity, sodium adsorption ratio, calcium carbonate percentage, alkalinity, and ammonium acetate extractible cations of soil materials from the waste rock site 7
Table 5: Land use management classifications for soils of the Waste Rock site.* 9

A REPORT ON THE SOILS OF THE WILBERG WASTE ROCK SITE

Soil survey

An on-site soil survey and sampling expedition was conducted on 27 and 28 July 1989. The survey phase of the reconnaissance involved ascertaining the approximate boundaries of the soil units at the waste rock site. Four different soil phases (map units) were identified in this study as in Table 1. Pedons 1, 2, 4, and 5 were located on the waste rock site. Pedon 3 was located in a nearby vegetation reference area, and has the same taxonomic classification as Pedon 1. Pedon 2 is classified as an Ustollic Calciorthid, 0-20% slopes, which correlates with similar soil phases recognized by the Soil Conservation Service- National Cooperative Soil Survey in Utah. However, a distinct break in the slope in the Ustollic Calciorthids map unit was used to delineate 0-5% and 10-20% slope phases of Ustollic Calciorthids. The slope phases of Ustollic Calciorthids are listed under Pedon 2 (Table 1), as there are no differences in the horizonation of the soil pedons in these two areas. Thus interpretation of the management and use of these areas is similar and the land use management classification of both units falls within the range of the Strych very stony loam, 3-30% slope in Table 5.

The area represented by Pedon 4 on the soils map has inclusions of a similar soil that contains surficial additions of sandy materials derived from the incorporation of weathered or weathering sandstone boulders and rocks. The inclusions are coarser textured than the fine-silty particle-size class characteristic of Pedon 4, but the distribution of the inclusions is not separable from the major soil. Thus, a thin (10-20 cm) surficial layer of loam-textured material may be differentiated from the predominantly silt loam or silty clay loam textures associated with soils derived from the Mancos shale. In general, the coarser-textured inclusions of Pedon 4 are adjacent to and downslope from the local topographic escarpments at the site and occupy 15-20 percent of the map unit. A survey along these escarpments established that these features formed the boundary between the Ustollic Calciorthids, 0-5% and 10-20% slope phases, and the Lithic Ustic Torriorthents 0-5% and 5-30% slope phases.

Soil phases identified at the waste rock site were correlated with soil series or map units from the Carbon-Emery Area Soil Survey (Swenson, et al. 1970) or the Carbon Area Soil Survey (Jensen et al. 1988). Mr. Thomas J. Reedy, a soil correlator with the Utah State Soil Survey Office, was consulted on the matter of what series the the soils of the waste rock site should be correlated to. Soils at the waste rock site were identified as the Kenilworth very stony sandy loam, 0-20% slopes, eroded, and Rock land, a miscellaneous land type, in the Carbon-Emery Area Soil Survey (Swenson et al. 1970).

The Kenilworth soil series was classified as a Xerollic Calciorthid, loamy-skeletal, mixed, mesic family. Fieldwork for the Carbon-Emery Area Survey was done in the period 1957-1961 and soil names and descriptions were approved in 1965. However, the Kenilworth soil series was never formally accepted by the National Cooperative Soil Survey, and by the publication of the

Carbon-Emery Survey in 1970, the Kenilworth soil series had been discontinued. Correspondence retained in the files of the State Office indicates that the Kenilworth soil series was correlated to the Ildefonso soil series, established in Torrance County, New Mexico. The Ildefonso soil series is classified as an Ustollic Calciorthid, loamy-skeletal, mixed, mesic family. With the publication of the Carbon Area Soil Survey (Jensen et al. 1988), the Strych soil series was established and classified as an Ustollic Calciorthid, loamy-skeletal, mixed, mesic family. Thus, the Strych very stony loam, dry, 3-30% slopes, described in the Carbon Area Soil Survey, will be used to infer land use management options for Pedon 2, 0-20% slopes.

The Rock land, miscellaneous land type map unit of the Carbon-Emery Soil Survey (Swenson et al. 1970) encompasses the area of Pedons 1, 3, and 4, and the Badland-Rubbleland-Rock Outcrop complex described in the Carbon Area Soil Survey (Jensen et al. 1988) is the only map unit comparable to this area. Although taxonomic classifications have been determined for Pedons 1 and 4, it is necessary to realize that both these pedons are marginal soils. The minimum thickness of soil required for classification is 10 cm and the minimum vegetal cover to consider a land area soil is arbitrarily set at 10 percent. Thus, while Pedons 1 and 4 are classified, they exist at the limit of soil and not-soil, and there are no formally recognized similar soils in the immediate survey areas.

Table 1: Classification and correlation of map units at the Waste Rock site.

Pedon	Classification; Slope phase of map unit
1	Fine-silty, mixed, mesic (calcareous) Lithic Ustic Torriorthents; 0-5 % slopes
2	Loamy-skeletal, mixed, mesic Ustollic Calciorthids; 0-20% slopes
	Two map units:
	0-5% slope phase
	10-20% slope phase
3	Fine-silty, mixed, mesic (calcareous) Lithic Ustic Torriorthents; 0-5 % slopes
4	Fine-silty, mixed, mesic (calcareous) Lithic Ustic Torriorthents; 5-30 % slopes

Correlation of Waste Rock site map units with currently recognized soil series or map units

Pedon(s)	Soil Series (Map unit) - Classification
1,3,4	Rock land- miscellaneous land type (Swenson et al. 1970)
	Badland-Rubbleland-Rock Outcrop complex (Jensen et al. 1988)
2	Strych very stony loam, dry, 3 to 30 percent slopes
	Loamy-skeletal, mixed, mesic Ustollic Calciorthids (Jensen et al. 1988)

Soil description and sampling

Soil pedons (Pedons 1, 2, and 3) were excavated at three sites and described according to the guidelines in Soil Taxonomy (Soil Survey Staff, 1975). Please note the soils map and pedon descriptions for the location of sampling sites. All pedon descriptions are included in Appendix 1 in this report.

Pedons were sampled by horizon and placed in plastic bags and labeled, prior to transport. The 24-90 cm horizon of Pedon 2 was split into two layers for laboratory analyses. Samples were taken from the 24-50 cm depth and the 50-90 cm depth.

A composite sample of the materials on the northwestern, northern, and northeasten midslopes surrounding the drainage head (site of Pedon 1) was taken in 15 cm increments to a depth of 30 cm. This composite sample is reported as Pedon 4 in the laboratory analyses. These samples too, were placed in plastic bags and labeled prior to transport.

Laboratory Methods

All soil samples were submitted to the Utah State University Soil Test Laboratory, Logan, Utah, on 31 July 1989 for physical and chemical analyses. The results of laboratory analyses were obtained from the Utah State University Soil Test Laboratory on the afternoon of 11 September 1989.

All samples were air-dried, ground and passed through a 2 mm sieve. Soil texture was determined by the hydrometer method (Day, 1965; method 43-5). Available Water Capacity was determined by the water retention difference method (USDA-SCS, 1984; method 4C1). Saturation percentage was determined in the preparation of the saturation paste extract (percent by mass). Electrical conductivity, pH, and alkalinity were determined on saturated paste extracts corrected to 25°C (Rhoades, 1982; methods 10-3.3, 10-3.2, and 10-2.3.1, respectively). The sodium adsorption ratio (SAR) was calculated on the water soluble concentrations of Ca, Mg, and Na (Rhoades, 1982; method 10-3.4). Calcium carbonate content was determined by the pressure-calcimeter method (Nelson, 1982; method 11-2.4). Organic carbon content was determined by the Walkley-Black procedure (Nelson and Sommers, 1982; method 29-3.5.2). Phosphorus and potassium content were determined by extraction with sodium bicarbonate at ph 8.5 (Olsen and Sommers, 1982; method 24-5.4). Rock volume (%) of the soil materials was estimated in the field based on a visual estimate of the amount of gravels, cobbles, and rock fragments excavated during sampling. Soil color was measured with a Munsell[1] soil color chart (1975 edition).

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1. "Munsell" is a registered trademark of Munsell Color, Macbeth A Division of Kollmorgen Corporation, 2441 North Calvert Street, Baltimore, Maryland 21218.

Results and Discussion

Soil Physical Analyses

Results of soil physical analyses are shown in Tables 2 and 3. Soil textural analysis confirms the coarser-textured nature of Pedon 2 and also indicates the influence of the sandstone covered small hill adjacent to Pedon 3, in the textures of the 0-2 and 2-22 cm soil horizons. The textures of the upper two horizons of Pedon 3 represent what the textures of the inclusions of Pedon 4 are like. Results of textural analyses for the C-horizons of Pedons 1, 3, and 4, are not indicative of what was observed in the field. These horizons are composed of 2-20 mm diameter, 2-5 mm thick gravel platelets of weathered Mancos shale. Thus, reported textural results for these C-horizons should be recognized as artifacts of the sample preparation method of grinding samples to pass a 2 mm sieve. Estimates of rock volume are in Table 3 and coarse fragments are described in detail in the pedon descriptions in Appendix 1.

Table 2: Particle size and available water percentage of soil materials from the waste rock site.

Pedon	Depth (cm)	Hydrometer Sand (%)	Hydrometer Silt (%)	Hydrometer Clay (%)	Texture	Available Water Atmospheres 1/3 (%)	Available Water Atmospheres 15 (%)	Saturation Percentage (%)
1	0-2	19	61	20	Silt loam	15.9	6.6	34.4
	2-10	8	60	32	Silty clay loam	16.3	9.0	50.7
	10-26	10	61	29	Silty clay loam	18.4	8.7	53.5
	26-65	16	60	24	Silt loam	18.8	9.0	65.3
2	0-7	72	21	7	Sandy loam	11.2	6.3	43.9
	7-24	76	18	6	Loamy sand	13.5	7.6	44.7
	24-50	61	29	10	Sandy loam	12.8	4.8	30.0
	50-90	60	29	11	Sandy loam	10.3	3.9	30.0
3	0-2	50	34	16	Loam	11.4	5.0	29.1
	2-22	40	32	28	Clay loam	14.6	8.4	35.2
	22-50	14	60	26	Silt loam	18.1	8.6	44.3
4	0-15	14	57	29	Silty clay loam	22.1	12.5	74.7
	15-30	14	57	29	Silty clay loam	22.9	12.0	73.2

The results of saturation percentage analysis, available water retention, and water retention by difference are included in Tables 2 and 3. The saturation percentage ranged from 30-50% for most soil horizons. Again, the saturation percentages for the C-horizon materials of Pedons 1, 3, and 4, are of doubtful validity given the content of coarse fragments in these horizons.

The available water results in Table 2 were used to calculate the values of water retention by difference (Table 3). The available water capacities (% by mass) by water retention

difference between 1/3 and 15 atmospheres are shown in Table 3 for all pedons. Values range from 4.9-10.9 percent (mass basis). Conversion of percent water values (% mass) to an inch/inch basis yields the data in the second column under water retention difference in Table 3.[2] In the upper 4 inches (10 cm) of Pedon 1, approximately 0.17 inches of water will be held between 1/3 and 15 atmospheres. In contrast, the upper 9.5 inches (24 cm) of Pedon 2 will hold approximately 0.30 inches of available water or about 1.75 times that of the soil horizons in Pedon 1.

The Munsell soil color (dry) is listed in Table 3. Measurements of moist and dry colors are included in all pedon descriptions in Appendix 1. The color in Pedons 1, 3, and 4 is largely inherited from the Mancos shale. As the value (dry) is greater than or equal to 5 in these pedons, the role of organic matter as a darkening agent is questionable.

Table 3: Color, organic carbon, total nitrogen, sodium bicarbonate extractible phosphorus and potassium, rock volume, and water retention difference of soil materials at the waste rock site.

Pedon	Depth (cm)	Color (dry)	Org C	Total N	-$NaHCO_3$- P	K	Rock Volume	Water Retention Difference	
			-------%-------		--mg/kg--		---%--	% mass	in/in*
1	0-2	10YR 6/2	0.92	0.065	4.5	162	2	9.3	.046-.055
	2-10	10YR 5/2	1.22	0.075	2.0	148	2	7.3	.036-.043
	10-26	10YR 6/1	0.99	0.060	0.9	89	>90	9.7	.048-.057
	26-65	10YR 5/1	0.72	0.045	0.6	127	>90	9.8	.048-.058
2	0-7	10YR 6/3	1.77	0.145	5.7	255	>50	4.9	.024-.029
	7-24	10YR 5/3	1.80	0.150	3.3	86	>50	5.9	.029-.035
	24-50	10YR 7/3	0.95	0.045	1.3	39	>50	8.0	.039-.047
	50-90	10YR 7/3	0.65	0.035	1.0	42	>50	6.4	.032-.038
3	0-2	10YR 7/2	0.60	0.050	6.4	103	2-5	6.4	.032-.038
	2-22	10YR 6/3	0.60	0.055	2.4	131	2-5	6.2	.031-.037
	22-50	10YR 6/2	0.66	0.050	4.1	103	.90	9.5	.047-.056
4	0-15	10YR 6/1	1.02	0.070	2.4	177	5-15	9.6	.047-.057
	15-30	10YR 5/1	1.01	0.055	1.8	186	>90	10.9	.054-.064

* Values in this column are calculated by assuming bulk densities of 1.25 g/cm³ and 1.5g/cm³ for the low and high estimates for each depth increment.

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2. From: Hanks and Ashcroft (1980:7-8).
   1. Pw/100= mass water content
   2. Mass water content X [bulk density (g/cm3) / density of water g/cm3)] X 1 cm = cm water/cm soil.
   3. [cm water/cm soil] / [2.54 cm/ 1 inch] = available water (in/in)

Soil Chemical Analyses

The results of organic carbon analysis, total nitrogen, and sodium bicarbonate extractable phosphorus and potassium are included in Table 3. Organic carbon ranges from 0.6-1.8% (roughly 1-3% organic matter) in all horizons analyzed. Total nitrogen in the upper two horizons of Pedon 2 is about 2-3 times greater than the total nitrogen content of any horizons of Pedon 1, 3, and 4.

Phosphorus contents of all soil horizons suggest the need for phosphorus fertilization. The USU Soil Test Lab recommendations suggest the application of 0-50 pounds P_2O_5 per acre for grasses and lawns for soil test levels between 1-10 ppm phosphorus.

Potassium contents of all soil horizons is adequate for plant growth with the highest levels generally in the surface soil horizons of all pedons. The USU Soil Test Lab does not recommend potassium fertilization for grasses, and only recommends potassium fertilization for alfalfa and other intensely managed irrigated crops when soil test levels are below 75 ppm K. Zero to 50 pounds K_2O per acre are recommended for soil test levels of less than 75 ppm K.

The rest of the soil chemical analyses are included in Table 4. The pH ranges from 7.8-8.4 across all horizons. Electrical conductivity values are below 0.6 mmhos/cm except in the Cr2 horizon of Pedon 1 and in both increments of Pedon 4. The sodium adsorption ratio is below 0.83 for all soil pedons except Pedon 4. The soil in Pedon 4 has a SAR which ranges from about 22-26 and this correlates with the highest reported values for ammonium acetate extractable sodium (about 10 meq/liter vs < 1 for all other soil horizons). Calcium carbonate content ranges from approximately 10-14% for Pedons 1, 3, and 4. Pedon 4 has calcium carbonate contents which increase from about 25% in the surface horizon to 34% in the 24-50 cm horizon, and then decreases to roughly 31% in the 50-90 cm depth. Alkalinity ranges from about 1-3 meq/liter across all pedons.

Table 4: pH, electrical conductivity, sodium adsorption ratio, calcium carbonate percentage, alkalinity, and ammonium acetate extractible cations of soil materials from the waste rock site

Pedon	Depth (cm)	pH	ECe (mmhos/cm)	SAR	$CaCO_3$ -%-	--(HCO_3^-)- Alkalinity (meq/liter)	----------NH_4OAc---------- Ca	Mg (meq/liter)	Na	K
1	0-2	8.0	0.5	0.72	12.7	3.07	22.18	1.53	0.17	0.62
	2-10	7.9	0.3	0.66	12.7	1.86	29.54	1.83	0.17	0.67
	10-26	8.0	0.2	0.67	13.1	1.86	27.79	2.16	0.14	0.48
	26-65	7.8	2.5	0.23	11.9	1.07	92.25	1.91	0.20	0.64
2	0-7	8.0	0.6	0.69	25.1	3.57	35.28	1.04	0.12	0.51
	7-24	8.0	0.5	0.40	27.3	3.07	37.25	1.43	0.11	0.16
	24-50	8.2	0.6	0.68	34.2	2.57	32.29	2.48	0.09	0.19
	50-90	8.4	0.4	0.67	30.8	3.36	33.38	4.29	0.10	0.51
3	0-2	8.2	0.4	0.66	13.9	3.14	25.00	1.19	0.08	0.12
	2-22	8.0	0.3	0.72	12.9	2.14	32.79	1.81	0.09	0.25
	22-50	7.8	0.3	0.83	11.8	1.64	30.36	2.50	0.11	BDL*
4	0-15	7.9	9.2	22.46	10.3	1.86	59.85	3.97	9.16	0.56
	15-30	8.1	10.6	26.22	11.3	1.43	55.29	4.78	10.90	0.34

*- Below detection limit

Soil management and land use of soils at the waste rock site.

Various land management classifications and ratings are presented in Table 5 for Pedons 2 and 5 (Ustollic Calciorthids, 0-5% and 10-20% slopes, respectively) and Pedons 1, 3, and 4 (phases of Lithic Ustic Torriorthents). As can be seen in Table 5, the soils which constitute the phases of Lithic Ustic Torriorthents have a land capability class of VIII. This is the land capability class with the most severe limitations for land use and these lands are traditionally reserved for recreation, wildlife, or aesthetic purposes. The Lithic Ustic Torriorthents are not rated for any other management categories other than wildlife. This is an indication of a severely limited soil resource.

The Ustollic Calciorthids, 0-20 percent slope phase have a land capability class of VII-s. This indicates that the soil has severe limitations that makes it unsuited to cultivation and use is restricted to grazing, woodland, or wildlife. At the waste rock site, the major limiting factor is that more than 50% of the soil volume is occupied by rock. Thus, the available water is cut in half by this factor. Also, the quantity (volume) of topsoil available for stockpiling and revegetation purposes must be discounted by about half. Other than a tendency towards droughtiness, which is characteristic of all coarse-textured soils in arid environments, there is little chemical evidence to suggest major limitations. The most marked feature of this soil is the increasing calcium carbonate content with depth. This

could indicate a tendency towards cementation, but indurated cemented layers were not detected during pedon excavation.

Of the soils identified at the waste rock site, the Lithic Ustic Torriorthent, fine-silty, mixed (calcareous) mesic family, 5-30 percent slopes would carry the most severe limitations for land use. Excessive slope, high salts, a high sodium adsorption ratio, and an exchangeable sodium percentage of 12-15 are the main limiting characteristics of this soil. Soil materials in this map unit should not be disturbed or stockpiled for revegetation purposes.

The 0-5 percent slope phases of Lithhc Ustic Torriorthents, fine-silty, mixed (calcareous) mesic family, have a major limitation in terms of soil depth. Four-to-possibly-six inches of soil material overlies the weathered horizons of Mancos shale and in Pedon 1, and increase in salts was detected below 26 cm (10 inches). However, 2.5 mmhos/cm is not a terribly limiting salt concentration in terms of revegetation potential. Low gravel content, an available water content of about 0.036-0.055 in/in, low salts, and low sodium content are favorable characteristics of the upper 10 cm of this soil. The results of soil physical and chemical analysis of the 10-65 cm depths of this pedon suggest that if the natural, gravelly-textured Cr horizons are crushed and passed through a 2 mm sieve, the material has roughly similar physical and chemical characteristics to upper 10 cm of soil. Thus, with crushing, soil material for revegetation could be manufactured from the soil horizons between 10 and 65 cm at this site. The silt content of Pedon 1 (about 60%) could indicate an enhanced potential for soil crusting, but this is a feature naturally characteristic of this soil as seen in the platy structure found in the A1 orizon (see Appendix 1, Pedon descriptions).

Table 5: Land use management classifications for soils of the Waste Rock site.*

Management category	Ustollic Calciorthids, 0-5 & 10-20% slopes/ Strych very stony loam, 3-30 % slopes		Lithic Ustic Torriorthents/ Rockland
Capability Classification[1]			
Non-irrigated	VII-s		VIII-s-3
Irrigated	not rated		not rated
Range Site[2]	Semi-Desert Stony Loam (Utah Juniper-Pinyon)		not rated
Total production			
Kind of year	Dry weight (lbs/acre)	Characteristic vegetation	Composition -%-
Favorable	650	Galleta	10
Normal	500	Needle-and-thread	10
Unfavorable	350	Birchleaf mahogony	10
		Mormon-tea	10
		Black Sagebrush	10
		Salina wildrye	5
		Bottlebrush squirreltail	5
		Indian ricegrass	5
Wildlife Suitability Group[3]	3		3
Textural Classification			
Unified	SM or SM-SC		not rated
AASHO	A-2 or A-4		not rated
Hydrologic group[4]	B		not rated
Erosion factors			
K	0.2		not rated
T (tons/acre/year)	2		not rated
Wind erodibility group[5]	8		not rated
Shrink-swell potential	Low		not rated
Frost action susceptibility	Low		not rated
Suitability as a source of:			
Topsoil	Poor- small stones, area reclaim, slopes		not rated
Sand	Improbable- excessive fines		not rated
Gravel	Improbable- excessive fines		not rated
Roadfill	Fair- large stones		not rated

* All information in this table is taken from interpretive tables and descriptions in Jensen et al. (1988) for the Strych very stony loam, 3-30% slopes (map unit 114), and from Swenson et al. (1970) for the Rockland map unit.

Explanation of management classification groups

1. Capability class VII- Soils have severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife. Capability class VIII- Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes. Capability Subclasses: s- shows that the soil is limited mainly because it is shallow, droughty, or stony. Capability Units: 3- inhibiting layer.
2. 60-80% of overstory is Utah juniper, the remainder is pinyon pine (Swenson et al. 1970).
3. Wildlife group 3- wildlife suited to these soils are mule deer, chukar partridge, and cottontail rabbits (Swenson et al. 1970).
4. Hydrologic group B- Soils having moderate (water) infiltration rate when thoroughly wet.
5. Wind erodibility group 8- Stony or gravelly soils, or other soil not subject to wind erosion.

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APPENDIX I.

DESCRIPTIONS OF SOILS

IN THE

WASTE ROCK AREA

Pedon 1

Location: In drainage head on interfluv area, approximately 300 meters SSW of the center of section 34, T 17 S, R 7 E.
Aspect: South.
Slope: 3-5 percent.

Classification: Lithic Ustic Torriorthents, fine-silty, mixed (calcareous) mesic family, 0-5 percent slopes.

Description:
(Colors are for dry soil unless otherwise noted.)

Horizon

A1 — 0-2 cm; Light brownish gray (10YR 6/2), dark grayish brown (10YR 4/2, moist) silt loam; strong, medium to very coarse platy structure; slightly hard, friable, sticky and slightly plastic; strong effervescence; few, very fine roots; abrupt wavy boundary.

A2 — 2-10 cm; Grayish brown (10YR 5/2), very dark grayish brown (10YR 3/2, moist) silty clay loam; moderate, very fine granular structure; loose, loose, sticky and plastic; strong effervescence; few, fine, and few, medium roots; abrupt smooth boundary.

Cr1 — 10-26 cm; Gray to light gray (10YR 6/1), dark gray (10YR 4/1, moist) weathered shale; massive; very hard, extremely firm, very sticky and very plastic; violent effervescence; common fine roots; clear smooth boundary.

Cr2 — 26-65 cm; Gray (10 YR 5/1), very dark gray (10YR 3/1, moist) weathered shale; massive; very hard, extremely firm, very sticky and very plastic; violent effervescence; few very fine roots.

Remarks: Effervescence in Cr1 and Cr2 is due to calcium carbonate coatings on shale fragments. Shale fragments exhibit very little effervescence when broken and the interior is tested with 10% HCl. Shale fragments in Cr1 are fractured to platelets which range from 2-20 mm diameter. Shale fragments in Cr2 range from 20-75 mm diameter and are lighter in color than the Cr1 horizon fragments due to calcium carbonate and/or gypsum accumulation. Gypsum crystals from 2-10 mm diameter were found in the Cr2 horizon.

Pedon 2

Location: Near the 4+00 survey marker for the proposed road for the waste rock site (actually about 3+90); due west of the Wilberg Mine road. In the NW 1/4 of the NE 1/4 of the SW 1/4 of section 34, T 17 S, R 7 E.
Aspect: Southeast.
Slope 1-5 percent.

Classification: Ustollic Calciorthids, loamy-skeletal, mixed, mesic family, 0-20 percent slopes.

Description:
(Colors are for dry soil unless otherwise noted.)

Horizon

A1 — 0-7 cm; Pale brown (10YR 6/3), brown to dark brown (10YR 4/3, moist); very stony sandy loam (Rock volume > 50%); weak, very fine granular structure; loose, loose, nonsticky and nonplastic; strong effervescence; few very fine roots; abrupt smooth boundary.

A2 — 7-24 cm; Brown (10YR 5/3), dark brown (10YR 3/3, moist); very stony loamy sand (Rock volume > 50%); weak, fine and medium subangular blocky structure, breaking to moderate very fine and fine granular structure; soft, friable, nonsticky and slightly plastic; strong effervescence; few fine and common medium roots; abrupt wavy boundary.

C — 24-90 cm; Very pale brown (10YR 7/3), brown (10YR 5/3, moist) very stony sandy loam (Rock Volume > 50%); massive; hard, friable, slightly sticky and slightly plastic; violent effervescence; few fine and few medium roots.

Remarks: Roughly half of this pedon is occupied by rock fragments. Most are cobbles (7.5-25 cm diameter) and stones (>25 cm diameter). Less than 10% of the total rock volume is comprised of gravel-sized particles (2-75 mm diameter). Carbonate coats all surfaces of the rock fragments.

Pedon 3

Location: In reference area (The southeast quarter of the southeast quarter of section 34, T 17 S, R 7 E.), due south of and near the toeslope of a small hill mapped as "Ry" on Map Sheet number 30 in the Carbon-Emery Area Soil Survey (1970).
Aspect: South.
Slope: 3-5 percent.

Classification: Lithic Ustic Torriorthents, fine-silty, mixed (calcareous) mesic family, 0-5 percent slopes.

Description:
(Colors are for dry soil unless otherwise noted.)

Horizon

A1 — 0-2 cm; Light gray (10YR 7/2), brown (10YR 5/3, moist) loam; Strong, medium and coarse platy structure; slightly hard, friable, plastic and sticky; slight effervescence; no roots; abrupt wavy boundary.

A2 — 2-22 cm; Pale brown (10YR 6/3), brown to dark brown (10YR 4/3, moist) clay loam; weak, fine and medium subangular blocky structure breaking to moderate, very fine granular and moderate very fine blocky structures; soft, very friable, very sticky and very plastic; strong effervescence; common fine roots; abrupt wavy boundary.

Cr — 22-50 cm; Light brownish gray (10YR 6/2), dark grayish brown (10YR 4/2, moist) weathered shale; massive; very hard, extremely firm, very sticky and very plastic; violent effervescence; few very fine roots.

Remarks: Shale in Cr horizon is fractured into platelets 2-20 mm diameter, and 1-5 mm thick. Very few, very fine roots penetrate weathered shale along fractures. Most roots are restricted to the A2 horizon.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Prime Farmland Determination

Volume 4

R645-301-200: Soils – Appendix B

R645-301-200: Soils

Appendix B

Prime Farmland Determination
1990

COOPERATIVE EXTENSION SERVICE

UTAH STATE UNIVERSITY

EMERY COUNTY OFFICE
Courthouse
Castle Dale, Utah 84513-0847
(801) 748-2381

January 19, 1990

Mr. Val Payne
Utah Power & Light Mining Division
15 N. Main
Huntington, UT 84528

Dear Val:

This is to confirm that the proposed Cottonwood/Wilberg Waste Rock Storage Facility is not located on prime farmland. The Underground Coal Mining Rules, Section UMC 783.27, paragraph b states:

"Land shall not be considered prime farmland where the applicant can demonstrate one or more of the following:

(1) The land has not been historically used as cropland;

(2) The slope of the land is 10 percent or greater;

(3) The land is not irrigated or naturally subirrigated, has no developed water supply that is dependable and of adequate quality, and the average annual precipitation is 14 inches or less;

(4) Other factors exist, such as a very rocky surface, or the land is frequently flooded during the growing season more often than once in two years and the flooding has reduced crop yields; or

(5) On the basis of a soil survey of the lands within the permit area there are not soil map units that have been designated prime farmland by the U.S. Soil Conservation Service."

The site meets all five of the above listed criteria. It cannot be considered farmland, let alone prime farmland, under any stretch of the imagination.

Please contact me if you have further questions about the agricultural capabilities of this site.

Sincerely,

Dennis R. Worwood
USU Extension Agent

10-10.1

Utah State University, Utah Counties and the U.S. Department of Agriculture cooperating
The Utah Cooperative Extension Service, an equal opportunity employer, provides programs and services to all persons regardless of age, sex, color, religion, national origin or handicap.

utah power
& LIGHT COMPANY
MINING DIVISION
P O Box 310
Huntington, Utah 84528

January 24, 1990

Mr. George Cook
Range Conservationist
United States Department of Agriculture
Soil Conservation Service
350 North 4th East
Price, Utah 84501

Dear Mr. Cook:

Please provide a Prime Farmland determination for the area associated with the proposed Cottonwood/Wilberg Coal Mine Waste Rock Storage Facility as required by the Utah DOGM (see attached memo).

As you are aware, the proposed site is located on public land administered by the Bureau of Land Management. It is located in Section 34, T17S, R7E as indicated on the accompanying drawing, CM-10520-WB.

Attached also, is land use information for the site area. This information is based on the 1988 BLM San Rafael Draft Resource Management Plan and Environmental Impact Statement.

Your assistance and prompt response regarding this matter are greatly appreciated.

If you need additional information please call me at 687-9821.

Sincerely,

Val Payne

Val Payne
Senior Environmental Engineer

VP:do
Enclosure

United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 11350
Salt Lake City, Utah 84147

February 13, 1990

Mr. Val Payne
Utah Power and Light Company
Mining Division
P. O. Box 310
Huntington, Utah 84528

Dear Mr. Payne:

We have reviewed the project for the Cottonwood/Wilberg Coal Mine Waste Rock Storage Facility.

The area is determined to be excluded from all categories of Important Farmland. A completed form AD-1006 is enclosed.

If we can be of further assistance, please call on us at (801) 524-5064.

Sincerely,

Tom Reedy, for

Ferris P. Allgood
State Soil Scientist

Enclosure

The Soil Conservation Service
is an agency of the
Department of Agriculture

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 1/26/90
Name Of Project Cottonwood/Wilberg Coal Mine Waste	Federal Agency Involved BLM owns the land
Proposed Land Use Rock Storage Facility	County And State Emery,Utah
PART II *(To be completed by SCS)*	Date Request Received By SCS 1/26/90

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☐ No ☒

Acres Irrigated	Average Farm Size
0	0

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
None	Acres: %	Acres: %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System: On Site Investigation	Date Land Evaluation Returned By SCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	25			
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide And Local Important Farmland	0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	0			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

10-10.4

(See Instructions on reverse side)

Form AD-1006 (10-83)

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Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

2001 Soil Sampling Analysis Results and Location Map

Volume 4

R645-301-200: Soils – Appendix C

Inter·Mountain Laboratories, Inc.

Report ID: 010106587

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report
Energy West Mining Co.
P.O. Box 310
Huntington, UT 84528

Client Project ID: Cottonwood Mine

Set #0101S06587

Date Received: 04/04/01

Report Date: 01/27/15

Lab Id	Sample Id	Depths (Feet)	pH s.u.	Saturation %	EC mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Available Sodium ppm	Exchangeable Sodium meq/100g
0101S06614	CW3101	0 - 6	7.5	29.6	0.66	2.75	1.27	1.62	1.14	0.42	0.37
0101S06615	CW3201	6 - 12	7.5	30.6	0.62	2.43	1.01	2.72	2.08	1.49	1.41
0101S06616	CW3301	0 - 6	7.5	32.8	0.78	2.89	1.15	3.92	2.75	0.77	0.64
0101S06617	CW3401	0 - 6	7.4	30.8	0.70	2.94	1.05	2.59	1.83	0.56	0.48
0101S06618	CW3501	6 - 12	7.0	34.6	2.53	21.9	9.00	2.93	0.75	0.54	0.44
0101S06619	CW3601	12 - 18	7.3	32.2	2.01	14.7	5.65	4.05	1.27	0.55	0.42
0101S06620	CW3701	0 - 6	7.2	40.5	0.51	3.10	0.90	0.58	0.41	0.40	0.38
0101S06621	CW3801	6 - 12	7.2	42.3	0.48	2.83	1.01	0.84	0.60	0.29	0.25
0101S06622	CW3901	12 - 18	7.4	39.8	0.41	2.57	1.10	0.61	0.45	0.31	0.29
0101S06623	CW4001	0 - 6	7.6	41.5	7.59	18.4	7.38	56.2	15.6	5.95	3.62
0101S06624	CW4101	6 - 12	7.6	37.7	7.59	16.7	7.41	52.8	15.2	5.16	3.17
0101S06625	CW4201	12 - 18	7.7	37.6	10.3	15.8	9.22	81.0	22.9	7.64	4.59
0101S06626	CW4301	0 - 6	7.2	33.5	2.70	22.0	2.31	3.40	0.97	0.50	0.39
0101S06627	CW4401	6 - 12	7.2	34.4	2.46	21.3	4.95	1.26	0.35	0.39	0.35
0101S06628	CW4501	12 - 18	7.2	34.5	2.66	21.8	8.83	1.27	0.33	0.44	0.40
0101S06629	CW4601	0 - 6	7.3	44.4	2.92	20.9	8.17	4.96	1.30	0.86	0.64
0101S06630	CW4701	6 - 12	7.6	42.0	4.36	18.9	20.5	11.7	2.63	1.49	1.00
0101S06631	CW4801	12 - 18	7.6	44.8	6.92	17.1	54.1	22.0	3.68	2.34	1.35
0101S06632	CW4901	6 - 12	7.8	50.6	7.25	17.7	8.42	49.6	13.7	5.71	3.20
0101S06633	CW5001	6 - 12	8.1	48.8	16.0	15.3	20.5	141	33.3	7.80	0.93
0101S06634	CW5101	12 - 18	8.2	48.7	17.9	15.1	24.9	166	37.0	21.5	13.5

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____

Inter·Mountain Laboratories, Inc.

Report ID: 010106587

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Soil Analysis Report
Energy West Mining Co.
P.O. Box 310
Huntington, UT 84528

Client Project ID: Cottonwood Mine

Set #0101S06587

Date Received: 04/04/01

Report Date: 01/27/15

Lab Id	Sample Id	Depths (Feet)	Coarse Fragments %	Sand %	Silt %	Clay %	Texture	1/3 Bar %	15 Bar %
0101S06614	CW3101	0 - 6	14.0	66.0	20.0	14.0	SANDY LOAM	16.8	6.7
0101S06615	CW3201	6 - 12	8.8	61.0	25.0	14.0	SANDY LOAM	15.8	7.0
0101S06616	CW3301	0 - 6	14.8	64.0	20.0	16.0	SANDY LOAM	15.2	7.3
0101S06617	CW3401	0 - 6	10.7	60.0	22.0	18.0	SANDY LOAM	16.5	7.3
0101S06618	CW3501	6 - 12	9.6	62.0	20.0	18.0	SANDY LOAM	17.2	7.7
0101S06619	CW3601	12 - 18	11.0	60.0	23.0	17.0	SANDY LOAM	15.5	7.4
0101S06620	CW3701	0 - 6	14.9	56.0	26.0	18.0	SANDY LOAM	20.7	9.2
0101S06621	CW3801	6 - 12	6.3	47.0	35.0	18.0	LOAM	24.6	10.5
0101S06622	CW3901	12 - 18	5.2	44.0	35.0	21.0	LOAM	25.2	10.3
0101S06623	CW4001	0 - 6	0.0	15.0	57.0	28.0	SILTY CLAY LOAM	20.0	15.2
0101S06624	CW4101	6 - 12	18.7	10.0	62.0	28.0	SILTY CLAY LOAM	19.9	14.7
0101S06625	CW4201	12 - 18	31.9	13.0	60.0	27.0	SILTY CLAY LOAM	19.8	17.0
0101S06626	CW4301	0 - 6	14.2	34.0	42.0	24.0	LOAM	16.7	8.2
0101S06627	CW4401	6 - 12	19.8	34.0	42.0	24.0	LOAM	17.1	9.5
0101S06628	CW4501	12 - 18	25.1	34.0	42.0	24.0	LOAM	16.8	8.8
0101S06629	CW4601	0 - 6	10.0	10.0	58.0	32.0	SILTY CLAY LOAM	17.5	13.7
0101S06630	CW4701	6 - 12	21.0	13.0	57.0	30.0	SILTY CLAY LOAM	17.8	12.5
0101S06631	CW4801	12 - 18	25.7	12.0	60.0	28.0	SILTY CLAY LOAM	18.6	13.8
0101S06632	CW4901	6 - 12	19.0	18.0	49.0	33.0	SILTY CLAY LOAM	21.9	17.6
0101S06633	CW5001	6 - 12	14.2	18.0	48.0	34.0	SILTY CLAY LOAM	20.8	16.8
0101S06634	CW5101	12 - 18	6.7	16.0	50.0	34.0	SILTY CLAY LOAM	19.8	15.6

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
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Set #0101S06587

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Lab Id	Sample Id	Depths (Feet)	TOC	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	Boron ppm	Nitrogen-Nitrate ppm	TKN %	Selenium ppm
0101S06614	CW3101	0 - 6	1.4	<0.01	0.00	352	352	0.60	9.72	0.10	<0.02
0101S06615	CW3201	6 - 12	1.4	0.02	0.62	369	368	0.39	5.94	0.11	<0.02
0101S06616	CW3301	0 - 6	1.5	0.01	0.31	334	334	0.41	8.82	0.10	<0.02
0101S06617	CW3401	0 - 6	1.4	<0.01	0.00	376	376	0.49	8.76	0.11	<0.02
0101S06618	CW3501	6 - 12	1.8	<0.01	0.00	332	332	0.58	10.9	0.11	<0.02
0101S06619	CW3601	12 - 18	1.7	0.02	0.62	326	326	0.57	9.56	0.12	<0.02
0101S06620	CW3701	0 - 6	1.6	<0.01	0.00	215	215	0.62	7.30	0.13	<0.02
0101S06621	CW3801	6 - 12	1.4	0.01	0.31	260	259	0.43	0.90	0.13	<0.02
0101S06622	CW3901	12 - 18	1.0	<0.01	0.00	265	265	0.33	1.08	0.10	<0.02
0101S06623	CW4001	0 - 6	0.8	0.41	12.8	108	95.4	0.72	4.50	0.09	0.02
0101S06624	CW4101	6 - 12	0.9	0.62	19.4	104	84.8	0.67	5.74	0.09	0.02
0101S06625	CW4201	12 - 18	0.8	0.40	12.5	110	97.2	0.68	10.6	0.09	0.10
0101S06626	CW4301	0 - 6	0.4	0.11	3.44	154	150	0.46	1.66	0.06	<0.02
0101S06627	CW4401	6 - 12	0.4	0.29	9.06	170	161	0.62	0.90	0.05	<0.02
0101S06628	CW4501	12 - 18	0.5	0.24	7.50	182	175	0.73	0.68	0.06	<0.02
0101S06629	CW4601	0 - 6	0.6	0.68	21.2	96.0	74.8	1.60	3.68	0.06	<0.02
0101S06630	CW4701	6 - 12	0.6	0.83	25.9	97.3	71.4	1.79	0.52	0.05	0.02
0101S06631	CW4801	12 - 18	0.6	0.64	20.0	105	84.8	1.27	1.06	0.06	<0.02
0101S06632	CW4901	6 - 12	0.6	1.24	38.7	106	67.6	1.36	9.32	0.06	0.02
0101S06633	CW5001	6 - 12	0.6	1.48	46.2	99.6	53.4	1.26	3.28	0.05	0.30
0101S06634	CW5101	12 - 18	0.6	0.97	30.3	102	72.0	1.05	2.34	0.12	0.40

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
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Inter·Mountain Laboratories, Inc.

Report ID: 010106587

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Client Project ID: Cottonwood Mine

Set #0101S06587

Date Received: 04/04/01

Report Date: 01/27/15

Lab Id	Sample Id	Depths (Feet)	pH s.u.	Saturation %	EC mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Available Sodium ppm	Exchangeable Sodium meq/100g
0101S06624	CW4101	6 - 12	7.6	37.7	7.59	16.7	7.41	52.8	15.2	5.16	3.17
0101S06624D	CW4101	6 - 12	7.6	37.2	8.11	19.3	8.45	59.0	15.8	5.15	2.95
0101S06626	CW4301	0 - 6	7.2	33.5	2.70	22.0	2.31	3.40	0.97	0.50	0.39
0101S06626D	CW4301	0 - 6	7.2	33.8	2.55	23.3	2.34	2.32	0.65	0.51	0.43
0101S06629	CW4601	0 - 6	7.3	44.4	2.92	20.9	8.17	4.96	1.30	0.86	0.64
0101S06629D	CW4601	0 - 6	7.3	44.1	3.06	22.1	8.52	5.09	1.30	0.83	0.61

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
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Lab Id	Sample Id	Depths (Feet)	Coarse Fragments %	Sand %	Silt %	Clay %	Texture	1/3 Bar %	15 Bar %
0101S06624	CW4101	6 - 12	18.7	10.0	62.0	28.0	SILTY CLAY LOAM	19.9	14.7
0101S06624D	CW4101	6 - 12	0.0	11.0	61.0	28.0	SILTY CLAY LOAM	19.6	15.6
0101S06626	CW4301	0 - 6	14.2	34.0	42.0	24.0	LOAM	16.7	8.2
0101S06626D	CW4301	0 - 6	0.0	34.0	42.0	24.0	LOAM	16.6	8.5
0101S06629	CW4601	0 - 6	10.0	10.0	58.0	32.0	SILTY CLAY LOAM	17.5	13.7
0101S06629D	CW4601	0 - 6	0.0	13.0	55.0	32.0	SILTY CLAY LOAM	17.7	13.6

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
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Lab Id	Sample Id	Depths (Feet)	TOC	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	Boron ppm	Nitrogen-Nitrate ppm	TKN %	Selenium ppm
0101S06624	CW4101	6 - 12	0.9	0.62	19.4	104	84.8	0.67	5.74	0.09	0.02
0101S06624D	CW4101	6 - 12	0.8	0.64	20.0	104	84.1	0.61	6.22	0.09	0.02
0101S06626	CW4301	0 - 6	0.4	0.11	3.44	154	150	0.46	1.66	0.06	<0.02
0101S06626D	CW4301	0 - 6	0.5	0.09	2.81	154	151	0.44	2.22	0.06	<0.02
0101S06629	CW4601	0 - 6	0.6	0.68	21.2	96.0	74.8	1.60	3.68	0.06	<0.02
0101S06629D	CW4601	0 - 6	0.6	0.67	20.9	96.0	75.0	1.62	3.60	0.06	<0.02

These results only apply to the samples tested.

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Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____

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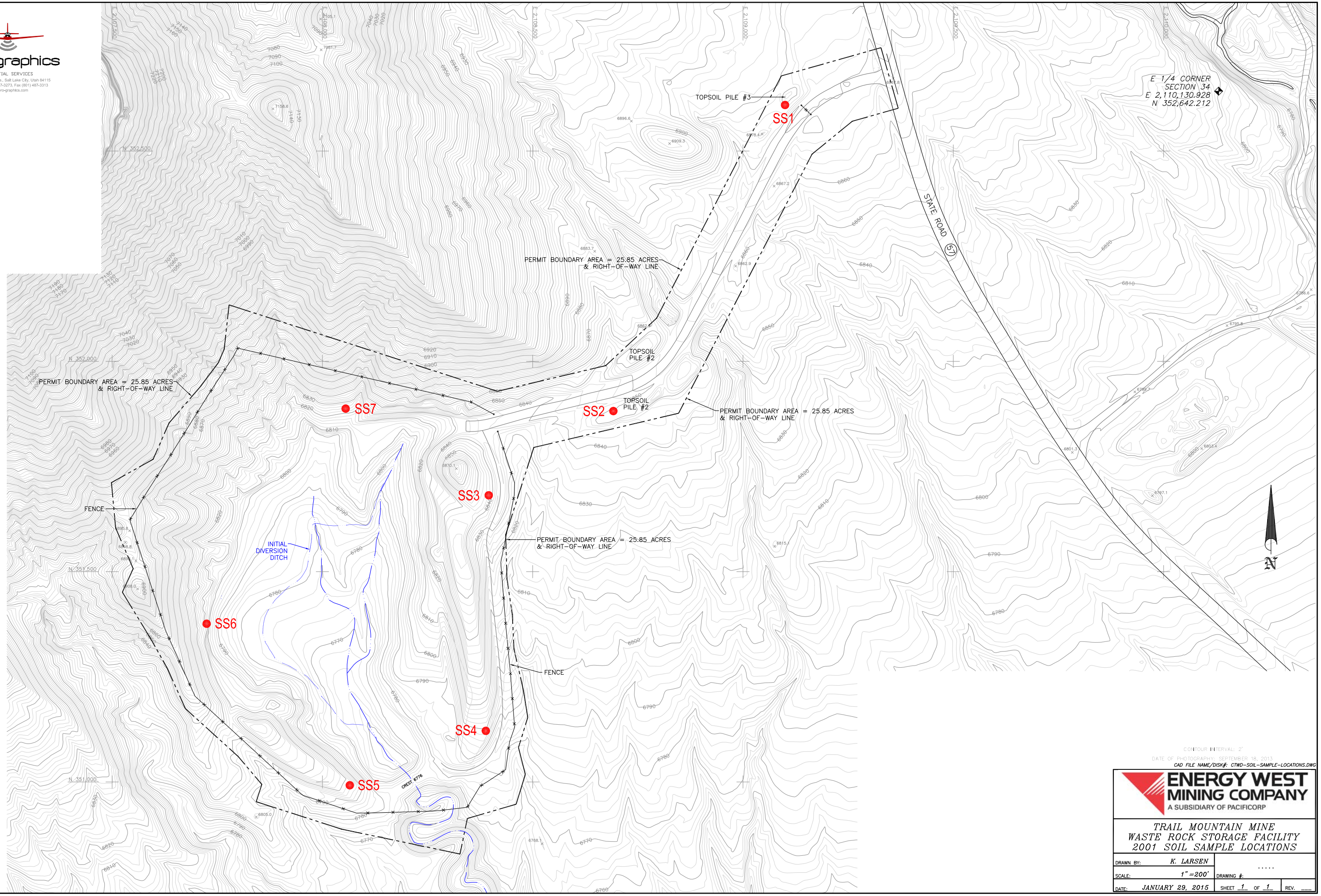

CONTOUR INTERVAL: 2'
DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013
CAD FILE NAME/DISK#: CTWD-SOIL-SAMPLE-LOCATIONS.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
2001 SOIL SAMPLE LOCATIONS

DRAWN BY:	K. LARSEN	.....	
SCALE:	1" =200'	DRAWING #:	
DATE: JANUARY 29, 2015		SHEET 1 OF 1	REV. ____

PacifiCorp

Energy West Mining Company

Trail Mountain Mine Waste Rock Site

Volume 4

R645-301-300: Biology

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Appendix A: ~~Cottonwood~~ Waste Rock Site Vegetation Report

Appendix B: SCS Vegetation Production Report

R645-301-300: Biology

R645-301-310 Introduction

R645-301-320: Environmental Descriptions

The following sections of this application contain descriptions, information, and plans to protect the biological, aquatic, and wildlife resources within and in the vicinity of ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility.

R645-301-321: Vegetation Information

The site location for the proposed disturbed area of the Waste Rock Storage Facility is 1.75 miles south of the Wilberg Mine, Emery County, Utah. The township and range of the site is: Township 17 South, Range 7 East, Section 34. Elevation of the Waste Rock Storage Facility ranges between 6,700 ft. and 7,000 ft. above sea level. The slopes are varied between 3 degrees and 36 degrees and are composed of exposures to the east, west and south.

A vegetation survey was conducted on the proposed disturbed area in August 1989 by Mt. Nebo Scientific. The purpose of the survey was to supply meaningful and scientific data that provides accurate standards for future reclamation of the area. Both proposed disturbed and reference areas were surveyed.

Major plant communities found in the general area are typical salt desert shrublands and comprise of communities with the following plant species as dominates and/or subdominates: Pinyon Pine (Pinus edulis), Utah Juniper (Juniperus ostersperma), Mat Saltbush (Atriplex corrugata), Gardner Saltbush (Atriplex gardneri), Shadscale (Atriplex confertifolia), Salina Wildrye (Elymus salinus), and Black Sagebrush (Artemisia nova). The Waste Rock Storage Facility, including the access road, drainage control diversions and sediment pond will occupy approximately 25 acres of land within the following associated vegetation communities:

Pinyon-Juniper	10 acres
Black Sagebrush	4 acres
Gardner Saltbush	11 acres

A complete report of this survey is found in Appendix A.

Proposed Disturbances

The two types of proposed disturbances are planned for the Waste Rock Storage Facility are: 1) a waste rock storage area; and 2) an access road. The proposed disturbances will impact three plant communities. The access road will dissect a Pinyon-Juniper community whereas the Waste Rock Storage Facility disturbance affects Gardner Saltbush and Black Sagebrush/Salina Wildrye plant communities.

Reference Areas

A reference area is used to develop a standard for success at the time of final reclamation for each of the proposed disturbances. These areas were chosen to comply with guidelines provided by DOGM and had similar slopes, soils, exposures, species composition, precipitation, elevations and other environmental variables.

R645-301-321.200 Productivity

Productivity and range condition estimates for the ~~Cottonwood/Wilberg~~ waste rock site were performed by the US Soil Conservation Service (now Natural Resource Conservation Service), Price, Utah in 1990. A letter from the Service is found in Appendix B.

R645-301-322 Fish and Wildlife Information

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility occupies portions of an Upper Sonoran/Transition life zone ecotone, within the Wasatch Plateau biogeographic area. A general discussion of wildlife species associated with these ecological zones is contained in Volume 2 of the Cottonwood/Wilberg Coal Mine Permit Application.

The area is ranked by the Utah Division of Wildlife Resources (DWR), as critical deer (Odocoileus hemionus) winter range and limited-value elk Cervus canadensis) winter range. DWR also ranks the area as substantial-value yearlong habitat for the Desert Cottontail (Sylvilagus audubonii).

Wildlife movement occurs throughout the area of the Waste Rock Storage Facility; however, the facility will not pose a barrier to big game movement. The facility is not expected to increase the potential for deer road-kill occurrences. (Personal communication with Larry Dalton, DWR, September 8, 1989.)

The BLM (San Rafael Draft Resource Management Plan/EIS) classifies a portion of the area

(approximately 12 acres) as crucial deer winter habitat.

The Waste Rock Storage Facility is within the territories of golden eagles (Aquila chrysaetos) and common ravens (Corvus corax). But, it is outside the buffer zones associated with nest sites of both species. The nearest raptor nests (Raven nests 64A and B) are approximately 0.8 mile from the facility. The golden eagle nest (62) is approximately 1.2 miles from the facility. The nests are included in the raptor monitoring program described in the Cottonwood/Wilberg PAP, Appendix XVI, Part H. Nest 62 was active in 1989 with one (1) young produced. Nests 64A and 64B were inactive in 1989.

R645-301-322.210 Listed Endangered or Threatened Plants and Animals of Emery County

The following plant, fish, and wildlife information tables includes Threatened and Endangered Species, listed in Emery County, Utah, and may be present in the Grimes Wash area. The data from these tables are reference from the Utah Division of Wildlife Resources website at http://www.dwrcdc.nr.utah.gov/ucdc/)

Table 300-1: Endangered or Threatened Plant, Fish, and Animal Species

Common Name	Scientific Name	Status*
Jones Cycladenia	*Cycladenia humilis var jonesii*	T
Last Chance Townsendia	*Townsendia aprica*	T
Barneby Reed-mustard	*Schoenocrambe barnebyi*	E
San Rafael Cactus	*Pediocactus despainii*	T
Winkler Pincushion Cactus	*Pediocactus winkleri*	E
Wright Fishhook Cactus	Sclerocactus wrightiae	E
Humpback Chub	*Gila cypha*	E
Bonytail	*Gila elegans*	E
Colorado Pikeminnow	*Ptychocheilus lucius*	E
Razorback Sucker	*Xyrauchen texanus*	E
Greater Sage-grouse	*Centrocercus urophasianus*	C
Yellow-billed Cuckoo	*Coccyzus americanus*	C
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Black-footed Ferret	*Mustela nigripes*	Extirpated
Canada Lynx *Lynx*	*Lynx canadensis*	T
Gray Wolf	*Canis lupus*	E

*T=Threatened, E=Endangered, C=Canidate

None of the above stated species are found within the area of the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. There is no suitable habitat within this area to support the above stated species.

R645-301-323 Maps and Aerial Photographs

Plate 8-1 in the Maps Section displays the vegetation communities within and adjacent to the Waste Rock Storage Facility. Plate 9-1 shows the locations for winter habitat and critical winter habitat for deer and elk within and adjacent to the Waste Rock Storage Facility.

R645-301-323.100 Reference Area Locations

Plate 8-1 in the Maps Section shows the location for the reference areas for specific plant species in the Waste Rock Storage Facility.

R645-301-320 Operation Plan

The original Cottonwood/Wilberg Waste Rock Storage Area is located south and east of highway 57. This site was filled to its capacity in 1989 (Phase III Bond Release of the original site was granted in July of 2009) making it necessary to construct a new facility to handle the disposal needs of the mine. Calculations have been made, based on past history, the rate and amount of waste rock generated during mining operations, these quantities have been used to formulate the design of a new facility. Refer to R645-301-500 Engineering for these calculations.

The area selected for the Waste Rock Storage Facility is located on public land managed by the US Department of Interior, Bureau of Land Management. The facility is located in the southeast quarter of Section 34, Township 17 South, Range 7 East, west of Highway 57 and used in support of the mining operations. The area was selected because it is close to the mine facilities and has the required capacity to contain all the waste rock generated at the Cottonwood/Wilberg, Des Bee Dove, and Trial Mountain mines for the anticipated life of each mine. Since the Cottonwood/Wilberg is being reclaimed and the Des Bee Dove Mine has been reclaimed, the site is used specifically for the Trail Mountain Mine. ~~Final reclamation has been conducted on the Des Bee Dove mine facilities. These activities were completed in 2006.~~

R645-301-331 Mitigation Measures

The Waste Rock Storage Facility was constructed and is operated in such a manner as to minimize, to the extent possible, disruption of normal wildlife activities in the area.

The Waste Rock Storage Facility is located approximately two (2) miles northwest of Grimes Wash, an ephemeral stream, and approximately four (4) miles from Cottonwood Creek, the nearest fishery. Therefore, no fish species or fish supporting habitat are present on the site and no streams containing biological communities exist within the site. No riparian habitat or wildlife species associated with such habitat exist on the site.

No electric power lines or other transmission facilities have been constructed to serve the Waste Rock Storage Facility.

Fences have been designed and constructed to allow uninhibited big game passage. It is not anticipated that the sediment pond will contain hazardous concentrations of toxic-forming materials; therefore, exclusion fencing of the pond was not proposed.

No persistent pesticides were used on the area, unless approved by the Division. If it is determined that pest control is needed, approved species-specific control measures will be implemented.

To the extent possible, range or forest fires will be prevented, controlled or suppressed, unless directed otherwise by the Division.

The primary post-mining land use is wildlife habitat and livestock grazing. Final reclamation plant species have been selected for that purpose and generally follow information provided to PacifiCorp by UDWR, which is identified as "Recommended Plant Materials and Rates of Application for Restoration or Enhancement of Wildlife Habitats." Adequate wildlife cover is available adjacent to the waste rock storage site; therefore, plant species were chosen primarily for forage production.

As discussed previously, approximately 25 acres of big game habitat will be displaced by the facility; therefore, mitigation in accordance with procedure was proposed prior to construction. Mitigation was achieved through implementation of procedures outlined in the approved Wildlife Habitat Mitigation Plan which was developed for the original Cottonwood/Wilberg Waste Rock Storage Area and the Des Bee Dove haul road (August 27, 1986).

R645-301-333 Mitigation Procedures

Mitigation sites were selected in the adjacent pinyon-juniper community (see Plate 9-1). Selection was made following consultation with BLM, DWR and DOGM. Prior to site work, an archaeological assessment was performed at the proposed locations. No resource conflicts were identified.

Trees were removed at the selected sites by bulldozer. Clearing work followed the natural contour of the sites (ridge tops). The trees were pushed over, crushed by the bulldozer and left on the site to provide some protection for plant establishment. Access to the sites was restricted by placement of large boulders at potential vehicles access points.

Soil samples were analyzed to determine fertilizer application rates and the need for additional soil amendments. The fertilizer and amendments were broadcast prior to removal of the trees and were incorporated into the soil during the tree removal operation.

Seeding took place between October 1st and November 30th. The following seed mixture was broadcast concurrently with tree removal. The seeds were covered during the tree removal operation.

Table 300-2: Mitigation Area Seed Mix

PLANT MATERIAL		LBS/ACRE (PLS)[1]
GRASSES:		
Smooth brome	*Bromus inermis - southern varity*	3
Alkali Sacation	*Sporobolus airoides*	2
Russian wildrye	*Elymus junceus*	2
Indian ricegrass	*Oryzopsis hymenoides*	1
Piute orchardgrass	*Dactylis glomerata*	3
FORBS:		
Utah sweetvetch	*Hedysarum gremiale*	3
Alfalfa	*Medicago sativa - ladak*	3
Small Burnett	*Sanguisorba minor*	2
Yellow Sweetclover	*Melilotus officinalis*	1
Palmer penstomen	*Penstemon palmeri*	1
Lewis flax	*Linum lewisii*	2
SHRUBS:		
Antelope bitterbrush	*Purshia tridentata*	1
Wyoming big sagebrush	*Artemisia tridentata wyomingensis*	1
Great Basin sagebrush	*A. t. tridentata*	1
Mountain sagebrush	*A. t. vaseyana*	1
Fourwing saltbush	*Atriplex canescens*	2
Winterfat	*Ceratoides lanata*	1
TOTAL		30

[1] Seed mixture was supplied by DWR

NOTE: See Cottonwood/Wilberg PAP, Vol. 2, for justification of introduced species.

Following seed covering a layer of alfalfa hay mulch was applied at the rate of approximately two (2) tons per acre. The mulch was crimped into the soil. Crimping was done in such a manner that implement tracks will intercept potential runoff water thus improving the potential for vegetation establishment.

Inspection and evaluation of the mitigation measures was made by PacifiCorp, DWR, BLM and DOGM personnel following the first and subsequence growing season.

Deer pellet-group counts were made in 1989 at the Wilberg/Des Bee Dove mitigation areas. Transects were run on the mitigation sites and in the pinyon-juniper community adjacent to the mitigation sites. The results were an average use level of 37 deer days per hectare at the mitigation sites and 25 deer days per hectare in the adjacent areas. This indicates the use level at the mitigation sites is 48% greater than in the adjacent pinyon-juniper. It is assumed that a similar increase in use can be achieved in the vicinity of the ~~Cottonwood/Wilberg~~ Waste Rock

facility. Mitigation measures were implemented on 45 acres of pinyon-juniper community to compensate for the disturbance of 25 acres at the facility site.

As has been stated, adequate cover exists in the area of the Waste Rock Storage Facility. The habitat requirements which limit the carrying capacity of the area are forage and water. Therefore, in addition to the forage enhancement measures conducted, a guzzler was also installed within the mitigation area. Specifications for the guzzler and its installation were coordinated with DWR, BLM and DOGM.

R645-301-333.100 Maintenance and Monitoring

As required, protective measures shall be used during the active mining phase of the operation. Such measures shall include protections to interim revegetation areas such as topsoil storage piles, subsoil storage piles, and road embankments. Protections shall include the following:

1. Signs will be placed around the planted slopes for their protection.
2. An annual site visit shall be conducted by representatives from the permittee and the Division of Oil, Gas, and Mining. Representatives from the Division shall include a plan specialists and/or a soil specialist. The site visit shall occur between the months of May and September.

R645-301-340 Reclamation Plan

The following discusses the process by which the permitee shall conduct reclamation activities associated with revegetation of the Waste Rock Storage Facility during operations and at final reclamation.

R645-301-341.100 Detailed Scheduled for Revegetation

Table 300-3 shows the timetable by which reclamation will be conducted on the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. Many of the reclamation operations will occur simultaneously.

Table 300-3: ~~Cottonwood/Wilberg~~ WRS Reclamation Schedule													
#	Project	Estimated Scheduling											
	Months	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	Structure Removal		•										
2	Hauling, Backfilling & Grading				•	•							
3	Review of Revegation Plan			•	•								
4	Order Seed			•									
5	Seed Bed Preparation				•								
6	Fertilization				•		•	•					
7	Seeding & Mulching							•	•				

Note: Timeframes are approximate and will vary depending on site conditions and the acreage involved.

Table 300-4 shows the scheduled activities throughout the responsibility period.

Table 300-4: ~~Cottonwood/Wilberg~~ WRS Reclamation Schedule: 1st thru 10th Year											
#	10 Year Revegetation & Monitoring	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
1	Plant Monitoring Disease & Pest Control *	•	•	•	•	•	•	•	•	•	•
2	Soil Stabilization Rills & Gullies	•	•	•	•	•	•	•	•	•	•
3	Contingent Seeding		•		•						
4	Sediment Pond and Access Road Removal			•							
4	Revegetation Inventory for Bond Release				•					•	•

R645-301-341.200 Description of Seeding Methods

Interim Revegetation

Interim revegetation will be implemented on the road embankment slopes, the top and outslopes of the soil stockpiles and the sediment pond banks. Timing of interim revegetation will be in accordance with R645-301-341.100. The Division will be notified prior to the beginning of revegetation activities.

The primary purpose of interim revegetation is soil stabilization: therefore, plant species were selected for their suitability to site conditions, ease of establishment, rate of growth and growth forms. Species selected include some that occur naturally at the site. Refer to Appendix A, "Vegetation of the ~~Cottonwood/Wilberg~~ Waste Rock Site".

300-5: Interim Revegetation Seed List

PLANT MATERIAL		LBS/ACRE (PLS*)
GRASSES:		
Thickspike Wheatgrass	*Agropyron dasystachyum*	2
Streambank Wheatgrass	*A. riparium*	2
Basin Wildrye	*Elymus cinereus*	3
Indian Ricegrass	*Oryzopsis hymenoides*	2
Bottlebrush Squirreltail	*Sitanion hystrix*	1
Sandberg Bluegrass	*Poa sandbergii*	0.5
Alkali Sacaton	*Sporobolus airoides*	0.25
FORBS:		
Prairie Aster	*Aster tanacetifolius*	0.5
Northern Sweetvetch	*Hedysarum boreale*	1
Yellow Sweetclover	*Melilotus officinalis*	3
Firecracker Penstemon	*Penstemon eatonii*	0.5
Alfalfa	*Medicago sativa var. Ladak*	1
SHRUBS:		
Shadscale	*Atriplex confertifolia*	3
Castle Valley Saltbush	*A. cuneata*	3
Winterfat	*Ceratoides lanata*	3
Basin Big Sagebrush	*Artemisia tridentata*	
	sp. tridentata	0.25
TOTAL		26.00

*PLS = Pure Live Seed

The proposed seed mixture and application rates results in approximately 115 seeds per square foot (55 grass, 45 forb, 15 shrub).

Interim Revegetation Methodology

1. Seedbed Preparation

   Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a roughened condition suitable for seed application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling to achieve maximum roughness.

2. Seeding
   The seed mixture will be hand broadcast with "hurrican spreaders" or applied by hydroseeder at the specified rate. The seed and water slurry will remain in the hydroseeder no longer than two hours. Seeding will take place during late Fall after October 1.

3. Fertilizer Application
   The fertilizer will be applied by hand broadcasting with "hurricane spreaders" or as a separate operation of hydroseeding. Fertilizer application rates will be determined from soil analysis (refer to R645-301-243 Soil Nutrients and Amendments). The following is an approximate combination and rate:

Ammonium Nitrate	50 lbs/acre
Triple Superphosphate	75 lbs/acre

4. Seed Covering
   Following hand broadcasting of the seed mixture and fertilizer, and whenever possible on hydroseeded areas, the sites will be hand or mechanically raked to cover the seeds.

5. Mulch Application
   Following hand broadcasting and raking, the seeded areas will be covered with an erosion control mulch blanket or hay mulch (2 tons/acre and netting). The blanket/netting (if used) will be mechanically anchored per the manufacturer's specifications.

All seed and hay mulch will be inspected by a State Department of Agriculture inspector prior to application. Copies of inspection certificates will be submitted to the Division.

Following hydroseeding, a wood fiber hydromulch with tackifier will be applied at the rate of approximately 2000 lbs/acre.

The criteria for interim revegetation success will be the establishment of at least 60% ground cover, on the majority of the slope, which prevents or minimizes erosion. This will be determined by spring and fall site inspections. If erosion damage occurs, it will be repaired and revegetated as needed.

Final revegetation

Final revegetation will be implemented on the completed disposal area upon completion of the backfilling and grading activities. Revegetation will follow the scheduled as outlined in the on Tables 300-3 and 300-4.

The potential for re-establishing vegetation is discussed in R645-301-200 Soils, Appendix A, Final Report: A Report on the Soils of the ~~Wilberg~~ Waste Rock Site (pages 7-9 through 7-11). Additionally, the revegetation success achieved at the existing waste rock site is an indicator that revegetation can be achieved.

300-6: Final Revegetation Seed List

PLANT MATERIAL		LBS/ACRE (PLS*)
GRASSES:		
Thickspike Wheatgrass	*Agropyron dasystachym*	2
Streambank Wheatgrass	*A. riparium*	2
Basin Wildrye	*Elymus cinereus*	3
Galleta	*Hilaria jamesii*	1
Indian Ricegrass	*Oryzopsis hymenoides*	2
Sandberg Bluegrass	*Poa sandbergii*	0.5
Bottlebrush Squirreltail	*Sitanion hystrix*	1
Alkali Sacaton	*Sporobolus airoides*	0.25
FORBS:		
Prairie Aster	*Aster tanacetifolius*	0.5
Northern Sweetvetch	*Hedysarum boreale*	1
Yellow Sweetclover	*Hedysarum boreale*	3
Firecracker Penstemon	*Penstemon eatonii*	1
Scarlet Globemallow	*Sphaeralcea coccinea*	0.5
Alfalfa	*Medicago sativa var. Ladak*	1
SHRUBS:		
Black Sagebrush	*Artemisia nova*	1
Fourwing Saltbush	*Atriplex canescens*	5
Shadscale	*A. confertifolia*	3
Castle Valley Saltbush	*A. cuneata*	5
Low Rabbitbrush	*Chrysothamnus viscidiflorus*	1
Green Mormon Tea	*Ephedra viridis*	5
Mat Saltbush	*Atriplex corrugata*	5
Winterfat	*Ceratoides lanata*	2
Basin Big Sagebrush	*Artemisia tridentata*	
	var. tridentata	0.25
TOTAL		43.00

The post-mining land use for the Waste Rock Storage Facility is wildlife habitat, primarily deer and elk winter range and livestock grazing. Therefore, the species selected for final revegetation were chosen for that purpose.

The proposed seed mixture and application rates result in approximately 190 seeds per square foot (62 grass, 58 forbs, 70 shrub). The shrub seeding rate results in approximately 3049 stems per acre (based on an establishment rate of 1:1,000).

Final Revegetation Methodology

1. Seedbed Preparation

   Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a roughened condition suitable for seed application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling to achieve maximum roughness.

2. Seeding

   The proposed seed mixture will be applied at the specified rates on sloping sites by hand broadcasting with "hurricane spreaders" or with a hydroseeder. The seed and water slurry will remain in the hydroseeder no longer than two hours. Seed application on level areas will be completed by the above methods or through drill seeding. If drill seeding is utilized, the application rates of grasses and forbs will be reduced by fifty (50) percent. Seeding will take place during the late part of the fall season and no earlier than October 1.

3. Fertilizer Application

   The fertilizer will be applied by broadcasting or as a separate operation of hydroseeding. Fertilizer application will be determined from soil analysis (refer to R645-301-243 Soil Nutrients and Amendments). The following is an approximate combination and application rate:

Ammonium Nitrate	50 lbs/acre
Triple Superphosphate	75 lbs/acre

4. Seed Covering

   Following hand broadcasting of the seed mixture and fertilizer, and

whenever possible on hydroseeded areas, the sites will be hand or mechanically raked to cover the seeds.

5. Mulch Application
Following hand broadcasting and raking, the seeded slope areas will be covered with an erosion control mulch blanket or hay mulch (2 tons/acre). The blanket will be mechanically anchored per the manufacturers' specifications.

Following hydroseeding, a wood fiber hydromulch with tackifier will be applied at the rate of approximately 2000 lbs/acre.

Following broadcast seeding, alfalfa hay mulch will be applied at the rate of two (2) tons per acre. The mulch will be mechanically crimped into the soil.

All seed and hay mulch will be inspected by a State Department of Agriculture inspector prior to application. Copies of inspection certificates will be submitted to the Division.

Since the initial construction of the waste rock site (June 1990) to this date of August 2013, three berms have been constructed around the waste rock pile, filled to their capacity, and their side slopes reclaimed according to the approved reclamation plan.

R645-301-350 Performance Standards

Construction/reclamation activities will not take place between December 1st and April 15th.

Signs will be placed around the planted slopes for their protection. The area will be entered only to provide maintenance (as needed) and/or monitoring duties.

Standards for successful revegetation include weed species not more than 10% and no noxious weeds. Weed control will not be undertaken unless it is determined necessary due to weed dominance and delayed rate of succession. All noxious weeds will be eradicated either chemically or physically if they become established on the site. Chemical applications will be approved by UDOGM in consultation with the BLM.

Rodent damage on revegetated areas will be assessed during monitoring periods. Species specific control measures will be implemented as necessary. Control measures must be approved by the Division in consultation with the Utah Division of Wildlife Resources prior to application.

Annual monitoring will also include inspection for rills and gullies. Should these be present, they will be filled and the soil reseeded. Rill and gully repair will follow the regulations set forth in the Coal Rules R645-301-357.360 through R645-301-357.365. As repairs are recognized, the Division will be notified and the affected area will be reported in the annual vegetation report.

All vegetation sampling will be undertaken in the late summer for maximum plant growth. The line intercept or ocular estimation methods will be used to measure cover and species composition. The point-center quarter method will be used to measure shrub and tree density.

Productivity measurements will be a double sampling procedure of clipped plots and ocular estimates. Rectangular plots (6.27 in. x 100 in.) will be randomly located in reference areas and revegetation sites. Sampling will be at the 90% confidence level.

The reference area will be checked to detect any change from natural or man-induced activities and to verify they are in fair or better condition. Sampling of the reference sites at the time of bond release will be conducted concurrently with final reclamation sampling, using the same methodology used to sample the reclaimed areas.

The standards for success to be applied for ground cover and production of living plants on the reclaimed areas at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility will be at least equal to 90% (with a 90% confidence level) to that of the corresponding reference area at the time of bond release. Cover in the reclaimed areas will not be less than that required to achieve the approved post-mining land use outlined in R645-301-400: Land Use and Air Quality.

The criteria for measuring revegetation success will be production, cover, and woody plant density. Although three (3) vegetation communities will be impacted, (Pinyon-Juniper, Saltbush, Black Sage/Grass) only one (1) mixed vegetation community (Shrub/Grass/Forb) will be re-established. Revegetation success will be dependent on soil and slope factors as well as proper species selection.

Revegetation success will be measured against the reference areas (soil type, slope and vegetation factors) as follows:

Revegetated Site	Production (1) & Cover (2)	Density (3)
Access Road (Ustollic Calciorthid, 3-30% slopes)	P-J Reference Area	2500
Waste Material Outslope (Lithic Ustic Toprriorthents, 50% slopes)	Saltbush Reference Area	2500
Top of Waste Material (Lithic Ustic Torriorthents, <5% slope	Black Sage/Grass Reference Area	2500

(1) See SCS Range Condition Survey , Appendix B
(2) See Vegetation Report, Appendix A
(3) A woody plant density of 2500 plants per acre should be adequate for post-mining wildlife habitat. This level is also achievable based on the success observed at the reclaimed cells and berms at the "Old" Cottonwood Waste Rock Site. Vegetation monitoring conducted in 1989 on Cell and Berm 3 indicated an average plant density of greater than 2300 plants/acre.

At the time of bond release or after the 10 year responsibility period has passed, similarity between the reclaimed area and corresponding reference area will compare life forms and/or species present in each community by the use of similarity indices. Indices of similarity provide the means of mathematically comparing the plant communities in the two areas. One, or a combination of the three indices found in the Vegetation Guidelines, February 1992, will be used to determine the similarity between the reclaimed and reference area. If another index (or combination thereof) is used, Division approval will be required. Similarity will be considered successful when the index value is at least 70% of the reference area.

All vegetation monitoring data will be reported annually. This report will contain a narrative of the actual monitoring methods used, results, and a discussion of the overall success or failure of each area. Raw data sheets will also be included in the annual reports. Standards attained at the time of bond release will be approved by the Utah Division of Oil, Gas and Mining (UDOGM).

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Waste Rock Site

Vegetation Report - 1989

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R645-301-300: Biology – Appendix A

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R645-301-400: Land Use and Air Quality

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Appendix A: Cultural Resource Evaluation

R645-301-400: Land Use and Air Quality

R645-301-410 Land Use

This chapter includes the general requirements to meet the State of Utah's regulatory requirements to conduct coal mining and reclamation operations at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility and operate these facilities in Grimes Wash as part of the ~~Cottonwood/Wilberg Mine and~~ Trail Mountain Mine refuse disposal site. This application includes descriptions of the premining and proposed postmining land uses.

The post mining land uses for the area, based on the BLM Land Resource Management Plan and Emery County Zoning regulations, are wildlife habitat and livestock grazing.

R645-301-411 Environmental Description

The site for the proposed disturbed area of the Waste Rock Storage Facility is located 1.75 miles south of the Cottonwood/Wilberg Mine, Emery County, Utah. The legal description of the site is: Township 17 South, Range 7 East, Section 34. Elevation of the site range between 6,700 ft. and 7,000 ft. above sea level. The slopes are varied between 3 degrees and 36 degrees and are composed of exposures to the east, west and south.

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility occupies approximately 25 acres of public land administered by the U.S. Department of the Interior, Bureau of Land Management. It is located in the San Rafael Resource Area of the Moab District, within BLM ecological sites described as follows:

<u>Semi-desert shallow loam</u>
The vegetation associated with the semi-desert shallow loam site consists of Utah juniper and pinyon-pine overstory with black sagebrush and Salina wildrye understory. Slopes range from 15 to 50 percent and vegetative production (air-dry) is poor (100 to 250 pounds/ac.)

<u>Semi-desert stony loam</u>
The vegetation associated with the semi-desert stony loam site consists of Utah juniper and pinyon-pine overstory with black sagebrush and Salina wildrye understory. This site occurs on fan terraces and fan remnants with an average slope of 15 to 50 percent. Vegetative production (air-dry) is from 350 to 700 pounds/ac due to the presence of pinyon and juniper.

~~Mining has not previously taken place within the Cottonwood/Wilberg Waste Rock Storage~~

~~Facility.~~

The general area is classified by the BLM as Deer Winter Habitat and Crucial Deer Winter Habitat. UDWR classifies the area as Critical Deer Winter Range (Southeast Manti Herd) and Limited-value Elk Winter Range (see Plate 9-1). Further discussion of the wildlife habitat associated with the site can be found in R645-301-300 Biology.

The Waste Rock Storage Facility is located within the West Grimes livestock grazing allotment (754 acres). This allotment is grazed from April 1 to June 10 each year. A total of 477 animal use months (AMU's) are allotted to the West Grimes Wash allotment; however, only 295 AUM's are active.

The mitigation/enhancement measures conducted for the disturbed wildlife habitat (R645-301-300 Biology) will be effective to offset the impacts resulting from the 3 percent (25acres/754 acres) reduction in the livestock grazing allotment. As stated in the Draft RMP/EIS (page 3-20), "…a greater number of water sources are in demand (within the resource area), particularly for wildlife and livestock. More water sources could help redistribute livestock and wildlife and assist in range management."

Section 34 is part of Oil and Gas Lease U-56024 held by Estelle H. Yates. An abandoned well exists approximately 1800 feet northeast of the waste rock facility. The facility will not negatively impact the oil and gas lease.

R645-301-411.130 Land Use Classifications

The area surrounding the Waste Rock Storage Facility is listed as Class IV in the BLM's Visual Resource Management (VRM) classification system. Class IV is described as follows:

"The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements."

The location, design, construction, and operation of the facility are consistent with this VRM class.

The Waste Rock Storage Facility is also located within the Roaded Natural Class according to the BLM Recreation Opportunity Spectrum (ROS) classification. The setting opportunity within the Roaded Natural Class is described as follows:

> "Area is characterized by a generally natural environment with moderate evidence of the sights and sounds of man. Resources modification and utilization practices are evident, but harmonize with the natural environment."

The location, design, construction, and operation of the Waste Rock Storage Facility are compatible with the Roaded Natural ROS class.

R645-301-411.140 Cultural and Historic Resources Information

Archeological-Environmental Research Corporation (AERC) prepared a report in 1987 called "Cultural Resource Evaluation of Potential Subsidence and Escarpment Failure Areas in the East Mountain Locality of Emery County (Project UPL-87-6)". This report was amended in 1989 to include the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. AERC prepared and addendum to the 1987 report as a statement that an intensive archeological evaluation was conducted of the proposed waste rock disposal and access road areas. It was reported that no cultural resource sites or isolated cultural material were observed during the evaluation. Refer to this addendum in Appendix A.

R645-301-412 Reclamation Plan

In areas where surface disturbances result from coal mining and reclamation operations, regrading and revegetation will be conducted to restore the areas to their premining conditions which they were capable of supporting prior to mining. Because such a small surface disturbance is planned for the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility, little or no effect to the past or future land use is anticipated. The land will be reclaimed to the original land use practices of grazing and wildlife habitats.

A detailed reclamation plan has been developed for the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility and is included in Section R645-301-200 through R645-301-700 of this volume.

R645-301-412.300 Suitability and Compatibility

The reclamation soil sampling will identify any soil that is not suitable. All unsuitable soils will be placed at least 4 feet below the final grade surface. This will ensure suitable growth material for vegetation. All fills will be graded at slopes compatible with the surrounding areas.

R645-301-413 Performance Standards

All disturbed areas will be restored in a timely manner to conditions they were capable of supporting before mining. Liability will be for the duration of the coal mining and reclamation operations and for the period of extended responsibility for achieving successful revegetation. All post mining land use criteria will be satisfied before the bond is fully released.

R645-301-420 Air Quality

Air pollution control measures are described in the Approval Order DAQE-835-91 issued by the Division of Air Quality. This order has conditions that the operator must comply with to control fugitive dust emissions, quantity of refuse hauled, maintenance to road to control fugitive dust emissions, etc. Those emissions will be controlled by typical dust suppressant measures. The Division of Air Quality requires that the Approval Order be in place and complied with by the operator for the life of the facility's operation. Periodic inspections, by the Division of Air Quality, are conducted at the site to verify compliance. This air quality Approval Order is filed at the Energy West Mining offices in Huntington, Utah and is also attached as Appendix B of this chapter.

R645-301-421 Clean Air Act

Coal mining and reclamation operations will be conducted in compliance with the requirements of the Clean Air Act (42 U.S.C. Sec. 7401 et seq.) and any other applicable Utah or federal statutes and regulations containing air quality standards.

R645-301-422 Utah Division of Air Quality

The operator has coordinated compliance efforts with the State of Utah, Division of Air Quality. The current Approval Order (AO) issued to the operator is DAQE-895-91 and is dated December 16, 1991.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Cultural Resource Evaluation of Potential Subsidence and Escarpment Faliure Areas in the East Mountain Locality of Emery County, Utah - 1989

Volume 4

R645-301-400: Land Use and Air Quality – Appendix A

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Approval Order: AO 835-91

Volume 4

R645-301-400: Land Use and Air Quality – Appendix B

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
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Volume 4

R645-301-500: Engineering

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Appendix A: Geotechnical Investigation

Appendix B: Physical and Chemical Analysis of Waste Material

R645-301-500: Engineering

During the operation of the ~~Cottonwood/Wilberg and~~ Trail Mountain mine~~s~~, certain waste products are generated that are not part of the coal product, they include; underground development waste, trommel screen reject, and sediment from the pond and drainages. The fill of the disposal site will comprise of these materials that will be permanently stored within the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. This chapter includes the general requirements to meet the State of Utah's regulatory requirements to conduct coal mining and reclamation operations at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility and operate these facilities in Grimes Wash as part of the ~~Cottonwood/Wilberg Mine and~~ Trail Mountain Mine refuse disposal site. This application includes descriptions of the Engineering design, operation, and reclamation of the waste rock site and access road area.

R645-301-510 Introduction

The original Cottonwood/Wilberg Waste Rock Storage Area is located south and east of highway 57. This site was filled to its capacity in 1989 (Phase III Bond Release of the original site was granted in July of 2009) making it necessary to construct a new facility to handle the disposal needs of the mine. Calculations have been made, based on past history, the rate and amount of waste rock generated during mining operations, these quantities have been used to formulate the design of a new facility.

The area selected for the Waste Rock Storage Facility is located on public land managed by the US Department of Interior, Bureau of Land Management. The facility is located in the southeast quarter of Section 34, Township 17 South, Range 7 East, west of Highway 57 and used in support of the mining operations. The area was selected because it is close to the mine facilities and has the required capacity to contain all the waste rock generated at the Cottonwood/Wilberg, Des Bee Dove, and Trial Mountain mines for the anticipated life of each mine. ~~Final reclamation has been conducted on the Des Bee Dove mine facilities. These activities were completed in 2006.~~ Since the Cottonwood/Wilberg is being reclaimed and the Des Bee Dove Mine has been reclaimed, the site is used specifically for the refuse disposal for the Trail Mountain Mine.

R645-301-511 General Requirements

This application includes descriptions of the Waste Rock Storage Facility's operation which includes maps, cross-sections, and plans for its operation and reclamation of the site.

R645-301-512. 100 Cross-Sections and Maps

Maps and cross-sections detailing environmental resources of the area and plans for construction of the site are included in the Maps Section of this Chapter. All design maps and cross-sections have been certified by a qualified, registered professional engineer.

R645-301-512.230 Coal Mine Waste

The professional engineer experienced in the design of similar earth and waste structures has certified the design of the disposal facility according to R645-301-536.

R645-301-512.250 Primary Roads

A primary access road has been planned for entrance into the Waste Rock Storage Facility. The professional engineer has certified the design and construction of the road as meeting the requirements of R645-301-534.200 and R645-301-742.420.

R645-301-514 Inspections

The storage pile will be inspected for stability by a qualified, registered professional engineer at least quarterly and during the following critical construction periods and throughout its operation:

1. Removal of all organic material and topsoil
2. Installation of surface drainage system
3. Construction of soil stockpiles
4. Revegetation
5. Placement and compaction of fill material

The report will be submitted in writing to the Division within the subsequent quarter following the inspection. A copy of the inspection report will be maintained at the Energy West Mining

Office for inspection by interested parties.

R645-301-520 Operation Plan

R645-301-521 General

The area selected for the Waste Rock Storage Facility is located on public land managed by the US Department of Interior, Bureau of Land Management. The area is located in the southeast quarter of Section 34, Township 17 South, Range 7 East, west of the coal haul road used for the Cottonwood/Wilberg Coal Mine facility. The area was selected because it is close to the mine facilities and has the required capacity to contain all the waste rock generated at both the Cottonwood/Wilberg, Des Bee Dove and Trial Mountain mines for the anticipated life of each mine. Refer to Plates 1-1, 1-2, and 4-1 for Coal Lease and Ownership map, Surface Ownership map, and Right of Way and Permit Boundary map, respectively. Construction of the site occurred in June 1990.

R645-301-521.200 Signs and Markers

Signs and markers will be made of durable material, such as thin sheet metal, and will be maintained during the conduct of all activities to which they pertain or until bond release. Each type of sign and marker will be of uniform design and shape and will be located so as to be easily seen and read.

Perimeter and topsoil markers will be approximately 10" x 14", post mounted and read "Perimeter Do Not Disturb, or Topsoil" respectively.

No stream buffer zone markers are required as there are no streams adjacent to the permit area.

On the day in which blasting occurs, a portable sign which says "Warning: Explosives in Use" will be displayed near the entrance sign.

R645-301-521.240 Mine and Permit Identification Signs

A Waste Rock Storage Facility permit identification sign will be placed at each point of access from public roads to areas of surface operations within the permit area. The sign will state the facility's name, owner/operator address and phone number, Utah Reclamation Permit No., MSHA ID NO., and UPDES Permit No.. The sign size will be approximately 40" wide by 18" high. Upon cessation of operations or bond release, signs and markers will be removed as appropriate.

R645-301-524 Blasting and Explosives

All blasting operations will be conducted by persons who have been trained, examined and certified as provided by 30 CFR 850 and applicable regulations of the State Industrial Commission. No resident or owner of a dwelling or structure is located within one-half mile of where surface blasting activity will occur.

All blasting will be conducted between sunrise and sunset. Warning and all-clear signals will be given before and after blasting. Access to the area possibly subject to fly rock from blasting shall be regulated. Access to the area shall be blocked until an authorized representative has determined that after blasting no unusual circumstances exist and that access to and travel in or through the area can be safely resumed.

Records of blasting will be kept on file at the PacifiCorp - Energy West Mining office in Huntington. The records shall contain the following:

- Name of Operator - PacifiCorp: Energy West Mining Company
- Location - ~~Cottonwood/Wilberg~~ Trail Mountain Waste Rock Site - date and time of blast
- Name, signature and license number of blaster-in-charge
- Direction and distance to nearest structure
- Temperature, wind directions and approximate velocity
- Type of material blasted
- Number of holes, burden and spacing
- Diameter and depth of holes
- Types of explosives used
- Maximum weight of explosives detonated within any 8-millisecond period
- Maximum number of holes detonated within any 8-millisecond period
- Initiation system

- Type and length of stemming
- If applicable - mats or other protection used
- Type of delay detonator and delay periods used
- Sketch of delay pattern
- Number of persons in blasting crew

R645-301-526 Mine Facilities

This section includes the design and operational plans for the facilities that make up the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. These facilities include the access road, refuse pile, and sediment pond. Construction of the site occurred in June 1990.

Access Road Design

The access road begins at the intersection with State Road 57 and extends in a southwesterly direction for 1435 feet to the northeast corner of the Waste Rock Storage Facility. The road is constructed through an area dominated by pinyon-juniper vegetation with several natural ephemeral stream channels. The road is used by trucks carrying waste rock materials from ~~Cottonwood/Wilberg, and~~ Trail Mountain mine~~s~~ for disposal in the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility.

The road is located in Section 34, Township 17 South, Range 7 East, SLBM, on public lands managed by the US Department of the Interior, Bureau of Land Management. The total area disturbed by the road and road construction activities is approximately 1.7 acres. Refer to Plate 4-1.

The horizontal and vertical alignment, the cuts and fills and the drainage structures have been designed and located to conform to the existing topography. The overall grade of the road is less than 1.8% with a maximum pitch grade of 3.4%. The road cross-section has a 28 foot wide graveled surface of 6" depth sloped at 1% toward the roadside drainage ditches. Roadside drainage has been constructed to carry road drainage to the cross culverts. Embankment sections have out slopes built on a 1V:1.5H. Cut sections are built on a 1V:1.5H in unconsolidated areas. A locked gate is located at the beginning of the access road, station 2+20, to the Waste Rock Storage Facility. A typical road cross-section is shown in Exhibit I.

All foundations for embankments shall be free from organic material and topsoil. The top layer of the ground underlying the roadway embankment was moistened and scarified to a depth of

6" and then compacted to 90 percent of standard proctor according to AASHTO Designation T-99 Method D. Placement of the embankment material was in 12" maximum lifts. All rocks were worked into the fill to avoid forming voids.

The road base course consists of 10" of pit run gravel. The base course was watered and thoroughly mixed and compacted in one lift to 90% of standard as determined by AASHTO Designation T-99 Method D.

The surface course consists of crushed stone meeting the gradation requirements listed in Table 500-1. The material was thoroughly mixed with water to optimum moisture content. The material was then be placed and compacted in a single lift. This material was compacted to 95% of standard as determined by AASHTO Designation T-180 Method D. The finished grade was graded smooth and uniform with surface deviations not exceeding 0.5 inch plus or minus in 10 feet.

Maps and drawings associated with the design and construction of the access road are Plates 4-3 (Pre-Existing Topography Map), 4-4 (Initial Construction Map), 4-8 (Access Road Cross-Section Map), and 4-9 (Profile/Centerline of Access Road). Refer to Maps Section.

Table 500-1: Gradation Requirements

UNTREATED ROAD BASE SPECIFICATION		
Sieve Size	**Ideal Gradation (% passing)**	**Ideal Gradation Tolerance**
1 INCH GRADATION		
1 inch	100	0
½ inch	85	± 6
No. 4	55	± 6
No. 16	31	± 4
No. 200	9	± 2
3/4 INCH		
3/4 inch	100	0
3/8 inch	85	± 7
No. 4	61	± 6
No. 16	33	± 5
No. 200	9	± 2

Note:

1. That portion of the material passing the No. 40 sieve shall be non-plastic when tested by AASHTO Designation T-90

2. The above gradation specifications are to be done by AASHTO Designation T-27

3. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 75 pounds per cubic foot according to AASHTO Designation T-19.

Access Road Placement and Handling of Materials

The road was designed and laid out to minimize the amount of cut and fill operations required for construction. The cuts were balanced with the fills so little excess material was generated.

Topsoil

The initial step of the road construction was to remove all vegetative matter from the area to be disturbed by road construction. Once the vegetative material was removed, the top soil (where existing in sufficient quantities to allow for mechanical collection) was removed and temporarily stockpiled until it was evenly redistributed on the embankment slopes after their construction. The temporarily stockpiled soil has been stored in three areas along the access road and away from the activities of the road construction. The piles were fertilized and planted as per the approved plan in 1990. The topsoil piles support a vigorous mature vegetative stand that controls runoff and erosion. Refer to Plate 4-4.

Silt fences were installed along the toe of the embankment slopes to provide erosion protection until the interim vegetation was established. Refer to R645-301-300 Biology for Interim Vegetation Plan.

Subgrade

Following removal of the topsoil and subsoil, the subgrade material was removed to the lines and grades shown on the plans as required to construct the cuts and fills. Each layer of embankment was placed, leveled and compacted in 12" maximum lifts. Large rocks were worked into the fill to avoid creating voids, etc. in the fills. The subgrade material was monitored during excavation to identify potential acid or toxic forming properties. If aberrant appearing (i.e. accumulated salts, etc.) materials were encountered, it was analyzed to determine if it is potentially toxic or acid forming. No aberrant material was found at the site.

Road Surface

Following the construction of the subgrade, 10 inches of road base gravel was placed and compacted. Then 6 inches of crushed stone was spread and compacted on the road surface. This serves as the final travel surface. The final configuration of the road was constructed to the lines and grades shown on the plans. Refer to Plates 4-8 Access Road Cross-Sections.

Dust Control

During construction of the road fills and soil stockpiles, water was spread (as needed) over the working level of the fill surface to aid in compaction and to control fugitive dust.

Access Road Drainage Control

The disturbed area consists of the roadway and associated cuts and fills in an Alternate Sediment Control Area (ASCA) and has treatment facilities as described below. (See Map 4-2 for area designated as ASCA's.)

The drainage system for the road consists of road side ditches and cross culverts. The drainage system is designed to safely pass the peak runoff from a 10 year, 6 hour precipitation event. The system is designed to minimize to the extent possible, erosion and degradation of surface.

To minimize erosion on the road bed the road cross-section was sloped 1% toward the roadside ditch (refer to Exhibit I). Roadside ditches have been provided along the entire length of the road to channel runoff into the cross culverts. Sediment controls, i.e. strawbales and/or silt fences perpendicular to the flow have been placed at no more than 200 foot intervals to prevent additional sediments from entering the natural channel.

All drainage culverts are designed to safely pass the 10 year, 6 hour precipitation event without a buildup of head water at the inlet. The inlet of all culverts has been provided with a rock rip-rap headwall to protect against erosion. The culverts have a minimum of 12 inches of compacted cover and have been installed in line with the natural drainage channel. Refer to Plate 4-4 for location of all culverts and R645-301-700 Hydrology, Appendix C for calculations.

Operation and Maintenance

On an as needed basis, as the road surface deteriorates due to usage and weather, a blade will be used to recontour the travel surface of the road. The rills and gullies will be backfilled and a smooth surface will be developed with side slopes of 1%. Road base gravel will be added to the surface as needed.

The ditches along the access road will be maintained at the same time as the road surface. A blade will be used to clean sediment and debris from the ditch. In areas where excessive erosion occurs, rock rip-rap will be placed to help control it.

The inlet and outlet works of all culverts will be maintained as needed. Any debris clogging these structures will be removed. Rock rip-rap will be used to control erosion. Any erosion that occurs on the fill or cut slopes will be repaired by either backfilling or in those cases where a small channel has developed, due to drainage concentration, a rip-rap channel will be established.

The silt fences along the toe of the road fill sections or in the roadside ditches will be cleaned of sediment accumulation by backhoe or hand methods. This material will be either used to backfill rills and gullies or disposed in the waste rock site.

~~Cottonwood/Wilberg~~ Waste Rock Storage Facility Design

The facility is designed to fit into the existing topography of the area with as little disturbance as is possible to the existing drainage system. Only one ephemeral drainage channel required a permanent diversion for the construction and operation at the facility. At completion, only 15.82 acres have been disturbed. A sediment pond designed and constructed as part of the facility catches and treats all the runoff from the site before releasing it back into the natural channel (refer to R645-301-700, Appendix C). The construction, operation, and reclamation of the facility will occur in the following sequence:

1. Installation of sediment control (i.e. silt fence, straw bales, etc.) prior to initial disturbance.
2. Construction of access road.
3. Initial construction of Waste Rock Storage Facility, including the topsoil and subsoil stockpiles, sediment pond dam and the initial diversion ditch. Construction date: June 1990.
4. Installation of silt fences at the base of soil stockpiles.
5. Construction of the perimeter fence.

6. Interim revegetation of soil stockpiles and road cut and fill slopes.
7. Placement of underground development waste and sediments, and construct perimeter berms.
8. Cover perimeter berms with soil and revegetate.
9. Construction and maintenance of diversion ditches to be ongoing for the duration of the facility's utilization.
10. Contemporaneous reclamation of outside slopes of berms.
11. Construction of permanent diversion around waste rock site into sediment pond.
12. Monitoring and cleaning of sediment pond as required.
13. Two years after seeding of outslopes and completed filling of the waste rock pile, reclaim top of pile according to plan, remove of sediment pond, and regrade of access roads begins.
14. Monitoring of revegetation efforts for bond release.

~~Cottonwood/Wilberg~~ Waste Rock Storage Facility Drainage Control

The drainage of the Waste Rock Storage Facility is confined to a single ephemeral stream at the bottom of a small valley. There is 15.3 acres of undisturbed land which normally drains through the valley that's diverted around the waste pile. This undisturbed runoff and the runoff from 15.82 acres of disturbed land are diverted into a sediment pond where it is retained to remove suspended solids prior to release into the natural channel. Alternative sediment control areas (ASCA) on the outside slopes of the soil stock piles consisting of 0.9 acres are treated through use of silt fences and straw bales. (refer to Area 1D, Plate 4-2.)

Initial Construction

The initial construction of the Waste Rock Storage Facility included the construction of the sediment pond and stripping and stockpiling of the topsoil and subsoil and construction of the initial diversion ditch on the west side of the valley. This diversion ditch was designed to convey the runoff from a 100 year, 6 hour storm event in a V-ditch with a 2% channel slope. This gentle slope keeps the velocity below 5 feet per second to minimize erosion. As the waste material pile grows and encroaches upon the initial diversion ditch and against the western and northern slopes, approximately 10" of soil material will be salvaged across the slopes. The ditch will be reconstructed at the toe of the waste pile to the same specifications as the initial ditch. Interim control of drainage on the surface of the pile will slope in a southwesterly direction. Runoff from the surface of the pile will discharge in a controlled manner into ditch DA and then to the sediment pond as shown on Drawing CM-10877-WB, Plate 4-14. Should water accumulate in depressions on the surface of the waste material, to a level which may affect the

stability of the waste pile, this water will be pumped to the sediment pond. When the active surface of the refuse pile reaches an elevation of approximately 6,795 feet, drainage control will be as the following describes. The western diversion ditch, labeled DA on Plate 4-5, drains the upland undisturbed areas, the top of the waste pile, the west slope of the waste pile and the top and inside slope of the topsoil pile. The eastern diversion ditch (DB) drains the east slope of the waste pile and top and inside slope of the subsoil stockpile. The total runoff to be collected into the sediment pond is 2.17 acre feet for the 10 year, 24 hour storm event. The estimated annual sediment production for the site is 1.65 acre feet. The actual design of the sediment pond provides 4.58 acre feet of storage so that there is 2.41 ac. ft. of sediment storage available. The spillway for the sediment pond safely passes runoff from a 25 year, 6 hour storm event with the required one foot freeboard. Refer to R645-301-700 Hydrology, Appendix C for all hydrological calculations.

The outside slopes of the two soil stockpiles have silt fences constructed at their bases to treat the runoff from precipitation and are designated as alternate sediment control area 1D, Plate 4-2. Interim revegetation was accomplished as soon as practical after construction to stabilize the slopes.

Monitoring of these drainage controls will be on a regular basis and maintenance will be scheduled as needed to ensure that they operate as designed. The ditches and silt fences will be cleaned, repaired and reshaped with a backhoe or hand methods as appropriate.

~~Cottonwood/Wilberg~~ Waste Rock Storage Facility Placement and Handling of Materials

During the operation of the mine, certain waste products are generated that are not part of the coal product, they include; underground development waste, trommel screen reject, and sediment from the pond and drainages. The fill of the disposal site comprises of material that will be permanently stored within the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility.

Topsoil

After the vegetative material was removed from the site the topsoil was stripped and stockpiled as shown on Plates 4-4 and 7-2. Stripping areas and depths were staked to facilitate topsoil excavation. Care was taken to avoid unnecessary compaction of the topsoil material. Following soil placement, the stockpile was planted with an interim seed mix (refer to R645-301-300 Biology).

Subsoil

Following removal of the topsoil material the remaining material needed for the subsoil stockpile was excavated to the lines and grades specified on the cross-sections. The material was placed, leveled and compacted in 12" maximum lifts. Rocks larger than the lift thickness was worked into the fill to avoid forming voids. Those rocks that make good rip-rap and were separated, hauled and stored for future use. No acid or toxic forming materials were found in the materials cut for fill. Any acid or toxic forming materials will be treated as spoil and placed in the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. (Refer R645-301-200 Soils for soil information.)

Underground Development Waste

The underground development waste generated during coal mining, sediments from the sediment pond, and trommel rejects will be hauled to the site by truck and dumped. The composition of this material i.e. waste rock will be a mixture from the various sources. The coal rock ratio is estimated to be less than 50/50. As the material is spread and placed in the fill, it will be thoroughly mixed helping to blend the materials.

The mixing action will come as a result of the handling required to get the material delivered to the site and the spreading and leveling actions at the site itself. The underground development waste is picked up and dumped at least three times prior to being deposited on the waste pile. The spreading and leveling is performed with a tracked dozer and will mix all of the dump truck piles of waste material, to disperse any waste which may be of higher concentrations than allowed.

When the quantity of material dumped at the site needs to be leveled it will be spread, placed and compacted in 24" thick horizontal lifts. Large rocks etc., will be worked into the fill to avoid forming voids. As the fill lifts are made, the top working surface will be sloped to allow for drainage. Any acid or toxic forming materials found in the final lift of the waste pile will be buried in the fill with a least 4 feet of non-toxic cover material.

To allow for contemporaneous reclamation of the outside slopes of the waste pile, a phased construction schedule will be implemented. A berm of waste rock materials will be constructed approximately 10 feet high at the outside edge of the waste pile. The waste material will be placed inside of the berm, spread out with a dozer and compacted in place. As the material level reaches the top of the berm, a new berm will be constructed with a 2 to 3 foot offset to provide a small terrace. This process will continue until the first three 10-foot high berms have been filled. Subsequent berms will be set back eight (8) feet from the

outside edge of the top of the previously completed berm. This process will continue until site construction is completed. This configuration will result in an overall outslope of approximately 2.5:1 as recommended by Rollins, Brown & Gunnel (Stability Analysis, October 1992). Contemporaneous reclamation activities will progress along with the construction of each berm. See Exhibit XXI, Exhibits Section.

Soil will be salvaged at a depth of approximately 10 inches along the western and northern slopes of the Waste Rock Storage Facility. Once a lift has enough refuse material that leveling beyond the existing ditch line and against the western and northern slope is required, soil material will be salvaged across the slope. The width of material to be salvaged will be determined by the depth of refuse to be leveled to the slope. The ditch line will be constructed in compliance with the permit requirements. These parameters will be followed each time refuse is leveled to the slope.

Salvaged soil material will be handled in the following ways. If the berm is in the process of being constructed, the salvaged soil material will be used in stabilization of the berm. If a berm is not being constructed, the salvaged material will be hauled to the subsoil pile for storage.

During the leveling process, extraneous material, trash and etc. will be separated from the fill material and disposed of in an approved sanitary landfill.

Sediment Pond Sludge

Material removed during cleaning of the ~~Cottonwood and~~ Trail Mountain sediment ponds will be placed in the Waste Rock Storage Facility. Sludge material that is dry enough to be immediately incorporated into the refuse material will be mixed with the waste rock and placed as previously described above. Sludge which contains more moisture than can be properly handled on the refuse pile will be placed in a containment area and allowed to dry. The containment area will be constructed within the refuse disposal area at a location that will allow drying of the sludge and maintain adequate working room for normal operation of the facility. When dry, the sludge material will be excavated and distributed throughout the refuse area for incorporation and compaction. This procedure will help maintain the proper coal-to-rock ratio throughout the site and ensure uniform stability.

R645-301-530 Operational Design Criteria and Plans

R645-301-531 General

This permit application includes a general plan and detailed design plans for each siltation structure, water impoundment, and coal processing waste bank, dam or embankment within the permit area. A discussion and design of the sediment pond and earthened dam is outlined in R645-301-700 Hydrology, Appendix C. Design of the Waste Rock Storage Facility is discussed above in R645-301-526.

R645-301-532 Sediment Control

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility covers approximately 15.82 acres of disturbed area. All water within this area is conveyed to ditches, and/or culvert systems. Sediment control allows for undisturbed runoff to bypass the facilities via a diversion ditch and culvert system into the surrounding ephemeral drainage adjacent to the site. Disturbed runoff from the site is diverted to the sediment pond. Refer to R645-301-700 Hydrology for a complete discussion on sediment control.

R645-301-533 Impoundments

As described previously, a sediment pond is utilized to collect storm water runoff from the disturbed area of the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility. The design of the pond is found in R645-301-700 Hydrology, Appendix C. Pond design encompasses approximately 1.0 acre of disturbed land.

R645-301-533.200 Foundations

The pond is designed as an incised structure. Foundations for embankments and impounding structures are constructed utilizing the information outlined in the Geotechnical Study conducted by Rollins, Brown, and Gunnel September, 1989. Refer to this report in Appendix A of this section. Stability analysis for the construction of the earthen dam is found in Exhibits XII through XVIII in the Exhibits Section.

R645-301-536 Coal Mine Waste

In order to better understand the chemical and physical properties of the rock that will be placed in the waste rock site, over 130 samples from both outcrop and drill cores were analyzed.

Samples were selected that would best represent the material that will be placed in the site over its useful life. The samples were tested individually and the results are summarized in the table in Appendix B according to the common rock types that will be stored in the site.

In addition to these analyses, representative samples were tested for their potential alkalinity, pyrite/marcasite content and clay content. The results are shown below:

Zone Sampled	Number of Samples	pH	Pyrite/Marcasite	Clay Alkalinity	%FeS_2 Potential
Hiawatha roof	3	7.8	3.3	-	218,400
Hiawatha floor	3	7.5	1.3	5.5	127,300
Blind Canyon roof	2	8.1	0.5	-	252,600
Blind Canyon floor	3	8.3	1.3	9.0	3,500

A review of the above data concerning the sodium absorption ratio of the Blind Canyon floor reveals that three out of four samples have values less than 5.0 (4.8, 1.5 and 1.3). One sample has a value of 60.4 which raised the sample mean to 17.36 and created a high standard deviation of 25.14. This indicates that in general the Blind Canyon floor rock will not pose a problem from its high SAR but from time to time higher than average values will be encountered. These concentrations will be diluted by other rocks with low SAR values when stored in the Waste Rock Storage Facility. These results show there is little potential for acid or toxic conditions to exist for the disposed of coal mine waste material.

Analysis results from the roof and floor samples taken at the Trail Mountain Mine are found in the Trial Mountain MPR, Volume 1, Chapter 6 and Appendix 6-2. Similar results are found in these samples.

To identify the acid- or toxic-forming potential of materials disposed of at the Waste Rock Storage Facility prior to covering the refuse pile berms for final reclamation, the top two (2) feet of the surface will be sampled according to the Division's "*Guidelines for Management of Topsoils and Overburdens*", January 2008, Tables 3 and 7. Grab samples will be taken during construction of the berm. Samples shall be collected at a rate of two samples per 200 linear foot of berm; one composite sample at 0-1 feet, and one sample at 1-2 feet. Suitability of the coal mine waste materials shall be evaluated to comply with the acceptable criteria of Tables 4 and 8 of the Division's guidelines. If initial sampling finds that the material does not comply with the acceptable criteria, than additional sampling will be implemented to define the extent of the problem material. All unacceptable material will be removed, buried, and covered with 4 feet of non-acid/non-toxic forming materials.

R645-301-540 Reclamation Plan

R645-301-541 General

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility consists of 15.82 acres of disturbed land to be used for disposal of underground development waste. An access road 1,435 feet long is constructed in conjunction with the site and involves 1.7 acres of disturbed land. The site is located on public lands managed by the US Department of the Interior, Bureau of Land Management and its principal use is wildlife habitat and livestock grazing. When the facility is completed, reclamation will return the area to these same uses.

Construction of the facility commenced as soon as the permit was issued. Sediment control measures were put in place to minimize the effects of the initial construction. Straw bales and silt fences were erected in the natural drainages to treat any runoff during the initial construction period. Interim revegetation was used on the bare slopes of the soil stockpiles and along the roadway to stabilize and prevent erosion. The tospoil stockpiles were marked as such. Drainage structures were constructed and maintained to ensure that they were in good repair and capable of handling the design flow rates. Silt fences were constructed at the base of the soil stockpiles outside slopes. These silt fences have been replaced with straw logs and are monitored and repaired as needed to ensure they are continuously in good working order.

Construction of the waste material pile incorporated a plan to allow for contemporaneous reclamation of the outside slopes of the pile. Waste material is used to construct a berm, approximately 10 feet high, to contain the waste material to be deposited. Quality sampling of this material is discussed above in R645-301-536.

As contemporaneous reclamation commences, 24 inches of subsoil and 12 inches of topsoil will be placed on the outside slope of the berm and revegetation of the slope will begin. Successive berms will be constructed on top of the previous berms as the level of the waste material rises. There will be a two to three foot offset of the toe of the upper berm to provide a small terrace to reduce runoff velocities. (See Exhibit XXI, Exhibit Section.) Since the initial construction of the waste rock site (June 1990) to this date of August 2013, three berms have been constructed around the waste rock pile, filled to their capacity, and their side slopes reclaimed according to the approved reclamation plan. Approximately 15,740 cubic yards of subsoil and 7,870 cubic yards of topsoil will be needed to fully cover the outside slope of the berms.

When the final berm is constructed, contemporaneous reclamation will be conducted as explained above on the outside slope. The outside slope will be revegetated with the approved seed mix as outlined in R645-301-341.200. Ditches DA and DB will also be constructed as outlined in Plate 4-12 and the pond will be left in place.

Soils from the top and subsoil piles will be move to the north side of the waste rock pile (refer to Plate 4-7) and seeded. There is ample room to store approximately 11,300 cubic yards in this location. This includes enough subsoil to cover the top of the site with 2' of material (5,050 cubic yards), and enough topsoil to cover the top of the site with 1' of material (2,525 cubic yards). An addition of approximately 2,725 cubic yards of subsoil and 1,000 cubic yards of topsoil will be stored to fill this storage area to capacity.

The original subsoil storage will then be covered with approximately 1' of topsoil (2,060 cy), pocked and seeded. The original topsoil storage area will be pocked and seeded for final reclamation. If there remains additional soil at these original storage locations, it will be blended in with the surrounding topography.

The access road to the waste rock pile will be re-routed for a north access to an east access from the pond access road. At this time, the two year time clock (as required by R645-301-763.100 of the Utah Coal Regulations) for sediment pond removal will commence as the remaining waste rock site is filled to the top level of the berm.

When the waste pile construction is complete, the top surface of the pile will be graded for proper drainage. To identify the acid- or toxic-forming potential of materials disposed of at the Waste Rock Storage Facility prior to covering the refuse pile for final reclamation, the top two (2) feet of the surface will be sampled according to the Division's "Guidelines for Management of Topsoils and Overburdens", January 2008, Tables 3 and 7. Grab samples will be taken prior

to covering with soil. Samples shall be collected at a rate of two samples per acre; at each sample site one composite sample will be taken at 0-1 feet, and one sample at 1-2 feet. Suitability of the coal mine waste materials shall be evaluated to comply with the acceptable criteria of Tables 4 and 8 of the Division's guidelines. If initial sampling finds that the material does not comply with the acceptable criteria, than additional sampling will be implemented to define the extent of the problem material. All unacceptable material will be removed, buried, and covered with 4 feet of non-acid/non-toxic forming materials.

Subsoil and topsoil stored at the north side of the waste rock pile shall be used to cover the top surface of the pile. The volumes of these piles are 7,775 cubic for subsoil, and 3,525 cubic yards for topsoil. This volume will cover the top of the pile with at least two feet of subsoil and one foot of topsoil. Pocks will be constructed as a means for alternative sediment control for this area. This surface shall be seeded utilizing the seed mix found in R645-301-341.200.

At the end of the two year time clock (mentioned above), the sediment pond and remaining access roads shall be removed to the lines and grades as shown on Plates 4-8 and 4-10. The areas will be pocked and seeded according to the plan in R645-301-700 and R645-301-300. Topsoil stored along the main access road shall be used to cover this regraded area.

Discussion of Salvaged Soil Volumes

Salvaged soil volumes have been calculated for the subsoil pile and topsoil piles. Calculations show that the waste rock site area can be covered with approximately 3.4 feet of subsoil and 1.7 feet of topsoil. The access road can be covered with the salvaged topsoil to a depth of approximately 1.9 feet.

Energy West has a limited confidence that the calculated subsoil and topsoil depths will be achieved. Calculations were based on the pre-existing contours established in the 1980's and compared to contours established in 2013. Energy West feels that there may be some discrepancy in the earlier established contours.

In 2013, pile volume calculations were conducted utilizing Carlson software which constructs a grid and drapes the grid over a surface. It cannot distinguish between boulders and solid ground surface. For that reason, it is felt that salvaged pile volumes are a bit over estimated. However, there is a high level of confidence that subsoil distribution can achieve a 2 foot depth and topsoil distribution can achieve a 1 foot depth.

Once the surface of the refuse pile and access road is completed, the surface will have been covered with subsoil and topsoil (a minimum of 24 and 12 inches, respectively) and revegetated. This equates to approximately 23,462 cubic yards of subsoil over a 7.3 acre area and 17,687 cubic yards of topsoil over an 11 acre area. Soils shall be distributed as shown in Figure 1 below. All other additional soils shall be used to enhance depths where needed and blend the reclaimed areas into the adjacent natural areas to achieve a post mining topography that complies with all section of the Utah Coal Regulations.

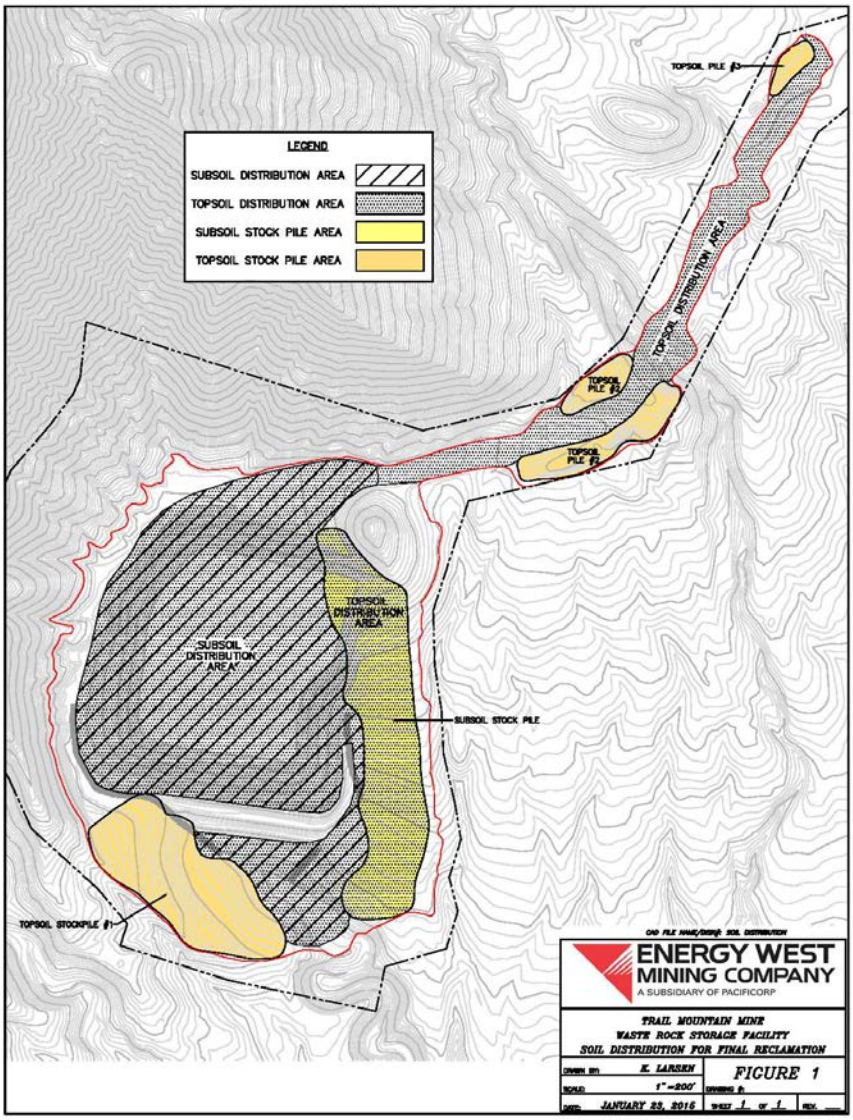

Figure 1: Soil distribution diagram.

At the time of final bond release for the reclaimed areas, all reclamation will have been completed. (Refer to Plate 4-7) This will include removal of the sediment pond dam and access

road, diverting the ditches into the natural drainage channel, covering the disturbed area with topsoil and removing the perimeter fence. Temporary sediment controls will again be used to prevent impact on the downstream areas during these construction efforts. Revegetation will take place on all reclaimed disturbed areas. Monitoring and maintenance, as required, will continue until final bond release is approved. Refer to R645-301-300 Biology.

R645-301-542 Narratives, Maps and Plans

A detailed timetable for the completion of each major step in reclamation is outlined in R645-301-300 Biology. Certified contour maps and soil placement maps can be found in the Map Sections of each chapter. A detailed plan for backfilling, soil stabilization, compacting and grading is outlined below in R645-301-553, Backfilling and Grading.

R645-301-542.600 Roads

The site access road will no longer be needed after the refuse pile is reclaimed. The road will be removed and the area reclaimed during the reclamation operations. All drainage structures will be removed and the natural drainage systems through the access road area will be returned to their pre-existing state.

R645-301-550 Reclamation Design Criteria and Plans

Reclamation activities at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility includes plans and designs for 1) Permanent features, and 3) Backfilling and grading. These plans and designs are outlined below.

R645-301-552 Permanent Features

Small depressions (pocks) will be constructed to retain moisture, minimize erosion, create and enhance wildlife habitat, and assist revegetation. The pocks will be constructed with a track-hoe or similar machinery and placed in random order. The pocks will measure approximately 1.5 feet deep by 3.0 feet in diameter. Pocking techniques and sediment loss is explained in detail in the Soil and Hydrology sections.

R645-301-553 Backfilling and Grading

Access Road

Final reclamation of the road will take place as detailed below. The gravel road surface material and subgrade material will be removed and placed against the inside cut slope of the road cross-section. The topsoil off the embankment outslope will be removed and temporarily stockpiled in an area at the road construction beginning. The subsoil material from the embankment slopes will then be spread over the road cross-section to obliterate the road. Natural drainageways shall be extended through the reclaimed area and blended in with the downstream segment. The sizing of this channel will be the same as the natural channel. The topsoil material from the temporary stockpile will then be evenly spread over the area and seeded.

Waste Rock Storage Facility

To provide for contemporaneous revegetation, a phased construction program will be implemented. Waste material will be used to construct a berm on the outside of the waste pile. Once the berm is completed and tested for toxic or acid forming materials, subsoil and topsoil materials will be used to cover the outside slope of the berm. Prior to placement of the subsoil, the waste material will be roughened to a depth of 18 inches. The soil materials will be loaded and hauled to the berm and distributed with either a track mounted backhoe or small tracked dozer. The subsoil will be spread to a thickness of approximately 24 inches and the topsoil to approximately 12 inches. Special efforts will be made to minimize the compaction of the topsoil layer. Revegetation will then take place on that portion of the waste pile which has been covered. As the waste pile elevation rises, new berms will be constructed and reclaimed. At the completion of the construction of the waste pile, the top surface will be covered with approximately 24 inches of subsoil and approximately 12 inches of topsoil and then revegetated (refer to R645-301-300 Biology).

The drainage plan for the reclamation of the facility is the same as the Operating Plan. The diversion ditches are sized for 100 year, 6 hour storm event and no changes should be necessary for reclamation. When the final stages of reclamation are initiated, an extension of the diversion ditches will be required to pass through the area of the sediment pond and dam and into the natural channel. The diversion will use the same shape and lining specifications used in Ditch DA except for the channel slope, which will be 10% instead of 20%. Refer to Plate 4-12 for ditch details.

R645-301-553.140 Minimization of Erosion and Water Pollution

Terraces will be provided (refer to Exhibit XXI) to reduce runoff velocities and ultimately erosion. A straw bale and silt fence filter will be constructed in the natural drainage channel during these activities to minimize the impact on the downstream areas.

R645-301-560 Performance Standards

Coal mining and reclamation operations will be conducted in accordance with the approved permit and requirements of R645-301-510 through R645-301-553.

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Trail Mountain Mine
Waste Rock Site

Geotechnical Investigation – 1989
Stability Analysis - 1992

Volume 4

R645-301-500: Engineering – Appendix A

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Trail Mountain Mine Waste Rock Site

Physical and Chemical Analysis Sheets

Volume 4

R645-301-500: Engineering – Appendix B

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Waste Rock Site

Volume 4

R645-301-600: Geology

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R645-301-600: Geology

R645-301-610 Introduction

The geology of the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility is fairly simple and straightforward. This site is located on the southern flanks of East Mountain south of Newberry Canyon. Rocks exposed in the area are marine derived mudstones in the lower portion of the Masuk Member of the Mancos Shale. The Masuk Shale on the bench which adjoins the proposed site on the north and east is covered by a five to twenty foot thick layer of terrace gravel of Quaternary age. North-south treading normal faults has disrupted the strata in the region. However, no faults are known to exist within the area of the Waste Rock Storage Facility.

R645-301-620 Environmental Description

The oldest rocks exposed in the region are part of the marine Mancos sequence deposited in Late Cretaceous time. This formation contains several alternating units of off-shore marine mudstones and near-shore marine sandstones. This discussion will address only the two upper members of the Mancos which are the Emery Sandstone and the Masuk Shale in ascending order.

Emery Sandstone

The Emery Sandstone member of the Mancos Shale is comprised of several upward fining transgressive sandstone deposits. To the east, where the Emery Sandstone is exposed on the surface, it is approximately 800 feet in thickness. However, subsurface data collected from the gas wells near the site indicate that the Emery Sandstone is positioned about 600-800 feet beneath the proposed waste rock site and is probably very thin (100 feet). Regionally, this member is water-bearing and may be classified as a limited regional aquifer. However, its importance as an aquifer is minimal in respect to other major water-bearing formations located at depth (Navajo and Wingate Sandstones).

Masuk Shale

The Masuk Member of the Mancos Shale overlies the Emery Sandstone and consists of light to medium gray marine mudstones. It forms the bedrock in the vicinity of the site. The Masuk Shale is generally devoid of significant water. However, it does transport small amounts of water along fractures present in the rock.

Terrace Gravels

The benches surrounding the north and east sides of the Waste Rock Storage Facility are covered by a Quaternary terrace gravel deposit. These gravels are located on a gentle slope leading down from the base of the southern tip of East Mountain and are thought to be glacial outwash in origin. The gravel deposits are five to twenty feet in thickness and are moderately permeable. Because of this, much of the rainfall percolates into these deposits and flows down dip toward Grimes Wash and Cottonwood Creek.

Alluvial Valley Floors

There are no alluvial valley floors within the Waste Rock Storage Facility. The nearest one is located in Straight Canyon approximately 2 miles to the south. This alluvial valley floor has been shown to contain groundwater but the operation of the waste rock site should have no impact on the quality or quantity of the water it contains due to the impermeability of the Masuk Shale separating the site from the alluvial valley floor.

Structure

The stratum in the area of the waste rock site is dipping gently in a westerly direction into the Straight Canyon Syncline (2 to 3 degrees). The nearest known fault to this area is the Pleasant Valley Fault which is located approximately one mile to the north where its displacement terminates. No faults exist in the area of the proposed site.

Regionally, the stratum contains a set of vertical joints trending in both a northwest and northeast direction. It is hard to identify jointing in the weathered Masuk shale outcrops, but in fresh cuts the joints appear to be wide spaced. Very limited amounts of ground water migrate down these fractures because the clays present in the rock swell when in contact with water, thus sealing the fractures.

R645-301-624 Geologic Information

As part of the preparations to construction of the Waste Rock Storage Facility, a geotechnical investigation was performed by Rollins, Grown and Gunnel Inc. in 1989. This document reports the existing site conditions, subsurface soil and water conditions, foundations considerations and recommendations, site preparations and compacted fill requirements, and results of field and laboratory tests. Refer to this report in R645-301-500 Engineering, Appendix A.

~~R645-301-624.100 Description of Geology~~

~~For a detailed description of the geology of the permit and adjacent areas down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining, refer to Volumes 1 and 2 of the Cottonwood/Wilberg Mining and Reclamation Plan. This plan will show the lithologic characteristics of the stratum, physical and chemical properties, chemical analysis of those strata as well as the coal seam. Most data will be presented in the appendix volume, Volume 3.~~

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Trail Mountain Mine
Waste Rock Site

Volume 4

R645-301-700: Hydrology

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R645-301-700: Hydrology

R645-301-710 Introduction

~~*R645-301-711.100*~~

~~A complete description of the regional and local hydrology for the East Mountain and surrounding areas is found in Volume 9.~~

R645-301-711.200

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility encompasses a dry wash which flows water for a short time immediately following a storm. Water from this wash flows into Grimes Wash which is located about 2 miles to the southeast, which in itself is ephemeral. Grimes Wash then flows to the south for approximately 2 1/2 miles where it intersects Cottonwood Creek.

Not all runoff from storms flow into the drainages. Some of the rain water migrates into the terrace gravels, where present, and flows down dip toward Grimes Wash and Cottonwood Creek. The waste rock disposal site should not impact this water occurrence because it is located at a lower elevation than the gravel terraces. Very limited quantities of ground water may be present by way of fractured permeability in the Masuk Shale.

The Mancos Shale typically contains large quantities of soluble minerals such as gypsum thus, any water passing through it or eroding it will be naturally high in dissolved solids.

R645-301-724 Baseline Information

Baseline information for hydrologic, geologic, and climatologic information~~ is found in Volumes 8 and 9~~ for the area of the Waste Rock Site is described in the sections below.

R645-301-724.100 Ground Water Information

Initially three test wells (drill holes 1, 2 and 3) were drilled within the Waste Rock Storage Facility to identify the soil conditions present (see Map 4-3). At each drill-hole location, water introduced in the hole from drilling was bailed from the drill hole at the end of the day. The next day the water level was checked and in most cases, the water level would rise. Drill holes

1 and 2 were cement filled upon completion to prevent any unnatural groundwater migration to occur, but drill-hole No. 3 was cased. Groundwater in this hole was intersected at the bedrock contact at 50 feet. The upper 55 feet of drill-hole No. 3 consisted of unconsolidated material followed by weathered shale to 63 feet, and the remainder of the hole was a solid gray, silty shale. An attempt to sample the water in drill-hole No. 3 was made on September 11, 1989 but the hole was dry to a depth of 62 feet where the casing was silt blocked. On November 29-30, 1989, an additional hole (No. 4) was drilled adjacent to hole No. 3 (see Map 4-3). Drill-hole No. 4 was drilled to a depth of 87 feet and will serve for groundwater monitoring. The data collected during the original drilling program and subsequent drilling indicate that groundwater enters the hole between a depth of 45 to 63 feet and stabilizes at approximately 56 feet. The hole was cased from 37 feet to 87 feet depth with 1 1/2 inch schedule 80 slotted PVC pipe and with solid riser from 37 feet to the surface. The slotted section was gravel packed and a bentonite seal was placed above the slotted section to prevent cement, utilized to seal the upper portion of the hole, from migrating into the gravel section. A locked well cap was installed to protect against outside contamination.

Baseline analysis was performed after a one-week stabilization period. It was apparent from the first sample that the hole still contained an elevated suspended solid content. In an attempt to reduce the amount of suspended solids the hole was purged with water until the discharge from the well was clear. Baseline analysis was again performed after a one week stabilization period. The suspended solid was still elevated but some improvement was noticed. Due to the suspended solid content, a third sample was collected and filtered before being fixed with acid to improve the accuracy of the results. As anticipated with groundwater associated with the Mancos Shale formation, the dissolved solids were extremely high and dominated by calcium, chloride, magnesium, sodium, and sulfate Refer to Appendix A for application for water well construction, and Appendix B for well water quality sampling results.

Although two years of baseline data were not collected specifically at the waste rock site, the samples discussed above are consistent with other Mancos influenced samples. To augment the data from the samples taken on-site, sampling continued through construction of the facility; thus providing at least one year's site-specific data prior to actual operation. Sampling of the waste rock well (WCWR) has continued since the construction of the facility and will continue until final reclamation of the site. Sampling is conducted on a quarterly basis or four (4) times per year. Refer to the annual report for current quality data for WCWR.

Aquifer Characteristics of the Terrace Gravels

The geologic section of the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility discusses the terrace gravels that surround the ~~Waste Rock Storage Facility~~ area. These gravels were deposited by glacial outwash and form a cap on the slopes leading down from East Mountain to the north and west. The thickness of these terrace gravels generally increases as one progresses down slope away from the mountain. Also, the lower contact of the gravels is unconformable and as such its thickness varies with paleotopography. A good example of this is at Test Hole No. 3 where the terrace gravel is 55 feet thick and its base is much lower there than where it is exposed in the dry wash to the west.

Although the terrace gravels are more permeable than the Mancos Shale that they overlay, permeability tests indicate that both soils are impervious (permeability coefficient 0.90 and 0.55 ft/yr respectively, per Rollins, Brown and Gunnel letter dated 24 September, 1989, page 4-62). On the down slope side of the Waste Rock Site, the base of the terrace gravel is exposed. No springs or damp areas exist along this contact which indicates that the limited recharge into this region is not sufficient to cause formation saturation. The recharge is most likely in balance with transpiration that occurs.

The design of the Waste Rock Storage Facility is such that any water that flows into the site either from precipitation or from the terrace gravels will migrate to the southeastern portion of the site where a sedimentation pond is located.

R645-301-724.200 Surface Water Information

The areas around the Waste Rock Storage Facility contain ephemeral washes where surface water flows for short periods of time immediately following a storm event. This surface storm water is diverted around the site where it eventually flows into Grimes Wash approximately two (2) miles to the southeast. Grimes Wash then flows to the south for approximately 2 1/2 miles where it intersects Cottonwood Creek. All storm water which flows within the boundaries of the disturbed areas of the site, is diverted through a sedimentation structure prior to being discharged into the natural drainageways.

The Mancos Shale typically contains large quantities of soluble minerals such as gypsum. Therefore, any water passing through it or eroding it will be naturally high in dissolved solids.

R645-301-724.400 Climatological Information

Rocky Mountain Power has maintained a weather station on East Mountain which is located two miles to the northeast from the Waste Rock Storage Facility since 1979. Historical records collected there show an average of 12.5 inches of precipitation annually. Much of this precipitation comes in the form of late summer thunder showers. This weather station is at a much higher elevation and consequently receives higher precipitation than at the Waste Rock Storage Facility. It is estimated that the site itself receives about 7-9 inches of moisture annually.

Temperatures in the area range from highs in the upper 90's to lows to -10 degrees below zero. The area experiences a frost-free period of about 120-140 days annually.

R645-301-728 Probable Hydrologic Consequences (PHC) Determination

The Waste Rock Storage Facility is located in an area which is very dry from a standpoint of both surface and groundwater. The only time surface water flows is during storm events. Also, the geotechnical study performed by Rollins, Brown and Gunnel Inc. shows that the near surface permeability is very low, being measured in terms of feet/year. The groundwater present in the Mancos Shale strata is high in total dissolved solids as documented in Hydrology of Area 56, Northern Great Plains and Rocky Mountain Coal Provinces, Utah, published by the U. S. Geological Survey in 1983. Rocks from the strata in the Blackhawk formation normally contributes less TDS to the groundwater. Therefore, because of the lack of surface and groundwater in the Waste Rock Storage Facility and the fact that what surface water does occur during storm events will be diverted around the site, this facility will not have any negative impacts on the hydrologic regime of the area. As discussed on earlier, the nearest alluvial valley floor is approximately two (2) miles from the site.

R645-301-730 Operation Plan

R645-301-731.100 Hydrologic Balance Protection

All rain water that falls onto the disturbed area of the Waste Rock Storage Facility and forms surface runoff, shall be collected in diversion ditches and diverted into a sediment pond prior to discharge into the surrounding ephemeral drainage systems.

R645-301-731.220 Surface Water Monitoring

The applicant commits to monitoring the surface waters surrounding the Waste Rock Storage Facility throughout the permit period. This monitoring shall include the measurement of quantity and quality of the water that is discharged from the sediment pond. Reasonable effort shall be made to measure the natural drainage during storm events in that it is almost always dry. The sediment pond discharge samples collected shall be analyzed as specified in UPDES permit (refer to ~~Volume 9 Appendix B~~ Appendix Volume, Appendix 7).

R645-301-740 Design Criteria and Plans

This permit contains site specific plans that incorporate minimum design criteria for the control of drainage from the disturbed and undisturbed areas. Drainage control is accomplished by means of diversions ditches and a sedimentation pond.

R645-301-742 Sediment Control Measures

Sediment control measures include practices carried out within and adjacent to the disturbed area. The sedimentation storage capacity of practices in and downstream from the disturbed areas will reflect the degree to which successful mining and reclamation techniques are applied to reduce erosion and control sediment. Sediment control measures consist of the utilization of proper mining and reclamation methods and sediment control practices, singly or in combination. Sediment control methods include, but are not limited to:

a. Retaining sediment within disturbed areas;
b. Diverting runoff away from disturbed areas;
c. Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion;
d. Using best management practices (BMP's) to reduce overland flow velocities, reduce runoff volumes and trap sediment.

R645-301-742.220 Sediment Ponds

Runoff from the area above the Waste Rock Storage Facility will be diverted into a ditch designed for the 100 year, 6 hour storm event. This runoff, as well as runoff from areas within the site will be diverted into a sediment pond which will contain the runoff of a 10 year, 24 hour storm with a spillway designed for the 25 year, 6 hour storm event. Refer to Appendix C for

sediment pond design.

R645-301-742.230 Other Treatment Facilities

During the design process it was found that there some disturbed areas which could not be reasonably treated by the sedimentation pond due to remote geographic locations, and which could not meet effluent limitations without treatment. These areas are considered Alternative Sediment Control Areas (ASCA). These areas will be treated by best management practices (BMP's) which include, but are not limited to: silt fences, berms, catch basins, vegetation, sediment filters, rolled erosion control products. ASCA areas present at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility include the access road and the subsoil pile. Refer to Plate 4-2 for location of all ASCA areas with this site. Also refer to Appendix C for the design of drainage control structures.

R645-301-747 Disposal of Non-Coal Mine Waste

Inherently, non-coal mine waste finds its way into the coal produced from the underground mining process. This waste is transported out of the mine with the produced coal. During breaking and screening (sizing) of the coal product, coal mine waste (refuse) is removed and separated from the final coal product. This waste stream is transported to the Waste Rock Storage Facility for permanent disposal.

As required by R645-301-528.330, non-coal wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage,….., and other combustible materials generated during mining activities will be disposed of in a solid waste disposal area. Non-coal wastes found in the storage pile are removed prior to permanent placement of the material. The non-coal waste is temporarily stored at the site until such time it can be transported off-site to a proper solid waste disposal site.

R645-301-748 Casing and Sealing of Wells

The water well located at the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility shall be cased, sealed, or otherwise managed, as approved by the Division, to prevent acid or other toxic drainage from entering ground or surface water, to minimize disturbance to the hydrologic balance, and to ensure the safety of people, livestock, fish and wildlife, and machinery in the permit and adjacent area.

The well has been provided with a steel casing and cemented in place at the surface. A lockable end cap is installed to prevent unauthorized access to the well.

R645-301-750 Performance Standards

All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, operations will be conducted to assure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

R645-301-751 Water Quality Standard and Effluent Limitations

Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

If the site receives a storm greater than the designed capacity of the sediment pond, discharge from the sediment pond will be routed through the designed emergency spillway~~s~~ and into the ephemeral drainage. Discharge from the sediment pond would constitute an emergency situation and comply with State of Utah Department of Environmental Quality Division of Water Quality storm water regulations.

R645-301-752 Sediment Control Measures

Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760 (refer to Appendix C: Drainage Control Plan for design, construction and maintenance of sediment controls for the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility).

At reclamation of the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility, pocking (or surface roughening) will be used to intercept and trap sediment on a microscale. Roughening also collects moisture, which improves vegetation establishment and consequently prevents erosion. Pocking is highly recommended for moderate to steep slopes (up to 1h:1½v) but is

also useful for flat or gently sloping areas with erosive soils and arid climates. Pocks are created by the use of a track-hoe shovel to dig, poke, or push basins with a minimum depth of eighteen inches. These basins should be 1 ½ to 2 feet deep and have the width of the bucket. This allows the basins to be up to four feet wide. The most common construction method is to dig a bucket load of soil and then drop it 2 to 3 feet above the soil surface. Repeat this process in a random and overlapping pattern, making it impossible for water to flow down slope.

Sediment control shall be maintained as runoff will be limited or eliminated by ponding water within the pocks. To illustrate the effectiveness of the pocks for controlling erosion and sedimentation, the revised universal sediment loss equation is used in a modeling program as discussed below (UDOGM, Practical Guide to Reclamation in Utah, pg 106).

Justification to control runoff is made by utilizing the computer program RUSLE2. This program solves a set of mathematical equations that compute values for rill and inter-rill erosion on the overland portion of the landscape. The user inputs variables to describe the site conditions such as climate, topography, soils, management practices, etc. to compute estimates for soil loss within the site.

Three areas were modeled using RUSLE2. These areas are the reclaimed berms of the refuse pile, the reclaimed top of the pile, and the reference area immediately north of the pile. The reference area was chosen because it is a main contributor of sediment near the site.

Variables used are those listed in the database files of the RUSLE2 program version 2.0.4.0. Not all variables are directly representative (i.e. location) of the site conditions; however they were similar to the conditions found at the site.

Results of the modeling calculations showed that sediment contributions from the pile are 0.23 t/ac/yr (top of reclaimed pile) and 0.16 t/ac/yr (reclaimed berms). The soil loss eroded portion of the reclaimed berms computed a 2.6 t/ac/yr. However, because of how terraces are constructed on the berms during reclamation, the program credits for deposition of sediment.

The reference area calculations (or soil loss from areas out of the permit area) showed sediment contributions of 16 t/ac/yr. The yield from this area is appreciably more than the sediment contributions from the reclaimed area. Therefore, a case is made that shows there will be no additional contributions of suspended solids to areas outside of the permit area than what naturally exist. Refer to Appendix XXII to review the Erosion Calculation Worksheets.

752.100 Siltation structures and diversions are located, maintained, constructed and will be reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763.

752.200 Road Drainage. Roads are located, designed, constructed, reconstructed, used, maintained and will be reclaimed according to R645-301-732.400, R645-301-742.400 and R645-301-762 and to achieve the following:

752.210 Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices;

752.220 Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area;

752.230 Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R645-301-751;

752.240 Minimize the diminution to or degradation of the quality or quantity of surface- and ground-water systems; and

752.250 Refrain from significantly altering the normal flow of water in streambeds or drainage channels.

R645-301-753 Impoundments and Discharge Structures

Impoundments and discharge structures have been located, maintained, constructed and will be reclaimed to comply with R645-301-733, R645-301-734, R645-301-743, R645-301-745 and R645-301-760. The sediment pond will be reclaimed no sooner than two years after the last augmented seeding of the reclaimed berms and soil storage pile locations.

R645-301-755 Casing and Sealing of Wells

All wells will be managed to comply with R645-301-748 and R645-301-765. The water well will be cased, sealed, or otherwise managed, as approved by the Division.

R645-301-760 Reclamation

Before abandoning a permit area or seeking bond release, the PacifiCorp will ensure that all temporary structures are removed and reclaimed, and that all sedimentation ponds, diversions, impoundments and treatment facilities meet the requirements of R645-301 and R645-302 for permanent structures, have been maintained properly and meet the requirements of the approved reclamation plan for permanent structures and impoundments. PacifiCorp will renovate such structures if necessary to meet the requirements of R645-301 and R645-302 and to conform to the approved reclamation plan. For complete discussion related to the reclamation plan for the ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility refer to R645-301-500 Engineering, and Plates 4-7 and 4-12 in the Maps Section.

R645-301-763 Siltation Structures

It is planned for the sediment pond to be removed during the reclamation of the ~~Cottonwood~~ Waste Rock Site as outlined in R645-301-540. State and Federal regulation require such structures to remain for at least two years after the last augmented seeding unless removal is authorized by the Division. For the Division to authorize removal a case must be made by the permittee that removal of the siltation structure will not contribute additional suspended solids to stream flow or runoff outside the permit area.

R645-301-765 Permanent Casing and Sealing of Wells

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, the water well shall be abandoned and provided a watertight barrier to the migration of water in the well bore, in the annular spaces or in fractures and openings adjacent to the well bore. Well abandonment shall be conducted as approved by the Division.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Request for Monitor Well Construction form - 1989

Volume 4

R645-301-700: Hydrology- Appendix A -

DIVISION OF WATER RIGHTS
REQUEST FOR MONITOR WELL CONSTRUCTION

APPLICANTS NAME Utah Power & Light - Mining Division

APPLICANTS ADDRESS P. O. Box 310, Huntington, UT 84528

INDIVIDUAL CONTACT Charles A. Semborski/Val E. Payne (Name) 687-9821 (Phone)

CURRENT PROPERTY OWNER Utah Power & Light Co.

PROPOSED NUMBER OF WELLS 1 DIAMETERS 3-7/8" APPROX. DEPTHS 87'

TYPE OF COMPLETIONS (Casing, intake, gravel pack, grout, etc.) 2-inch ID slotted pVC pipe

PROJECT ENGINEER/MANAGER Rodger C. Fry (Name)
P. O. Box 310, Huntington, UT 84528 (Address) 687-9821 (Phone)

GENERAL LOCATION DESCRIPTION Cottonwood Mine Waste Rock Storage Site COUNTY Emery

WELLS IN CONJUNCTION WITH (LEAKING) UNDERGROUND STORAGE TANKS ____ Yes X No

NAME OF LICENSED DRILLER N/A LICENSE # ____

PROPOSED CONSTRUCTION DATE November 1989 ANTICIPATED COMPLETION DATE 11/30/89

LOCATION OF WELLS:

1. N/S 800 FT. & E/W 2100 FT. FRM SE COR. or __1/4__1/4 of SEC. 34 T 17 N/S R 7 E/W SLBM/USM
2. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
3. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
4. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
5. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
6. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
7. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
8. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
9. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM
10. N/S____FT. & E/W____FT. FRM __COR. or __1/4__1/4 of SEC.___T___N/S R__E/W SLBM/USM

(continued on reverse side)

Comments or explanation ____

For office use only

DATE OF REQUEST ____ APP/REJ DATE BY ____
AREA OFFICE ____ AUTHORIZATION # ____

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Waste Rock Well Water Analysis Reports 1989 - 1990

Volume 4

R645-301-700: Hydrology – Appendix B

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

December 22, 1989

Job No.: 59 10184

Date Rec'd: December 5, 1989

Date Sampled: December 5, 1989

Sampled By: UP&L

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

Sample ID: UP&L

COTTONWOOD WASTE ROCK WELL
Depth 57'
FIELD MEASUREMENTS
pH 7.07
D.O. 7.03
Conductivity 10666

WATER ANALYSIS

Aluminum 12-19-89	61.00 14:00 hr.	mg/l	Chromium 12-19-89	0.28 14:00 hr.	mg/l
Alk., Bicarbonate 12-07-89	414 15:20 hr.	mg/l HCO3	Conductivity 12-07-89	10000 11:00 hr.	umhos/cm
Alk., Carbonate 12-07-89	1< 15:20 hr.	mg/l CaCO3	Copper 12-19-89	0.320 15:30 hr.	mg/l
Alk., Total 12-07-89	339 15:20 hr.	mg/l CaCO3	Fluoride 12-06-89	0.85 15:30 hr.	mg/l
Arsenic 12-21-89	0.008 9:00 hr.	mg/l	Hardness, Total 12-13-89	4037	mg/l CaCO3
Anions, Total	119.73	meq/l	Iron 12-11-89	5.01 12:00 hr.	mg/l
Barium 12-19-89	0.03< 14:00 hr.	mg/l	Lead 12-19-89	0.470 11:00 hr.	mg/l
Boron 12-22-89	1.59 14:00 hr.	mg/l	Magnesium 12-13-89	292.00 13:30 hr.	mg/l
Cadmium 12-19-89	0.020 11:00 hr.	mg/l	Manganese 12-11-89	2.48 12:15 hr.	mg/l
Calcium 12-13-89	1135.0 13:15 hr.	mg/l	Mercury 12-20-89	0.002< 17:00 hr.	mg/l
Cations, Total	120.38	meq/l	Molybdenum 12-19-89	0.15 14:00 hr.	mg/l
Chloride 12-07-89	815.0 13:15 hr.	mg/l	Nickel 12-19-89	0.57 11:00 hr.	mg/l

ANALYST: [illegible]

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

[illegible]
Manager, Huntington Laboratory

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Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

December 22, 1989

Job No.: 59 10184

Date Rec'd: December 5, 1989

Date Sampled: December 5, 1989

Sampled By: UP&L

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

Sample ID: UP&L

COTTONWOOD WASTE ROCK WELL
Depth 57'
FIELD MEASUREMENTS
pH 7.07
D.O. 7.03
Conductivity 10666

WATER ANALYSIS

Nitrogen, Ammonia	1.23	mg/l	Selenium	0.002<	mg/l
12-05-89	16:00 hr.		12-21-89	10:00 hr.	
Nitrogen, Nitrate	0.09	mg/l	Sodium	851.00	mg/l
12-08-89	13:00 hr.		12-13-89	13:00 hr.	
Nitrogen, Nitrite	0.01<	mg/l	Solids, Dissolved	9316.0	mg/l
12-08-89	13:00 hr.		12-14-89	16:00 hr.	
Oxygen, Dissolved	7.4	mg/l	Solids, Suspended	15754.0	mg/l
12-05-89	16:45 hr.		12-14-89	16:00 hr.	
pH	7.85	Units	Sulfate	4300.0	mg/l
12-05-89	17:00 hr.		12-14-89	10:15 hr.	
Phosphorus, Total	0.80	mg/l	Sulfide	9.80	mg/l
12-06-89	13:00 hr.		12-07-89	08:30 hr.	
Potassium	119.10	mg/l	Zinc	1.06	mg/l
12-13-89	14:00 hr.		12-19-89	11:00	

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ANALYST: [illegible]

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

[illegible]
Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

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Member of the SGS Group (Societe' Generale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

January 11, 1990

Job No.: 59 10212

Sample ID: UP&l

Date Rec'd: December 19, 1990

COTTONWOOD WASTE ROCK WELL
Rec'd 1630 hr.
Sampled 1500 hr.

Date Sampled: December 19, 1990

Sampled By: UP&L

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P.O. Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	10	mg/l CaCO3	Chloride	280.0	mg/l
12-28-89	1500 hr.		12-29-89	1815 hr.	
Aluminum	4.00	mg/l	Chromium	0.05	mg/l
01-10-90	1300 hr.		01-10-90	1300 hr.	
Alk., Bicarbonate	798	mg/l HCO3	Conductivity	32000	umhos/cm
12-28-89	1430 hr.		01-08-90	1500 hr.	
Alk., Carbonate	1<	mg/l CaCO3	Copper	0.070	mg/l
12-28-89	1430 hr.		01-10-90	0900 hr.	
Alk., Total	654	mg/l CaCO3	Fluoride	0.80	mg/l
12-28-89	1430 hr.		01-09-90	0930 hr.	
Arsenic	0.006	mg/l	Hardness, Total	3354	mg/l CaCO3
01-11-90	1100 hr.				
Anions, Total	150.79	meq/l	Iron	11.30	mg/l
			01-08-90	1000 hr.	
Barium	0.03<	mg/l	Iron, Dissolved	9.00	mg/l
01-10-90	1300 hr.		01-08-90	1000 hr.	
Boron	0.69	mg/l	Lead	0.050<	mg/l
01-09-90	1600 hr.		01-10-90	0900 hr.	
Cadmium	0.002<	mg/l	Magnesium	473.00	mg/l
01-10-90	0900 hr.		01-08-90	1400 hr.	
Calcium	563.0	mg/l	Manganese	0.89	mg/l
01-08-90	1415 hr.		01-08-90	0930 hr.	
Cations, Total	149.93	meq/l	Mercury	0.002<	mg/l
			01-11-90	0900 hr.	

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

COMMERCIAL TESTING & ENGINEERING CO.
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Member of the SGS Group (Societe' Generale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

January 11, 1990

Job No.: 59 10212

Sample ID: UP&l

Date Rec'd: December 19, 1990

COTTONWOOD WASTE ROCK WELL
Rec'd 1630 hr.
Sampled 1500 hr.

Date Sampled: December 19, 1990

Sampled By: UP&L

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

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WATER ANALYSIS

Molybdenum		0.10<	mg/l	Potassium		41.60	mg/l
01-10-90	1300 hr.			01-08-90	1315 hr.		
Nickel		0.14	mg/l	Selenium		0.002<	mg/l
01-10-90	0900 hr.			01-11-90	1315 hr.		
Nitrogen, Ammonia		0.14	mg/l	Sodium		1905.00	mg/l
01-04-90	1330 hr.			01-08-90	1300 hr.		
Nitrogen, Nitrate		0.48	mg/l	Solids, Dissolved		8714.0	mg/l
01-09-90	1500 hr.			01-03-90	1600 hr.		
Nitrogen, Nitrite		0.12	mg/l	Solids, Settleable		13.0	mg/l
01-09-90	1500 hr.			12-19-89	1645 hr.		
Oil and Grease		1.0<	mg/l	Solids, Suspended		8000.0	mg/l
12-29-89	1100 hr.			01-03-90	1600 hr.		
Oxygen, Dissolved		3.3	mg/l	Sulfate		6200.0	mg/l
12-19-89	1730 hr.			01-08-90	1645 hr.		
pH		7.70	Units	Sulfide		19.80	mg/l
12-19-89	1700 hr.			12-29-89	1745 hr.		
Phosphorus, Total		0.29	mg/l	Zinc		0.35	mg/l
01-04-90	1105 hr.			01-10-90	0900 hr.		

ANALYST: O. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

January 16, 1990

Job No.: 59 10243

Date Rec'd: January 9, 1990

Date Sampled: January 9, 1990

Sampled By: UP&L

Sample ID: UP&L

COTTONWOOD WASTE ROCK WELL
Depth 56.5'
Rec'd 1645 hr.
Sampled 1350 hr.

Utah Power and Light Co.
P.O. Box 1005
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WATER ANALYSIS

Acidity	12	mg/l CaCO3	Chloride	425.0	mg/l
01-12-90	1645 hr.		01-11-90	1545 hr.	
Aluminum	0.01<	mg/l	Chromium	0.02<	mg/l
01-10-90	1300 hr.		01-10-90	1300 hr.	
Alk., Bicarbonate	534	mg/l HCO3	Conductivity	16000	umhos/cm
01-10-90	1130 hr.		01-11-90	1610 hr.	
Alk., Carbonate	1<	mg/l CaCO3	Copper	0.020	mg/l
01-10-90	1130 hr.		01-10-90	0900 hr.	
Alk., Total	438	mg/l CaCO3	Fluoride	0.69	mg/l
01-10-90	1130 hr.		01-15-90	1415 hr.	
Arsenic	0.002	mg/l	Hardness, Total	2345	mg/l CaCO3
01-11-90	1000 hr.				
Anions, Total	144.34	meq/l	Iron	0.21	mg/l
			01-12-90	1400 hr.	
Barium	0.03<	mg/l	Iron, Dissolved	0.19	mg/l
01-10-90	1330 hr.		01-12-90	1400 hr.	
Boron	1.00	mg/l	Lead	0.070	mg/l
01-09-90	1600 hr.		01-10-90	0900 hr.	
Cadmium	0.002<	mg/l	Magnesium	408.00	mg/l
01-10-90	0900 hr.		01-12-90	1445 hr.	
Calcium	266.4	mg/l	Manganese	0.15	mg/l
01-12-90	1430 hr.		01-12-90	1515 hr.	
Cations, Total	146.29	meq/l	Mercury	0.002<	mg/l
			01-09-90	0930 hr.	

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

6-1.7

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

COMMERCIAL TESTING & ENGINEERING CO.
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SINCE 1908
Member of the SGS Group (Societe' Generale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

January 16, 1990

Job No.: 59 10243

Date Rec'd: January 9, 1990

Date Sampled: January 9, 1990

Sampled By: UP&L

Sample ID: UP&L

COTTONWOOD WASTE ROCK WELL
Depth 56.5'
Rec'd 1645 hr.
Sampled 1350 hr.

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

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JAN 16 1990
MINING DIV.
FIELD OFFICE

WATER ANALYSIS

Molybdenum	0.10<	mg/l	Potassium	23.80	mg/l
01-10-90	1300 hr.		01-12-90	1500 hr.	
Nickel	0.06	mg/l	Selenium	0.002<	mg/l
01-10-90	0900 hr.		01-11-90	1000 hr.	
Nitrogen, Ammonia	0.20	mg/l	Sodium	2300.00	mg/l
01-15-90	1320 hr.		01-12-90	1415 hr.	
Nitrogen, Nitrate	9.94	mg/l	Solids, Dissolved	10170.0	mg/l
01-15-90	1150 hr.		01-15-90	1540 hr.	
Nitrogen, Nitrite	0.06	mg/l	Solids, Settleable	20.0	mg/l
01-15-90	1150 hr.		01-10-90	0930 hr.	
Oil and Grease	3.7	mg/l	Solids, Suspended	11064.0	mg/l
01-15-90	1525 hr.		01-15-90	1540 hr.	
Oxygen, Dissolved	4.1	mg/l	Sulfate	5900.0	mg/l
01-10-90	1500 hr.		01-15-90	1100 hr.	
pH	7.50	Units	Sulfide	0.00	mg/l
01-10-90	1425 hr.		01-15-90	1015 hr.	
Phosphorus, Total	0.06	mg/l	Zinc	0.02	mg/l
01-11-90	1100 hr.		01-10-90	0900 hr.	

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Drainage Control Design – Runoff, Peak Flow, Pond Sizing, Ditch Sizing, Culvert Sizing

Volume 4

R645-301-700: Hydrology –Appendix C

Drainage Control Design

General

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility encompasses 16.9 acres of disturbed land and has an access road 1,435 feet long. Drainage along the road will be routed to four culverts which will convey storm runoff safely under the road surface and into the natural drainage channels. Runoff from the waste pile and from the 15.5 undisturbed acres of land which normally drain through the waste rock site will be diverted to a sediment pond where the water will be retained to remove suspended solids before discharging back into the natural drainage.

Sediment Pond Sizing

This section details the methods used to estimate storm runoff volume and mean sediment yield to determine the design volume of the sediment pond.

Storm Runoff Volume

Sediment ponds and other sediment treatment facilities are required to treat the runoff from a 10 year, 24 hour storm event.

The runoff depth resulting from a given rainfall event was determined using the runoff curve number technique, as defined by the USDA Soil Conservation Service (now Natural Resource Conservation Service) in 1972. According to the curve number methodology, the relationship between storm rainfall, soil moisture storage, and runoff can be expressed by the equations:

$$Q = \frac{(P-0.2S)^2}{P+0.8S} \quad (1)$$

$$CN = \frac{1000}{10+S} \quad (2)$$

Where:

Q = direct runoff depth, inches
P = storm rainfall depth, inches
S = maximum infiltration depth (defined as Q), inches; and
CN = curve number, dimensionless

Use of equations 1 and 2 requires the selection of a curve number, which is a function of vegetative cover and hydrologic soil groups. Curve numbers for the study area were selected

from information provided by the USDA Soil Conservation Service (1972), by US Bureau of Reclamation (1977), and from personal hydrologic judgment following field observation. To determine a representative curve number the 31.3 acres were divided into two nearly homogeneous subareas. The south facing slopes above 6900 feet elevation, consisting of 15.3 acres, are deteriorated shale and sandstone ledges with very little vegetative cover. The sandstone ledges are close to vertical while the shale colluvial slopes range from 1:1 to 2.5:1 with an average of about 1.5:1. Select CN of 86 based on soil type C, 10% ground cover and figure 9.6, Soil Conservation Service National Engineering Handbook Section 4, Exhibit VI. Below 6900 feet elevation, the slopes are less steep with more vegetation including the valley floor. From Figure 9.6 (Exhibit VI), select CN of 80 based in soil type C and 30% ground cover for the 16.0 acres. Therefore a weighted average CN = ((5.3 x 86) + (16.0 x 80)) / (15.3 + 16.0) = 82.9.

Equation 1 is based on the assumption that Ia = 0.2S, where Ia is the initial abstraction from storm rainfall, defined as the rainfall which must fall before runoff begins (i.e., to satisfy interception, evaporation, and soil-water storage). Therefore, determination of runoff from Equation 1 is valid only when P ≥ O.2S. Below this point, no runoff can occur. Once Q was determined from the above equation, the runoff volume was calculated by multiplying the runoff depth by the drainage area.

Values of precipitation (P) were selected for the design return periods from Volume VI-Utah of the NOAA ATLAS 2 Precipitation-Frequency Atlas of the Western United States, (Miller et.al., 1973). For P equal to 2.2 inches and weighted average curve number of 82.9, the computed runoff is 0.831 inches over 31.3 acres or 2.17 acre feet.

<u>Mean Annual Sediment Yield</u>

The amount of sediment to be deposited in the sediment pond was determined from the Universal Soil loss Equation from B. J. Barfield, R.C. Warner, and C. T. Haan, Applied Hydrology and Sedimentology for Disturbed Areas, Oklahoma State University, Stillwater, Oklahoma, 1981. In accordance with this equation, the annual soil loss due to precipitation related erosion is:

$$A = R \bullet K \cdot LS \cdot CP$$

where:

A = computed amount of soil loss 'in tons/acre/year
R = rainfall factor, average annual value
K = rainfall factor, average annual value
LS = topographic factor
CP = erosion control factor

The R value can be estimated from Equation 5.5, Barfield et.al.

$$R = 27 \times (P_{2,6})^{2.2}$$

Where, $P_{2,6}$ is the 2 year, 6 hour precipitation inches. For the Waste Rock Site, the $P_{2,6}$ is 1.0 inches (NOAA ATLAS Volume VI). Therefore:

$$R = 27\,(1.0)^{2.2} = 27$$

The K - value was taken as 0.03 from the map presented by C. Earl Israelsen, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, Erosion and Sedimentation in Utah: A Guide for Control. UWRL/H-84/03, 1984 Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.

LS values are determined for each subarea of the watershed based on equation 5.10, Barefield et.al.

$$LS = \frac{(L)^m}{72.6}\,(430x^2 + 30x + 0.43)/(6.613)$$

where:

L = slope length, feet

M = exponent dependent on the slope
if slope 3% then m = .3
if slope = 4% then m = .4
if slope 5% then m = .5

X = sine of the slope angle
= sin (arc tan (slope %)/100)

The CP values are also determined from Barefield, et.al., from either table 5.8 or table S.A.3.

Table 4.1 summarizes the sediment prediction calculations and references the areas depicted in the map in Exhibit XI.

TABLE 4.1

Description	Subarea ID	Area (Acres)	Length (ft)	Slope (%)	LS	CP	CP Source Table #	A* Tons/Acre/Yr	Annual Sediment Yield
Undisturbed 10% Cover No Canopy	A	14.4	800	62.5	68.8	0.32	5.A.3	178	2570
Undisturbed 10% Cover No Canopy	B	2.0	320	56.2	37.6	0.32	5.A.3	97	195
Undisturbed 30% Cover No Canopy	C	2.8	150	40	15.4	0.15	5.A.3	19	52
Reclaimed Soil Stockpile, 20% cover, No Canopy	D	1.6	100	67	26.7	0.2	5.A.3	43	69
Disturbed, Compacted	E	1.7	100	50	17.7	1.3	5.8	186	317
Disturbed, Compacted	F	6.3	500	2	0.32	1.3	5.8	3.3	21
Disturbed, Compacted	G	1.8	120	50	19.4	1.3	5.8	204	368

*A = R *x* K *x* LS *x* CP = (27) (0.3) LS *x* CP

Total = 3,592 tons/yea

The total sediment yield per year is 3,592 tons. For a density of 100 pounds per cubic foot, that relates to

3,592 tons x 2,000 lbs/ton *x* ft^3/100 lbs *x* Acre foot/43,560 ft^3 = 1.65 Ac. Ft.

Table 4.2 Sediment Pond Design

Precipitation from 10 Year 24 Hour Storm	2.2 inches
Weighted Average Curve Number	82.9
Direct Runoff	0.831 inches
Contributing Area	31.3 acres
Total Collected Runoff per Design Storm	2.17 ac ft
Annual Sediment Production	3,592 tons/year
Total Volume of Annual Sediment	1.65 ac ft
Combined Total Required Pond Volume 2.17 + 1.65	3.82 ac ft
Design Volume of Pond	4.58 ac ft
Additional Sediment Volume Provided (4.58 – 3.82)	0.76 ac ft
Design Sediment Volume (1.65 + 0.76)	2.41 ac ft
Clean out required at 60% of annual sediment production plus Additional sediment volume provided (60% x 1.65) + 0.76	1.75 ac ft

Refer to Exhibit XX Sediment Pond Storage – Capacity and Stage – Discharge Curves.

Spillway Design

A single, non-erodible open channel spillway will be provided to safely discharge from the impoundment without damage to the dam. The peak flow calculated for the 100 year, 6 hour storm event (refer to the section entitled “Peak Flow Determination” below) was 22.13 cubic feet per second. The channel will be concrete lined with random exposed rocks for roughness to achieve a Manning's N value of 0.030 (Chapter 4, State Department of Transportation, Manual of Instruction, Part 4, Road Way Drainage, 1984). The slope of the channel across the 15 foot wide crest is 5%. Manning's equation is used to determine the depth of flow and channel geometry. A six foot wide channel with 2:1 side slopes results in a design depth of six inches. The channel will be continued down the slope of the dam and discharge into the natural channel.

General

Temporary diversions will be constructed at the base of the valley side slopes to collect the runoff from the undisturbed areas and convey it to the sediment pond. As the waste pile grows and expands to cover the initial diversion ditch, new diversions will be constructed to convey

the collected runoff to the pond. This process will be repeated until the waste pile reaches its maximum size in plan view and the ditches will not be moved thereafter. (Refer to Exhibit IV) Upon final reclamation, the ditches will become permanent diversions of the natural ephemeral drainage channel.

Sub-Area Divisions

The ~~Cottonwood/Wilberg~~ Waste Rock Storage Facility is divided into four subareas for hydrologic calculations based on the route that runoff takes to enter the sediment pond. (Refer to Map 4-2) The first area, 1A, includes the largest portion of the disturbed area consisting of the top and western slope of the waste pile, the inside slope and top of the topsoil stockpile and the undisturbed areas above the site which will also drain into the sediment pond. The ditch for this area, DA, will be constructed on a 2% slope until it reaches the last 355 feet before the sediment pond. The slope will then change to 18%. The total area to be drained by this ditch is 26.4 acres.

The second area, 1B, totaling 3.4 acres, consists of the eastern slope of the waste pile, the road to the top of the waste pile, and the inside slope and top of the subsoil stockpile. The ditch, DB, will be constructed on grades of 2.5% and 12% until it reaches the sediment pond.

Area 1C consists of the slopes above the sediment pond and the pond itself where runoff will flow directly into the pond without ditches. This area totals 1.6 acres.

The last area, 1D, consists of 0.9 acres including the outside slopes of the two soil stock piles and the dam. Runoff from these areas will not be collected in the sediment pond. Treatment of these areas will be by silt fences and straw bales.

Peak Flow Determination

A unit hydrograph program by Richard Hawkins and Kim Marshall, "Storm Hydrograph Program" Utah State University, 1974, was used to model the rainfall and resulting runoff. The model *is* based on the Soil Conservation Service rainfall runoff function, also called the curve number equation. As such, a curve number was determined for each sub-area along with a time of concentration. See Exhibit 10, Tables 1-A and 1-B for hydrograph results.

Curve numbers were derived based Conservation Service National Engineering Handbook, Section 4 - Hydrology, Chapters 7, 8, and 9.

Time of concentration was based on two methods. For the flow from the undisturbed area, the following relationships from Barfield et.al., were used:

$t_c = t_{l/\cdot 6}$
t_c = time of concentration, hours
t_l = lag time, hours
$t_l = L^{0.8} (S+1)^{0.7} / (1900 \times y^{0.5})$
L = hydraulic length, feet
S = (1000/curve number - 10)
Y = slope in percent

For subarea 1A, the first portion of the travel time for the runoff from the highest point in the subarea to the diversion ditch is 0.0796 hours, or 4.78 minutes, based on a length of 1350 feet, CN = 83 and an average slope of 59%.

The second portion consists of the time required to travel in the ditch to the pond. Manning's equation was used to derive a value for the velocity of the flow in the ditch. Assuming a flow rate of 20 cfs and a V-ditch with 2.5:1 side slopes and channel slope of 2%, Manning's n = 0.035, the velocity was determined to be 4.40 feet/second. The length of the ditch is 1300 feet which gives a travel time of 4.92 minutes. Therefore, the total time of concentration is 4.78 + 4.92 or 9.7 minutes.

The t_c for subarea 1B was similarly determined from 185 feet of overland flow at 50% slope and CN=82 to yield an initial travel time of 0.0182 hours or 1.09 minutes. The travel times for the two foot wide trapezoidal ditch estimated as follows:

1.5 cfs; 400 feet at 2.5% slope = 2.3 fps= 2.90 minutes
2.5 cfs; 320 feet at 12 % slope = 4.6 fps= 1.16 minutes
3.0 cfs; 170 feet at 7.5% slope = 4.1 fps= 0.69 minutes
Total ditch travel time = 4.75 minutes

Therefore the t_c for the Area 1B equals 5.84 minutes.

Peak flows from Area 1C were determined based on assuming 100% of the rainfall went directly to the pond. The peak flows for the ditches occurred at 2.52 hours when the rainfall intensity was 0.22 inches in 30 minutes or 0.0073 inches/minute. This resulted in a peak flow of:

$$1.6\ acres\ x\ \frac{0.0073\ inches}{minute}\ x\ \frac{43{,}560\ ft2}{acres}\ x\ \frac{1\ minute}{60\ second}\ x\ \frac{1\ foot}{12\ inches} = 0.71\ cubic\ feet/second$$

Table 4-2.1: Diversion Peak Flow Rates

	Acres	Curve No.	Time of Concentrtation	Peak Flow
1A	26.3	82.6	0.162 hrs	18.9 cfs
1B	3.4	82	0.0973	2.52
1C	1.6	-		0.71
1D	0.9	-		
Total	**32.2 acres**			**22.13 cfs**

(Peak flows based on 100 year, 6 hour storm event of 2.2 inches)

Each ditch was designed to keep the velocity below 5 feet per second in order to prevent erosion. Ditch DA will be a V-ditch for the entire length until it approaches the pond where the slope increases from 2 to 18%. At that point, a wide trapezoidal ditch will be used with a rip-rap lining. Ditch DB will be a narrow trapezoidal ditch for its entire length. Both ditches will be monitored throughout the life of the facility for erosion and formation of gullies. If erosion does occur with the ditches, the applicant will repair any gullies and install velocity controls (i.e. rip-rap, gabions, etc.) as needed to correct the problem.

Rip-rap sizing for the steep section of ditch DA was taken from Utah State Department of Transportation Manual of Instruction, Part 4, Roadway Drainage, Section 4-610.30, Stable Channel Design. Using a stone diameter of 0.5 feet, Manning's n = 0.0305 from fig. 3-28, Utah DOT MOl Part 4 (Exhibit VII), the calculated depth of the flow is less than the stone diameter so use velocity against stone equal to the average velocity. (Exhibit VIII) Then entering the calculated velocity of 7.58 fps in fig. 3-30 (Exhibit IX) the required stone size for 2.5: 1 side slope is confirmed at the assumed size, i.e. 0.5 feet diameter for D_{50}.

Ditch DA

- V-ditch, 2.5:1 side slopes, 2% channel slope, Manning's n = 0.035, peak flow 18.9 cfs, depth 1.32 feet, velocity 4.34 feet/second.
- Trapezoidal, 10 foot bottom width, 2.5:1 side slopes, 18% channel slope, Manning's n = 0.0305, peak flow 18.9 cfs, depth 0.235 feet, velocity 7.58 feet/second, rip-rap D50 size = 0.5 feet.

<u>Ditch DB</u>

- Trapezoidal, 2 foot bottom width, 2.:1 side slopes, 12% channel slope, Manninng's n = 0.035, peak flow 2.52 cfs, depth 0.217 feet, velocity 4.59 fps.

Combined Ditch A and B (after final reclamation and removal of sediment pond)

- Trapezoidal, 10 foot bottom width, 3:1 side slopes, 2.1% channel slope, Manning's n = 0.035, peak flow 22.1 cfs, depth of flow 0.52 feet, depth of ditch 1.0 feet, velocity 3.61 feet/second.

CURVE NUMBER DETERMINATION FOR DIVERSION PEAK FLOW CALCULATION

Area 1A

15.3 Acres Undisturbed

Sage Grass, 10% Cover, Soil Type C

CN = 83 SCS NEH-4 fig 9.6 (Exhibit VI)

11.0 Acres Disturbed

Waste rock pile consisting of soils with moderate infiltration rate, deep and well drained with moderate fine to moderate coarse texture use Soil Type B, NO Cover, Dirt Roads

CN = 82 NEH-4 Table 9.1

Weighted Average CN =

(15.3 (83) + 11.0 (82)) / (15.3 + 11.0) = 82.6

Area 1B

Use CN = 82 as above for disturbed area with No Cover.

Access Road Drainage

The access road will cross several natural ephemeral drainage channels and will require culverts to convey the runoff underneath the road surface. The drainage areas for each culvert have been marked on Map 4-2 and numbered 2 through 5. (Area 1 is the waste rock storage site and the undisturbed area which naturally drains through the site.) Peak flows were determined in the same manner as was used for the diversions in the previous section. Table 4-3 gives the parameters used to determine peak flows and culvert sizing. See Exhibit 10, Tables 2 through 5 for hydrograph results. Refer to Exhibit XIX for culvert outlet protection and trash racks.

Application to Alter a Natural Stream Channel

See following page.

STATE OF UTAH
NATURAL RESOURCES
Water Rights

Norman H. Bangerter, Governor
Dee C. Hansen, Executive Director
Robert L. Morgan, State Engineer

Southeastern Area • 453 S. Carbon Avenue • P.O. Box 718 • Price, UT 84501-0718 • 801-637-1303

April 3, 1990

UP&L Mining Division
Attn: Val Payne, Senior Environmental Engineer
P.O. Box 310
Huntington, Utah 84528

Dear Val:

Pursuant to the requirements set forth in Section 73-3-29 (Natural Stream Channel Alteration) Utah Code Annotated, 1953, a field exanination of the proposed Wilberg Waste Rock Site was completed on March 30, 1990. Upon review of the designed channel crossings, it was concluded that the existing channels are, at best, ephemeral in nature and are not supportive of a riparian type habitat. Further, installation of the drainage controls (culverts) and ancillary site construction should not adversely impact the immediate drainage areas. Therefore, application to alter a natural stream channel is hereby waived.

In regards to construction of monitor wells, applications should be submitted to this office prior to drilling. I have enclosed several application forms for your use, which should incorporate any existing as well as proposed monitor wells. Please be advised that all wells must be constructed by a licensed well driller of the State of Utah.

In addition, I have included Administrative Rules for Well Drillers and Stream Channel Alterations as requested. If I can be of any further assistance, please feel free to contact me at your convenience.

Sincerely,

William A. Warmack

William A. Warmack
Assistant Area Engineer

Enclosures
WAW/mjk

Table 4.3: Access Road Culvert Sizing

Area #	Acres	Hydrologic Length	Slope (%)	Curve Number	Time of Conc. (hrs)	Peak Flow (cfs)	Culvert Diameter (in)	Culvert Capacity (cfs)	Minimum Culvert Slope (%)
2	2.21	420	37.4	80	0.0433	0.589	12	2.3	0.5
3	25.14	2630	34.6	80	0.195	5.08	24	13	0.5
4	4.18	915	8.6	73	0.207	0.186	12	2.3	0.5
5	33.97	3260	29.3	80	0.252	6.21	24	13	0.5

Earth Dam Design

The earth dam is analyzed for stability using a computer program, Rotational Equilibrium Analysis of Multilayered Embankments, by Yang H. Huang. (Exhibit XII) Both the simplified Bishop method and the normal method of slices are used to determine a factor of safety based on a cylindrical failure surface. The method allows a variety of conditions to be analyzed including both static and seismic loading and seepage through the earth dam. A piezometric surface is specified along with the geometry of the dam as input for the program. Soil data includes density, angle of internal friction, cohesion, depth and thickness of each layer.

The factors of safety are determined for a number of points forming a grid pattern above the slope. A routine within the program automatically searches for the minimum factor of safety between the grid points and displays the location of the center and gives the radius and the most critical factor of safety.

The analysis of stability is based on the method of slices which assumes the failure surface is cylindrical and the earth mass rotates about some center point located above the slope. The sliding mass is divided into separate slices, each slice being acted upon by a set of forces. The weight of the soil in the slice acts to cause the soil to move. This is the driving force of the slope failure. The resisting force is the sum of the shear and cohesion acting along the failure surface. The factor of safety is the ratio of resisting forces to the driving force.

$$SF = \frac{\sum_{i=1}^{n}(\bar{c}\, Li + \bar{N}i \tan \overline{\emptyset})}{\sum_{i=1}^{n}(Wi \sin \theta i)}$$

Where:

SF	=	Factor of Safety
n	=	Number of slices
$\bar{c}$	=	Effective cohesion
Li	=	Length of *ith* slice at the failure surface
$\bar{N}i$	=	Effective normal force at the failure surface
$\overline{\emptyset}$	=	Angle of internal friction of the soil
$\bar{N}i$ Tan	=	Shear strength of the soil
Wi	=	Weight of *ith* slice
θ	=	Angle of inclination of the *ith* slice

Equation 2.7, Yang H. Huang, STABILITY ANALYSIS OF EARTH SLOPES, Van Nostrand Reinhold Co., 1983.

The normal method of slices assumes the resultant of all forces on the vertical sides of the slice is zero in the direction normal to the failure arc for that slice. This method is usually conservative in comparison to other stability methods. The simplified Bishop method assumes the resultant of the forces on the sides of the slice is zero in the vertical direction. This produces an equation for the safety factor as follows:

$$SF = \frac{\sum_{i=1}^{n}[\bar{c}\,Li + (Wi - UiLi)\,tan\bar{\theta}][\frac{1}{Mi(\theta)}]}{\sum_{i=1}^{n} Wi \sin\theta i}$$

Where *Ui* = Pore pressure = depth from phreatic surface x density of water

$$Mi\,(\theta) = Cos\,\theta i\,[1 + \frac{\tan\emptyset}{SF}]$$

All other parameters described above.

Equation 24.12, T.W. Lambe and Robert V. Whitman, SOIL MECHANICS, John Wiley and Sons, 1969.

Because the equation contains the expression for safety factor on both sides, the solution is a trial and error procedure.

The earth dam is analyzed under three conditions of loading: (1) full reservoir and steady - state seepage, (2) full reservoir with seismic loading, and (3) rapid draw down. Soil layer strength parameters are obtained from the geotechnical investigation performed by Rollins, Brown and Gunnell, Inc. dated 7 September, 1989 (See Geotechnical Report R645-301-500 Engineering, Appendix A). Strength parameters for the dam embankment were determined by the same firm and dated 29 September, 1989 (refer to this report within the Geotechnical Report page number 4-62). The location of the phreatic surface was determined from Figure 4.3, Huang, a chart for determining the point of exit of the phreatic surface from the earth slope. (Exhibit XIII) The seismic coefficient of 1.13 was taken from Table 2.2, Huang, for Zone 2 which includes Central and Eastern Utah. (Exhibit XIV).

The results of the analysis are:

Condition	Safety Factor	Exhibit
Full reservoir with steady state seepage	1.9	XV
Full reservoir with seismic loading	1.3	XVI
Rapid draw down	2.4	XVII

Refer to Exhibit XVIII for the diagram of the input data for the program and the location of critical failure surfaces.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Volume 4

R645-301-800: Bonding

R645-301-800: Bonding

A detailed bond estimate is provided for in Volume ~~2, Part 4 of the Cottonwood/Wilberg~~ 1, Chapter 3, Appendix 1 of the Trail Mountain Mining and Reclamation Plan.

PacifiCorp

Energy West Mining Company

Trail Mountain Mine
Waste Rock Site

Exhibits I - XXII

Volume 4

PacifiCorp

Energy West Mining Company

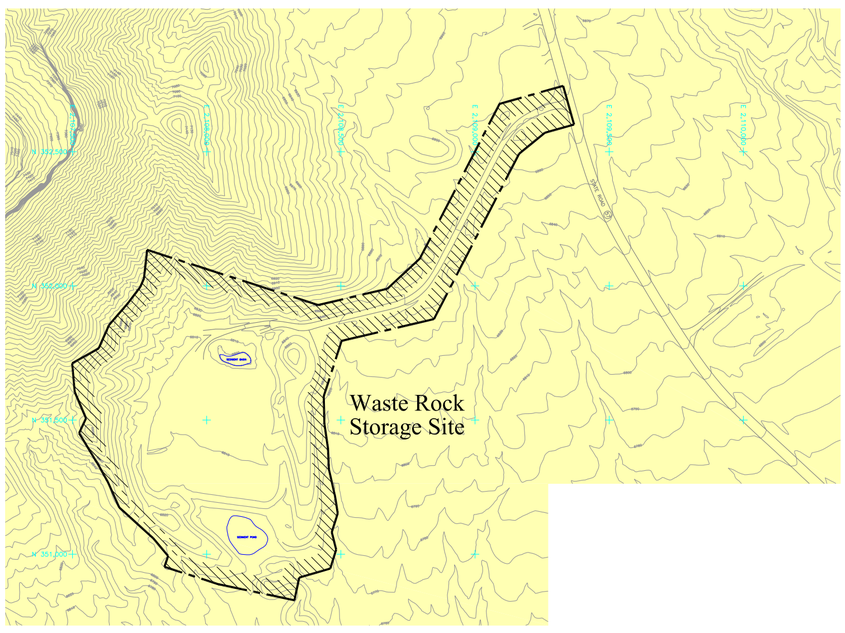
Trail Mountain Mine Waste Rock Site

Maps and Drawings

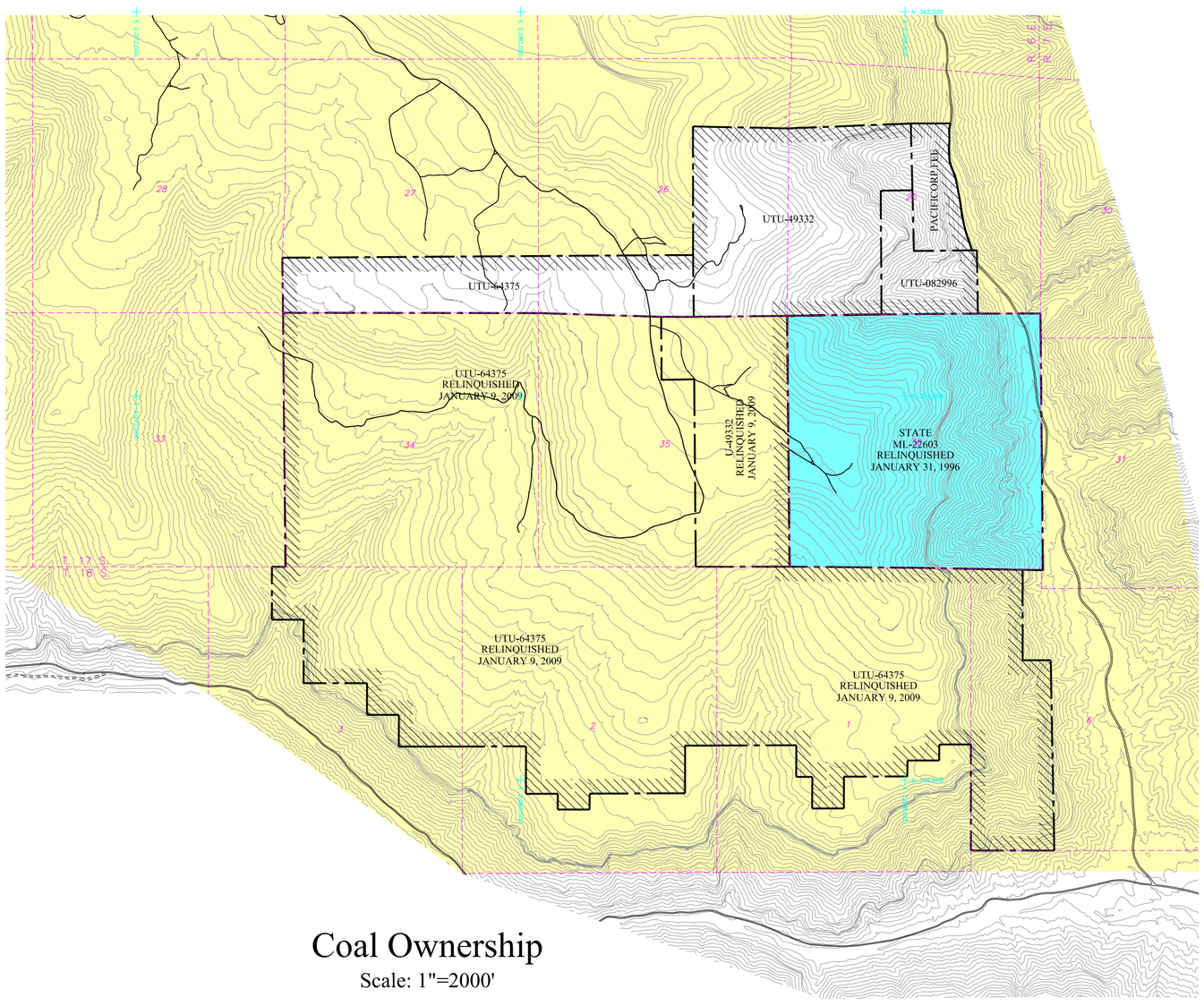
Volume 4

LEGEND

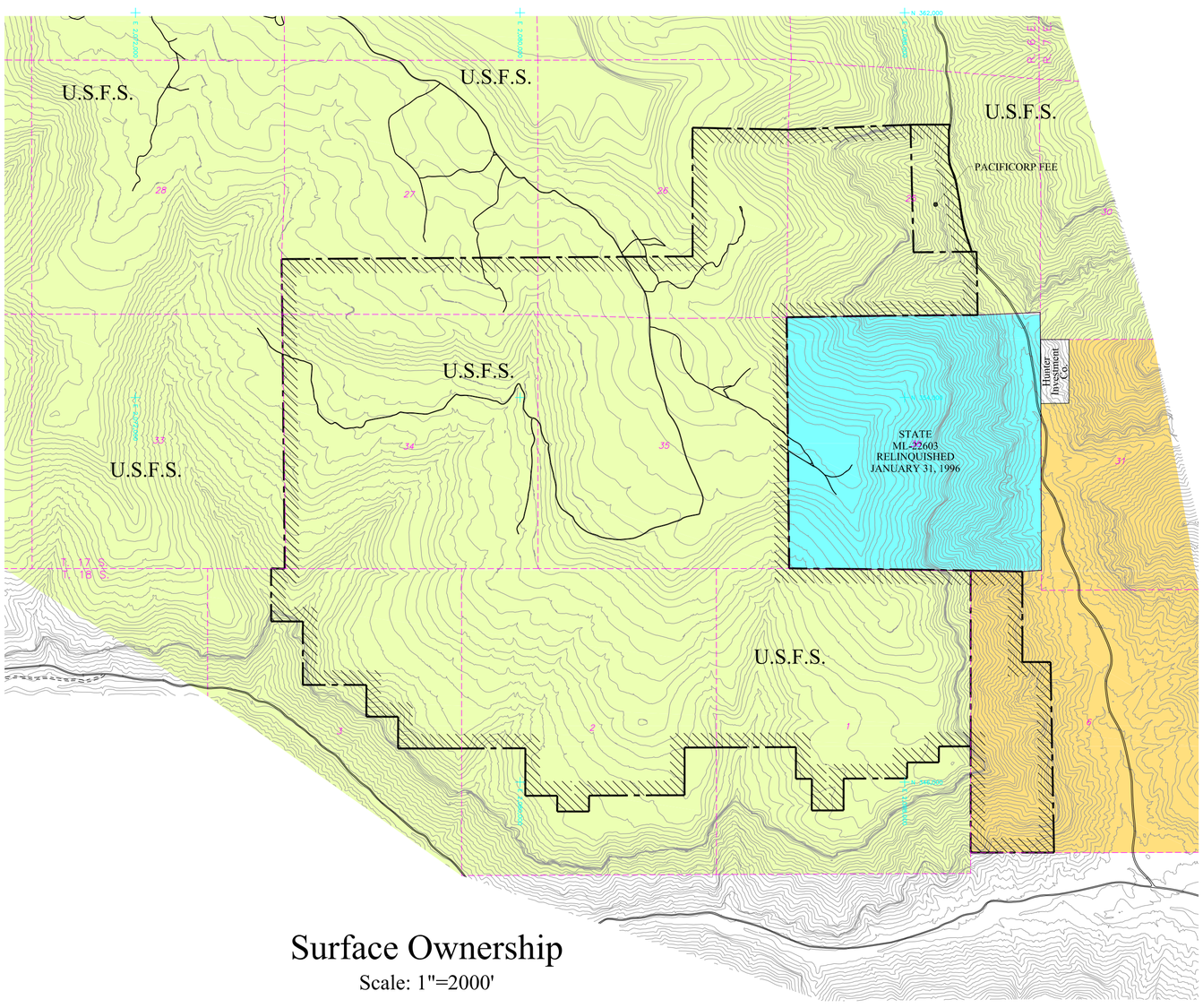
TRAIL MOUNTAIN MINE PERMIT BOUNDARY
UNLEASED FEDERAL COAL
STATE COAL LEASE
UTU-64375 FEDERAL COAL LEASE



Coal Ownership
Scale: 1"=400'



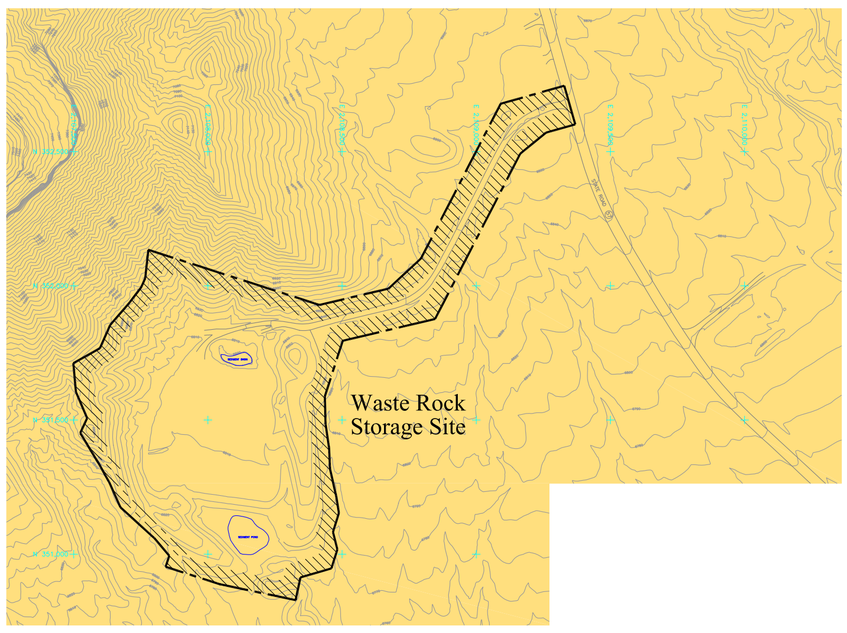
Coal Ownership
Scale: 1"=2000'



Surface Ownership
Scale: 1"=2000'

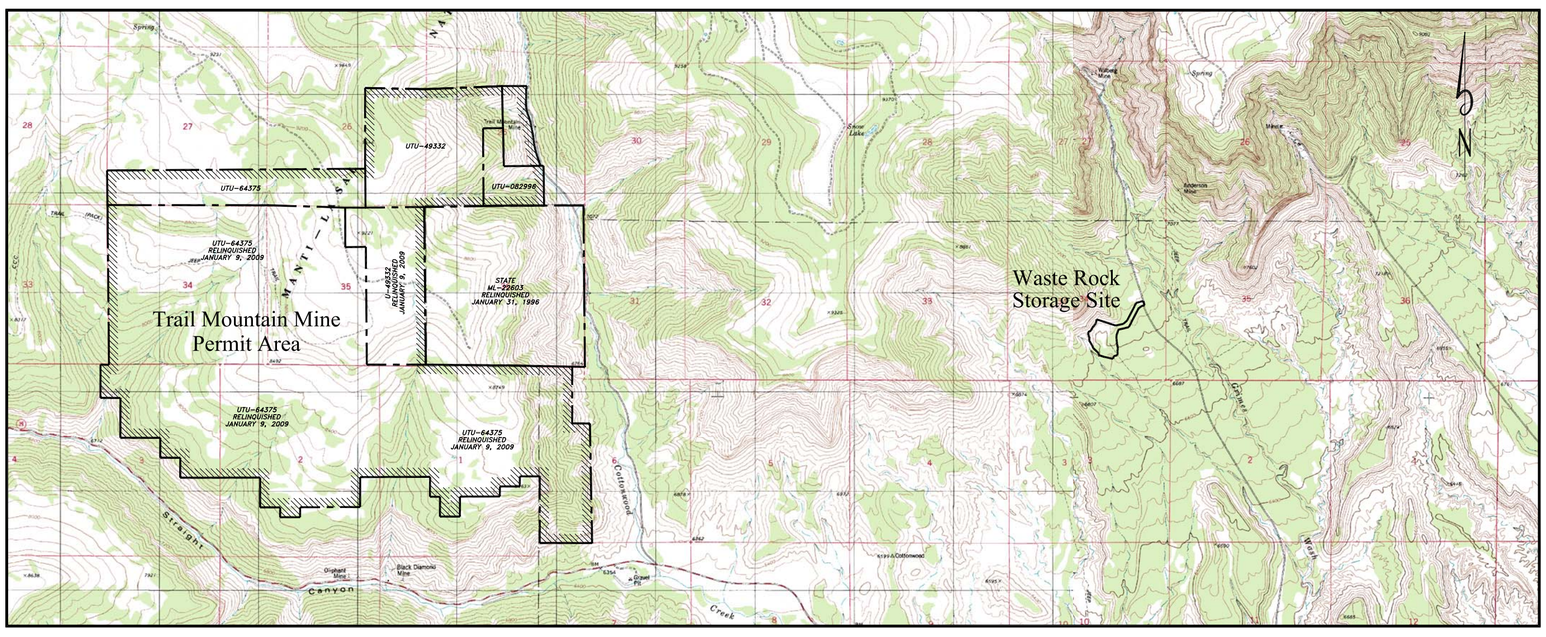
LEGEND

TRAIL MOUNTAIN MINE PERMIT BOUNDARY
U.S. NATIONAL FOREST
NATIONAL RESOURCE LAND
STATE COAL LEASE



Surface Ownership
Scale: 1"=400'

General Location Map
Scale: 1"=3000'



LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

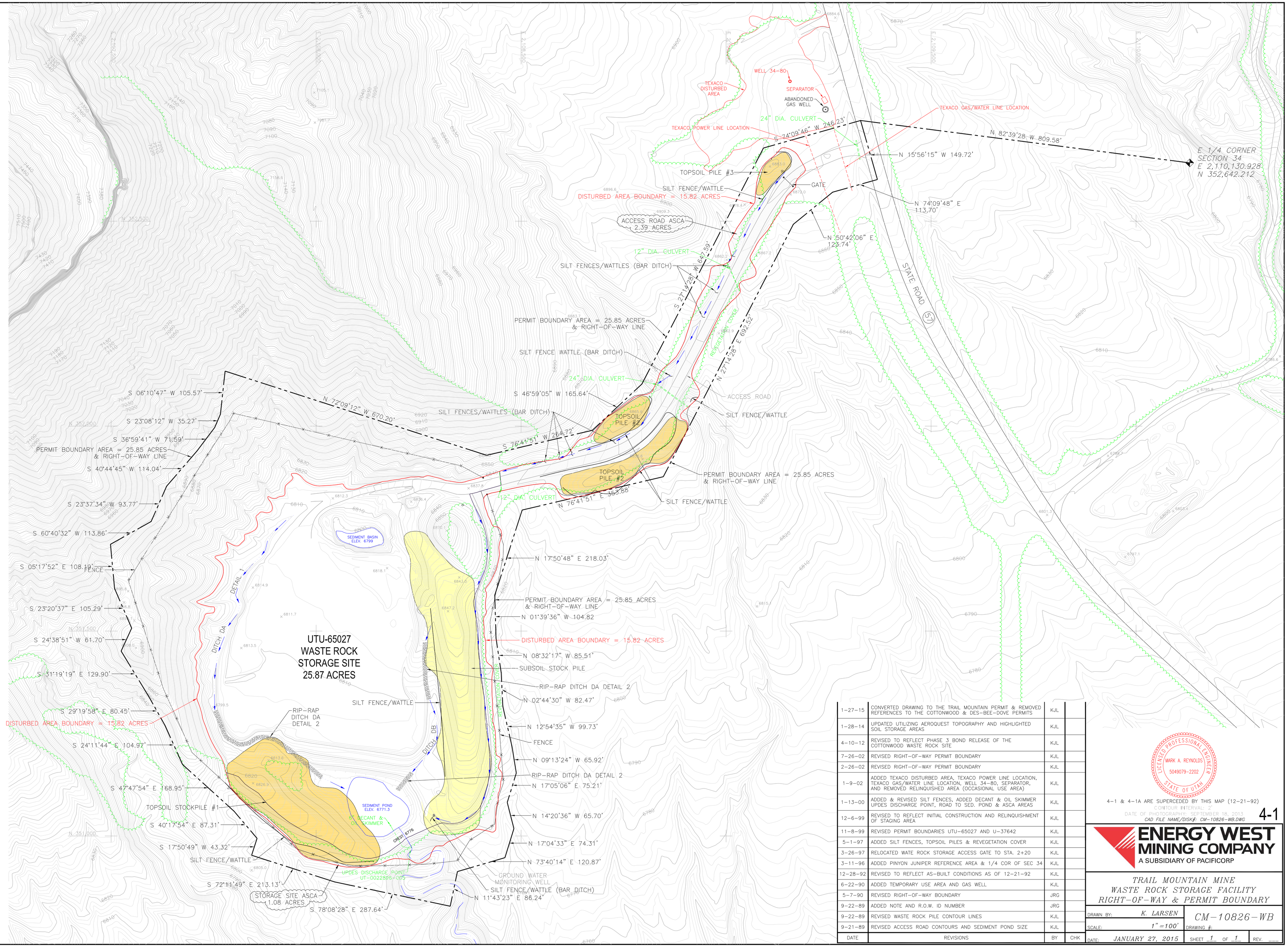
CAD FILE NAME/DISK#: TMS1454C

1-1

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
SURFACE & COAL OWNERSHIP MAP

DRAWN BY:	K. LARSEN	TMS1454D	
SCALE:	AS NOTED	DRAWING #:	
DATE:	JANUARY 29, 2015	SHEET 1 OF 1	REV. ___



NOTES:

REFER TO DRAWING #CM-10830-WB PLATE 4-12 FOR DETAIL 1 AND DETAIL 2

BONDED AREA IS DISTURBED AREA

ASCA AREAS
SUBSOIL STORAGE
TOPSOIL STORAGE

aero-graphics
GEOSPATIAL SERVICES
40 West Oakland Ave., Salt Lake City, Utah 84115
Telephone (801) 487-3273, Fax (801) 487-3313
www.aero-graphics.com

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
1-28-14	UPDATED UTILIZING AEROQUEST TOPOGRAPHY AND HIGHLIGHTED SOIL STORAGE AREAS	KJL	
4-10-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
2-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED TEXACO DISTURBED AREA, TEXACO POWER LINE LOCATION, TEXACO GAS/WATER LINE LOCATION, WELL 34-80, SEPARATOR, AND REMOVED RELINQUISHED AREA (OCCASIONAL USE AREA)	KJL	
1-13-00	ADDED & REVISED SILT FENCES, ADDED DECANT & OIL SKIMMER UPDES DISCHARGE POINT, ROAD TO SED. POND & ASCA AREAS	KJL	
12-6-99	REVISED TO REFLECT INITIAL CONSTRUCTION AND RELINQUISHMENT OF STAGING AREA	KJL	
11-8-99	REVISED PERMIT BOUNDARIES UTU-65027 AND U-37642	KJL	
5-1-97	ADDED SILT FENCES, TOPSOIL PILES & REVEGETATION COVER	KJL	
3-26-97	RELOCATED WATE ROCK STORAGE ACCESS GATE TO STA. 2+20	KJL	
3-11-96	ADDED PINYON JUNIPER REFERENCE AREA & 1/4 COR OF SEC 34	KJL	
12-28-92	REVISED TO REFLECT AS-BUILT CONDITIONS AS OF 12-21-92	KJL	
6-22-90	ADDED TEMPORARY USE AREA AND GAS WELL	KJL	
5-7-90	REVISED RIGHT-OF-WAY BOUNDARY	JRG	
9-22-89	ADDED NOTE AND R.O.W. ID NUMBER	JRG	
9-22-89	REVISED WASTE ROCK PILE CONTOUR LINES	KJL	
9-21-89	REVISED ACCESS ROAD CONTOURS AND SEDIMENT POND SIZE	KJL	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

4-1 & 4-1A ARE SUPERCEDED BY THIS MAP (12-21-92)
CONTOUR INTERVAL: 2'
DATE OF PHOTOGRAPHY: SEPTEMBER 13, 2013
CAD FILE NAME/DISK#: CM-10826-WB.DWG

4-1

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
RIGHT-OF-WAY & PERMIT BOUNDARY

DRAWN BY:	K. LARSEN	CM-10826-WB	
SCALE:	1"=100'	DRAWING #:	
DATE:	JANUARY 27, 2015	SHEET 1 OF 1	REV. ___

AREA 5
33.97 Ac.

AREA 3
25.14 Ac.

AREA 4
4.18 Ac.

AREA 5
33.97 Ac.

E 1/4 CORNER
SECTION 34
E 2,110,130.928
N 352,642.212

STATE ROAD 57

ASCA

PERMIT BOUNDARY AREA = 25.85 ACRES
& RIGHT-OF-WAY LINE

AREA 2
2.21 Ac.

ACCESS ROAD

PERMIT BOUNDARY AREA = 25.85 ACRES
& RIGHT-OF-WAY LINE

PERMIT BOUNDARY AREA = 25.85 ACRES
& RIGHT-OF-WAY LINE

AREA 1
32.24 Ac.

PERMIT BOUNDARY AREA = 25.85 ACRES
& RIGHT-OF-WAY LINE

1A

1B

1C

1D ASCA

TERRACE GRAVELS

ASCA = ALTERNATE SEDIMENT CONTROL AREA

N 352,500

N 352,000

N 351,500

N 351,000

E 2,107,000

E 2,108,000

E 2,108,500

E 2,109,000

E 2,109,500

E 2,110,000

N

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LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL 2'

CAD FILE NAME/DISK#: CM-10821-WB.DWG

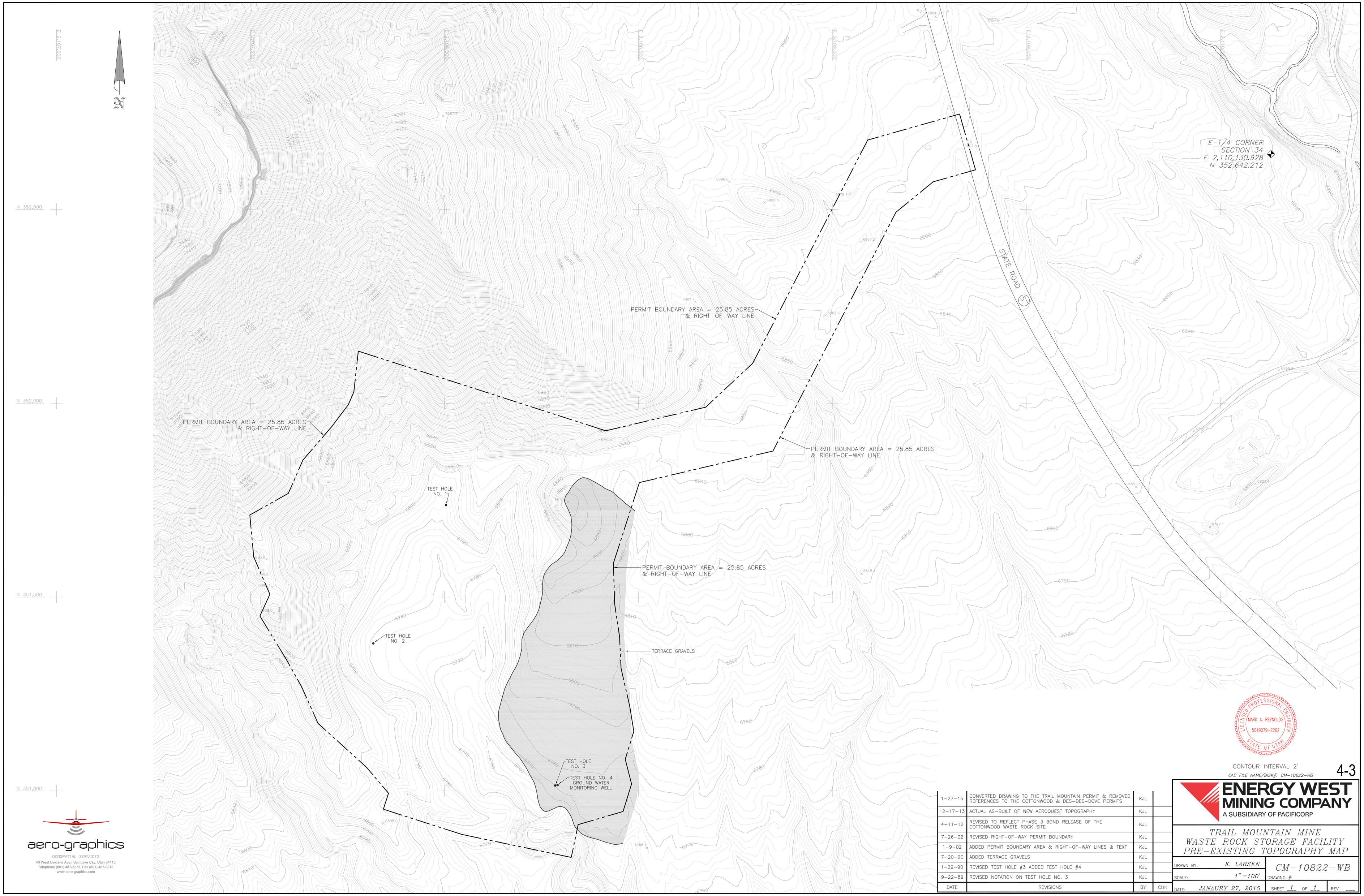
4-2

ENERGY WEST
MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
HYDROLOGICAL AREA MAP

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
1-8-14	UPDATED UTILIZING AEROQUEST TOPOGRAPHY	KJL	
9-22-89	REVISED HYDROLOGICAL AREA LINES	JRG	

DRAWN BY: J.R.G. & K.J.L.
SCALE: 1"=100'
DATE: JANUARY 27, 2015
DRAWING #: CM-10821-WB
SHEET 1 OF 1
REV. ---



CONTOUR INTERVAL 2'

CAD FILE NAME/DISK#: CM-10822-WB

4-3

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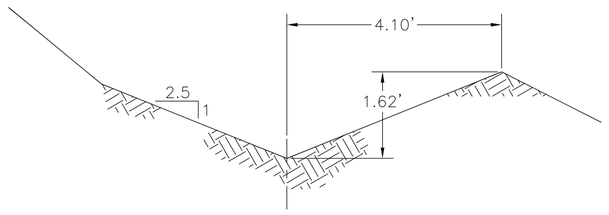
DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
12-17-13	ACTUAL AS-BUILT OF NEW AEROQUEST TOPOGRAPHY	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED PERMIT BOUNDARY AREA & RIGHT-OF-WAY LINES & TEXT	KJL	
7-20-90	ADDED TERRACE GRAVELS	KJL	
1-29-90	REVISED TEST HOLE #3 ADDED TEST HOLE #4	KJL	
9-22-89	REVISED NOTATION ON TEST HOLE NO. 3	KJL	

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

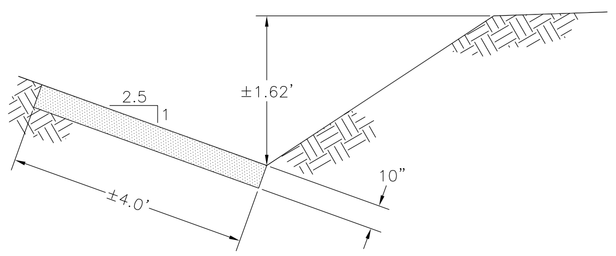
TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
PRE-EXISTING TOPOGRAPHY MAP

DRAWN BY: K. LARSEN
SCALE: 1" =100'
DRAWING #: CM-10822-WB
DATE: JANAURY 27, 2015
SHEET 1 OF 1
REV. ___



INITIAL DIVERSION DITCH
CROSS SECTION
SCALE: 1"=2'

CHANNEL SLOPE 2%
FLOW RATE 18.9 cfs
FLOW DEPTH 1.32 ft.
VELOCITY 4.34 fps



TYP. MATERIAL SALVAGING
N.T.S.

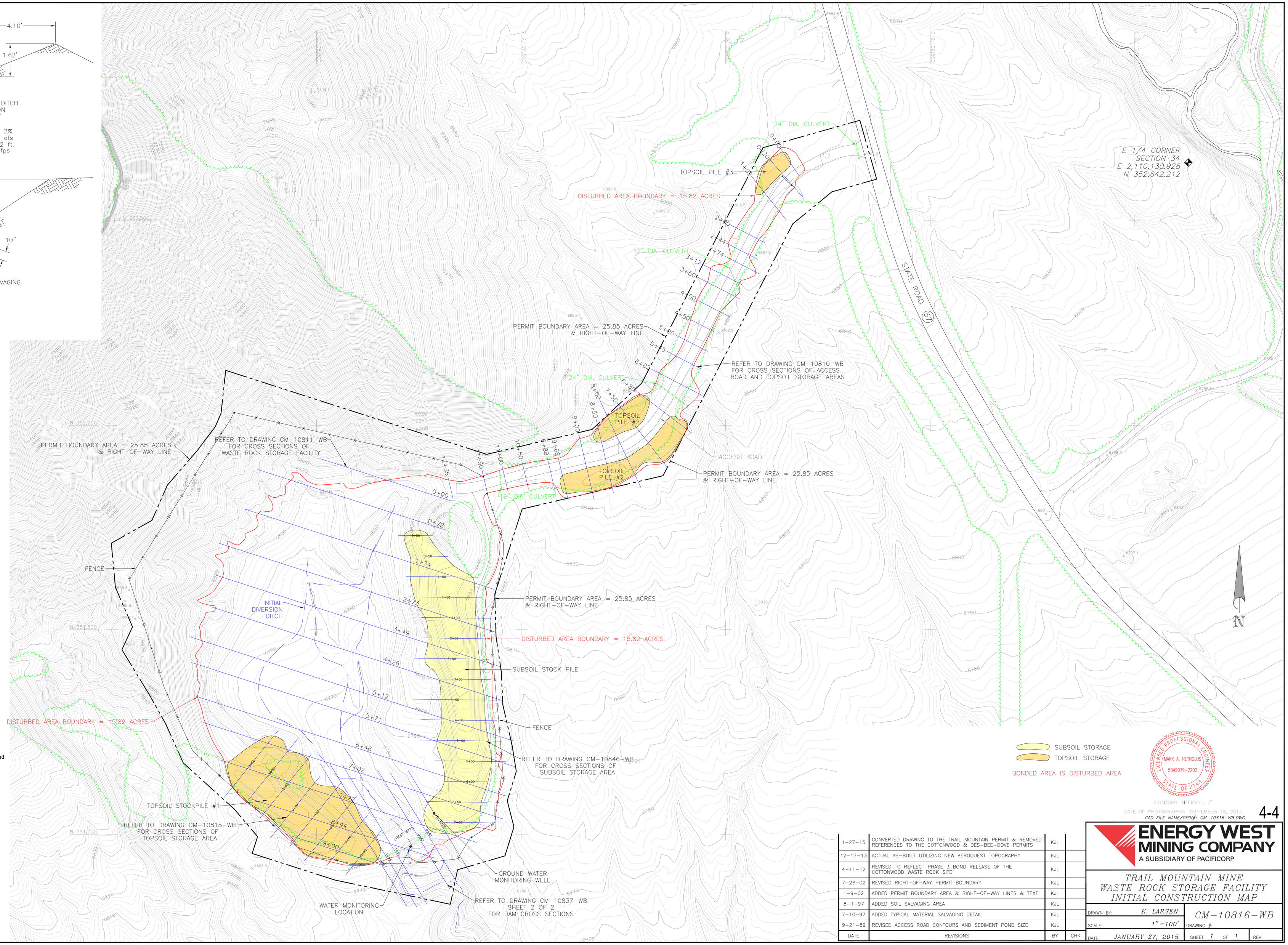
Topsoil Pile #1
Volume Report - January 13, 2014
Comparing Grid: J:/Revised Permit Maps/topsoil 1 original.grd
and Grid: J:/Revised Permit Maps/topsoil 1 const.grd
Grid corner locations: 2111755,350914 to 2112205,351289
Grid resolution X: 18, Y: 15 Grid cell size X: 25.00, Y: 25.00
Area in Cut : 12,547.0 S.F., 0.29 Acres
Area in Fill: 155,578.0 S.F., 3.57 Acres
Total inclusion area: 168,125.0 S.F., 3.86 Acres
Cut to Fill ratio: 0.01
Average Cut Depth: 0.58 Average Fill Depth: 4.57
Max Cut Depth: 4.13 Max Fill Depth: 28.04
Cut (C.Y.) / Area (acres): 70.24
Fill (C.Y.) / Area (acres): 6819.39
Cut volume: 7,319.5 C.F., 271 C.Y.
Fill Volume: 710,646.6 C.F., 26,320 C.Y.

Topsoil Piles #2
Volume Report - January 13, 2014
Comparing Grid: J:/Revised Permit Maps/topsoil 2 original.grd
and Grid: J:/Revised Permit Maps/topsoil 2 const.grd
Grid corner locations: 2112578,351801 to 2112953,352126
Grid resolution X: 15, Y: 13 Grid cell size X: 25.00, Y: 25.00
Area in Cut : 27,818.6 S.F., 0.64 Acres
Area in Fill: 92,181.4 S.F., 2.12 Acres
Total inclusion area: 120,000.0 S.F., 2.75 Acres
Cut to Fill ratio: 0.06
Average Cut Depth: 0.28 Average Fill Depth: 1.47
Max Cut Depth: 1.94 Max Fill Depth: 14.78
Cut (C.Y.) / Area (acres): 105.63
Fill (C.Y.) / Area (acres): 1818.01
Cut volume: 7,856.8 C.F., 291 C.Y.
Fill Volume: 135,223.9 C.F., 5,008 C.Y.

Topsoil Pile #3
Volume Report - January 13, 2014
Comparing Grid: J:/Revised Permit Maps/topsoil 3 original.grd
and Grid: J:/Revised Permit Maps/topsoil 3 const.grd
Grid corner locations: 2113053,352556 to 2113193,352686
Grid resolution X: 14, Y: 13 Grid cell size X: 10.00, Y: 10.00
Area in Cut : 8,468.6 S.F., 0.19 Acres
Area in Fill: 9,131.4 S.F., 0.21 Acres
Total inclusion area: 17,600.0 S.F., 0.40 Acres
Cut to Fill ratio: 1.23
Average Cut Depth: 1.18 Average Fill Depth: 0.89
Max Cut Depth: 3.36 Max Fill Depth: 5.50
Cut (C.Y.) / Area (acres): 913.90
Fill (C.Y.) / Area (acres): 743.91
Cut volume: 9,969.9 C.F., 369 C.Y.
Fill Volume: 8,115.4 C.F., 301 C.Y.

Topsoil Pile #1
Fill volume: 26,320 C.Y.
Topsoil Piles #2
Fill volume: 5,008 C.Y.
Topsoil Pile #3
Fill volume: 301 C.Y.
Total Fill Volume: 31,629 C.Y.

Subsoil Pile
Volume Report - January 13, 2014
Comparing Grid: J:/Revised Permit Maps/SUBSOIL 1 ORIGINAL.grd
and Grid: J:/Revised Permit Maps/SUBSOIL 1 CONST.grd
Grid corner locations: 2112194,350991 to 2112469,351791
Grid resolution X: 11, Y: 32 Grid cell size X: 25.00, Y: 25.00
Area in Cut : 27,128.3 S.F., 0.62 Acres
Area in Fill: 192,871.7 S.F., 4.43 Acres
Total inclusion area: 220,000.0 S.F., 5.05 Acres
Cut to Fill ratio: 0.02
Average Cut Depth: 0.62 Average Fill Depth: 5.64
Max Cut Depth: 5.83 Max Fill Depth: 26.36
Cut (C.Y.) / Area (acres): 123.70
Fill (C.Y.) / Area (acres): 7982.86
Cut volume: 16,868.8 C.F., 624.77 C.Y.
Total Fill Volume: 1,088,571 C.F., 40,317 C.Y.



SUBSOIL STORAGE
TOPSOIL STORAGE
BONDED AREA IS DISTURBED AREA

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL: 2'
DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013
CAD FILE NAME/DISK#: CM-10816-WB.DWG

4-4

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
12-17-13	ACTUAL AS-BUILT UTILIZING NEW AEROQUEST TOPOGRAPHY	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED PERMIT BOUNDARY AREA & RIGHT-OF-WAY LINES & TEXT	KJL	
8-1-97	ADDED SOIL SALVAGING AREA	KJL	
7-10-97	ADDED TYPICAL MATERIAL SALVAGING DETAIL	KJL	
9-21-89	REVISED ACCESS ROAD CONTOURS AND SEDIMENT POND SIZE	KJL	

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
INITIAL CONSTRUCTION MAP

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JANUARY 27, 2015
DRAWING #: CM-10816-WB
SHEET 1 OF 1
REV. ___

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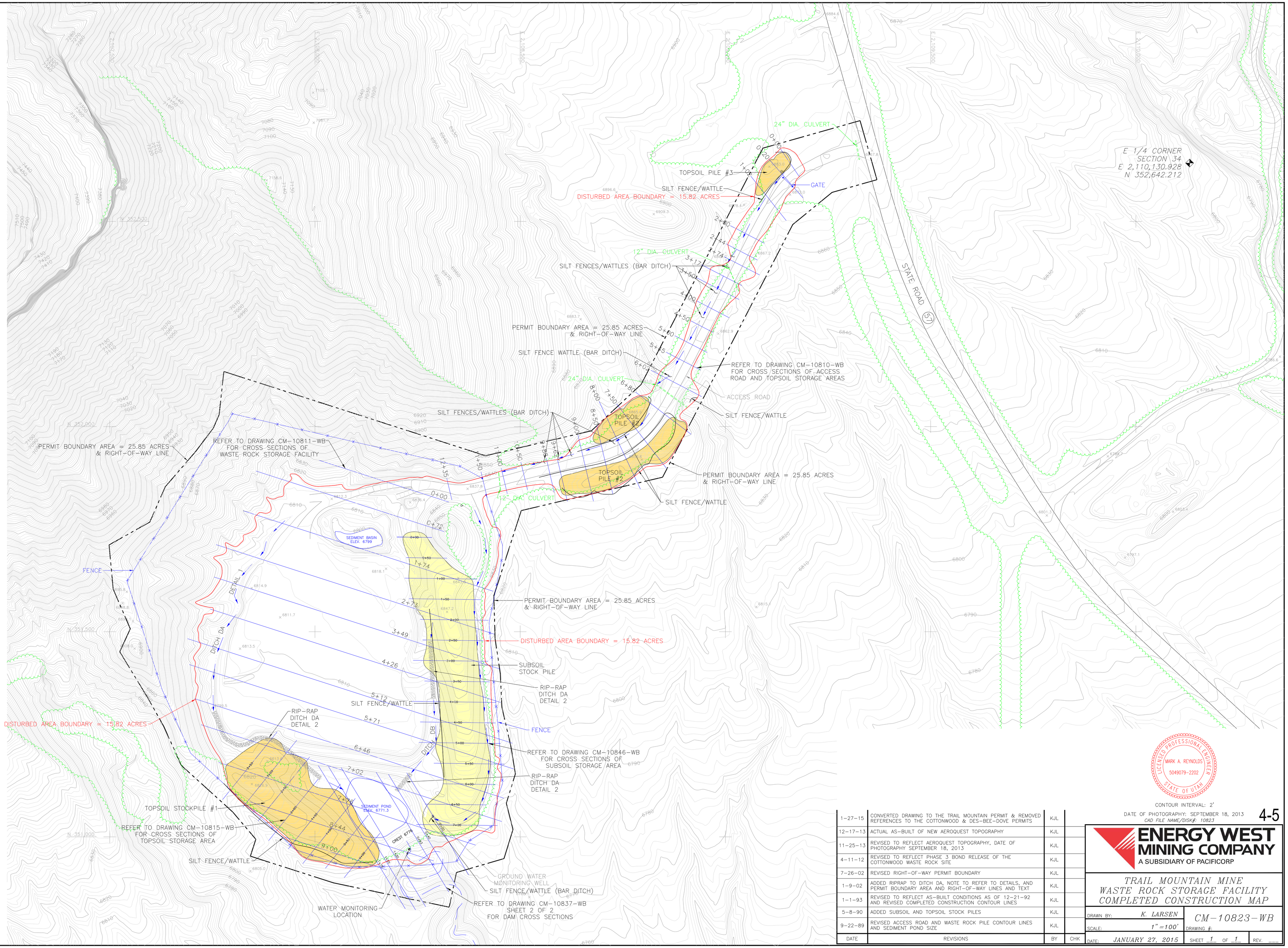

NOTES:

REFER TO DRAWING #CM-10830-WB PLATE 4-12 FOR DETAIL 1 AND DETAIL 2

BONDED AREA IS DISTURBED AREA

SUBSOIL STORAGE

TOPSOIL STORAGE

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DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
12-17-13	ACTUAL AS-BUILT OF NEW AEROQUEST TOPOGRAPHY	KJL	
11-25-13	REVISED TO REFLECT AEROQUEST TOPOGRAPHY, DATE OF PHOTOGRAPHY SEPTEMBER 18, 2013	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED RIPRAP TO DITCH DA, NOTE TO REFER TO DETAILS, AND PERMIT BOUNDARY AREA AND RIGHT-OF-WAY LINES AND TEXT	KJL	
1-1-93	REVISED TO REFLECT AS-BUILT CONDITIONS AS OF 12-21-92 AND REVISED COMPLETED CONSTRUCTION CONTOUR LINES	KJL	
5-8-90	ADDED SUBSOIL AND TOPSOIL STOCK PILES	KJL	
9-22-89	REVISED ACCESS ROAD AND WASTE ROCK PILE CONTOUR LINES AND SEDIMENT POND SIZE	KJL	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL: 2'

DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013

CAD FILE NAME/DISK#: 10823

4-5

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
COMPLETED CONSTRUCTION MAP

DRAWN BY: K. LARSEN

SCALE: 1"=100'

DRAWING #: CM-10823-WB

DATE: JANUARY 27, 2015

SHEET 1 OF 1

REV. ---

MASS BALANCE:

VOLUME OF TOPSOIL AND SUBSOIL THAT CAN BE STORED AT THE LOCATION NORTH OF THE WASTE ROCK PILE	= 11,291 YDS.^{3}
VOLUME OF SUBSOIL IN EXISTING STORAGE PILE	= 40,317 YDS.^{3}
SUBSOIL NEEDED FOR RECLAMATION OF OUTSLOPES, SUBSOIL PILE, AND TOPSOIL PILE	= 23,386 YDS.^{3}
REMAINDER OF SUBSOIL FOR RECLAMATION OF TOP OF WASTE ROCK PILE	= 16,931 YDS.^{3}
AMOUNT OF SUBSOIL NEEDED FOR TOP OF WASTE ROCK PILE	= 5,050 YDS.^{3}
EXTRA SUBSOIL TO BE USED FOR RECLAMATION OF THE SEDIMENT POND AND BLENDED INTO EXISTING SURFACE TOPOGRAPHY	= 11,881 YDS.^{3}
VOLUME OF TOPSOIL IN EXISTING STORAGE PILE	= 26,320 YDS.^{3}
TOPSOIL NEEDED FOR RECLAMATION OF OUTSLOPES, SUBSOIL PILE, AND TOPSOIL PILE	= 11,693 YDS.^{3}
REMAINDER OF TOPSOIL FOR RECLAMATION OF TOP OF WASTE ROCK PILE	= 14,627 YDS.^{3}
AMOUNT OF TOPSOIL NEEDED FOR TOP OF WASTE ROCK PILE	= 2,525 YDS.^{3}
EXTRA TOPSOIL TO BE USED FOR RECLAMATION OF THE SEDIMENT POND AND BLENDED INTO EXISTING SURFACE TOPOGRAPHY	= 12,102 YDS.^{3}
VOLUME OF TOPSOIL AND SUBSOIL NEEDED FOR THE TOP OF THE WASTE ROCK PILE FOR FINAL RECLAMATION	= 7,575 YDS.^{3}

NOTES:

THESE VOLUMES ARE CALCULATED BY PLACING 24" OF SUBSOIL AND 12" OF TOPSOIL DURING PHASE 1 AND PHASE 2 RECLAMATION

REFER TO DRAWING #CM-10830-WB PLATE 4-12 FOR DETAIL 1 AND DETAIL 2

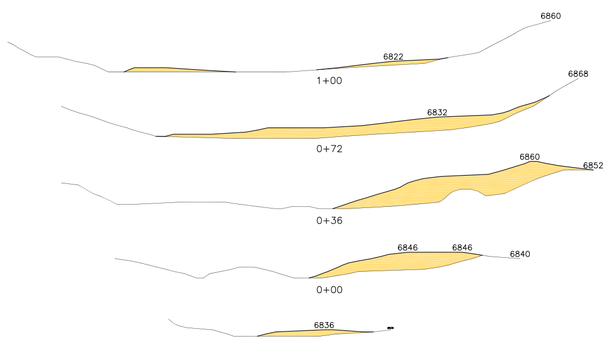
REFER TO DRAWING #CM-10810-WB PLATE 4-8 FOR ACCESS ROAD CROSS SECTIONS

REFER TO DRAWING #CM-10815-WB PLATE 4-11A FOR TOPSOIL PILE CROSS SECTIONS

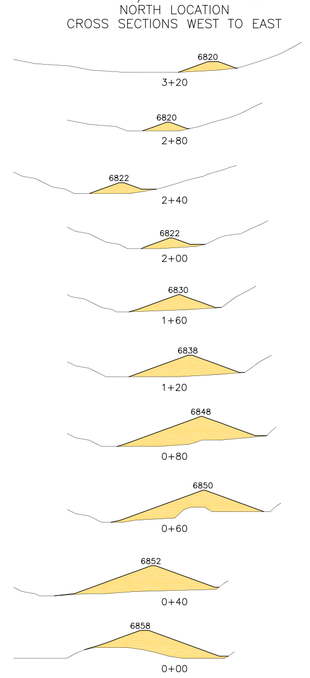
REFER TO DRAWING #CM-10846-WB PLATE 4-11B FOR SUBSOIL PILE CROSS SECTIONS

REFER TO DRAWING #CM-10811-WB PLATE 4-10 FOR WASTE ROCK STORAGE FACILITY CROSS SECTIONS

REFER TO DRAWING #CM-10837-WB PLATE 4-13 FOR DAM CROSS SECTIONS



TOPSOIL/SUBSOIL STORAGE
NORTH LOCATION
CROSS SECTIONS WEST TO EAST



TOPSOIL/SUBSOIL STORAGE
NORTH LOCATION
CROSS SECTIONS SOUTH TO NORTH

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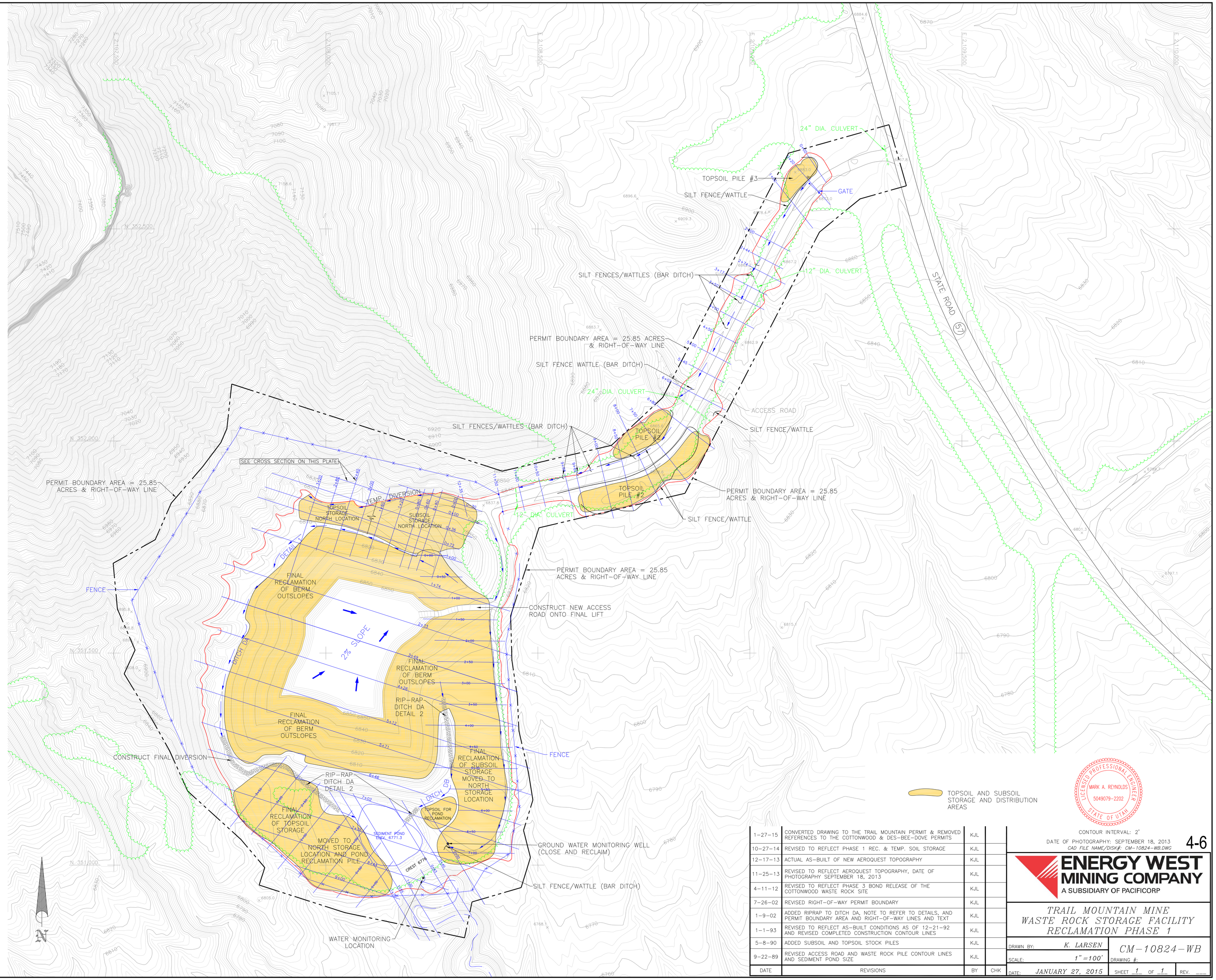


LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
10-27-14	REVISED TO REFLECT PHASE 1 REC. & TEMP. SOIL STORAGE	KJL	
12-17-13	ACTUAL AS-BUILT OF NEW AEROQUEST TOPOGRAPHY	KJL	
11-25-13	REVISED TO REFLECT AEROQUEST TOPOGRAPHY, DATE OF PHOTOGRAPHY SEPTEMBER 18, 2013	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED RIPRAP TO DITCH DA, NOTE TO REFER TO DETAILS, AND PERMIT BOUNDARY AREA AND RIGHT-OF-WAY LINES AND TEXT	KJL	
1-1-93	REVISED TO REFLECT AS-BUILT CONDITIONS AS OF 12-21-92 AND REVISED COMPLETED CONSTRUCTION CONTOUR LINES	KJL	
5-8-90	ADDED SUBSOIL AND TOPSOIL STOCK PILES	KJL	
9-22-89	REVISED ACCESS ROAD AND WASTE ROCK PILE CONTOUR LINES AND SEDIMENT POND SIZE	KJL	

CONTOUR INTERVAL: 2'
DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013
CAD FILE NAME/DISK#: CM-10824-WB.DWG

4-6

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
RECLAMATION PHASE 1

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JANUARY 27, 2015
DRAWING #: CM-10824-WB
SHEET 1 OF 1
REV. ____

NOTES:

REFER TO DRAWING #CM-10830-WB PLATE 4-12 FOR DETAIL 1 AND DETAIL 2

REFER TO DRAWING #CM-10810-WB PLATE 4-8 FOR ACCESS ROAD CROSS SECTIONS

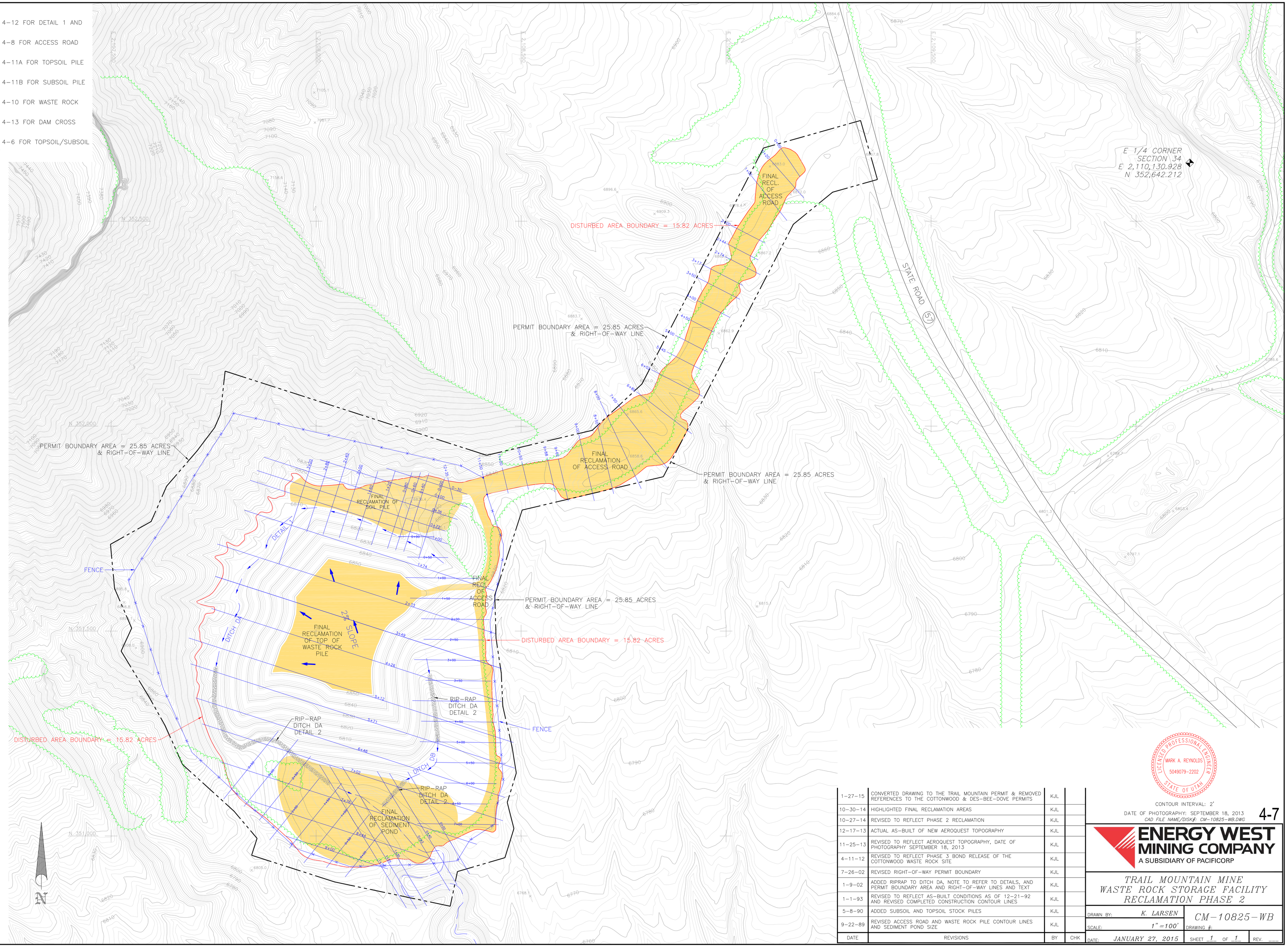
REFER TO DRAWING #CM-10815-WB PLATE 4-11A FOR TOPSOIL PILE CROSS SECTIONS

REFER TO DRAWING #CM-10846-WB PLATE 4-11B FOR SUBSOIL PILE CROSS SECTIONS

REFER TO DRAWING #CM-10811-WB PLATE 4-10 FOR WASTE ROCK STORAGE FACILITY CROSS SECTIONS

REFER TO DRAWING #CM-10837-WB PLATE 4-13 FOR DAM CROSS SECTIONS

REFER TO DRAWING #CM-10824-WB PLATE 4-6 FOR TOPSOIL/SUBSOIL STORAGE NORTH LOCATION CROSS SECTIONS



NOTES:

REFER TO DRAWING #CM-10830-WB PLATE 4-12 FOR DETAIL 1 AND DETAIL 2

BONDED AREA IS DISTURBED AREA

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DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
10-30-14	HIGHLIGHTED FINAL RECLAMATION AREAS	KJL	
10-27-14	REVISED TO REFLECT PHASE 2 RECLAMATION	KJL	
12-17-13	ACTUAL AS-BUILT OF NEW AEROQUEST TOPOGRAPHY	KJL	
11-25-13	REVISED TO REFLECT AEROQUEST TOPOGRAPHY, DATE OF PHOTOGRAPHY SEPTEMBER 18, 2013	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED RIPRAP TO DITCH DA, NOTE TO REFER TO DETAILS, AND PERMIT BOUNDARY AREA AND RIGHT-OF-WAY LINES AND TEXT	KJL	
1-1-93	REVISED TO REFLECT AS-BUILT CONDITIONS AS OF 12-21-92 AND REVISED COMPLETED CONSTRUCTION CONTOUR LINES	KJL	
5-8-90	ADDED SUBSOIL AND TOPSOIL STOCK PILES	KJL	
9-22-89	REVISED ACCESS ROAD AND WASTE ROCK PILE CONTOUR LINES AND SEDIMENT POND SIZE	KJL	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL: 2'

DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013

CAD FILE NAME/DISK#: CM-10825-WB.DWG

4-7

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
RECLAMATION PHASE 2

DRAWN BY: K. LARSEN

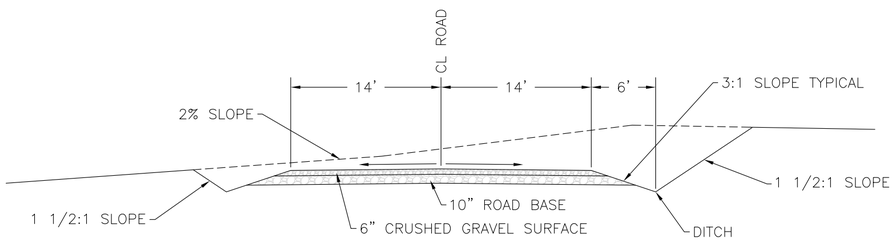
SCALE: 1" = 100'

DRAWING #: CM-10825-WB

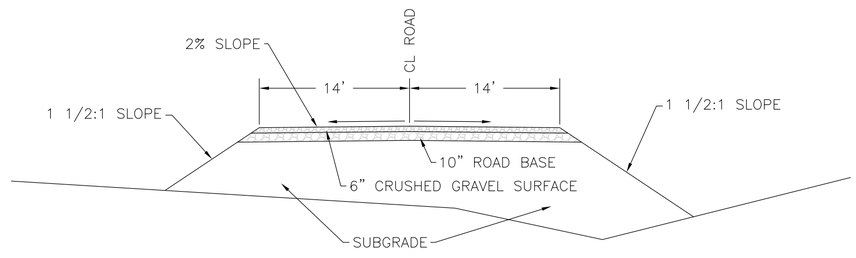
DATE: JANUARY 27, 2015

SHEET 1 OF 1

REV.



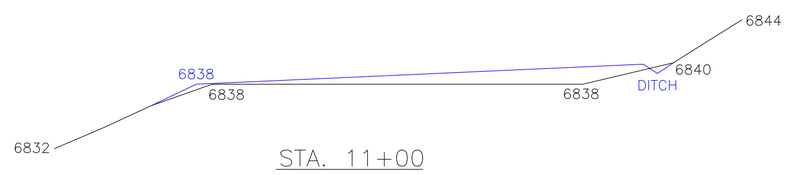
TYPICAL CUT SLOPE – CROSS SECTION



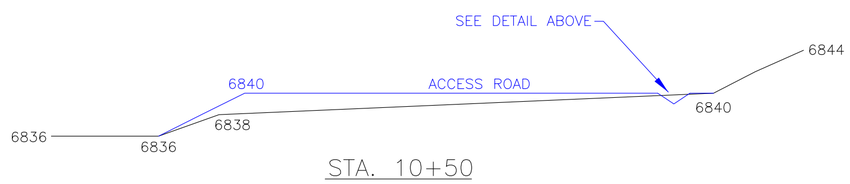
TYPICAL FILL SLOPE – CROSS SECTION

STA. 12+35

STA. 11+50



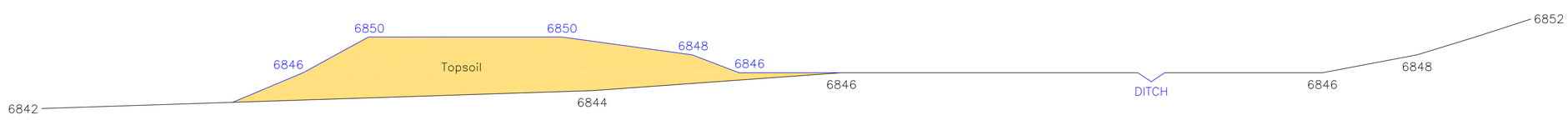
STA. 11+00



STA. 10+50

STA. 9+88

STA. 9+62



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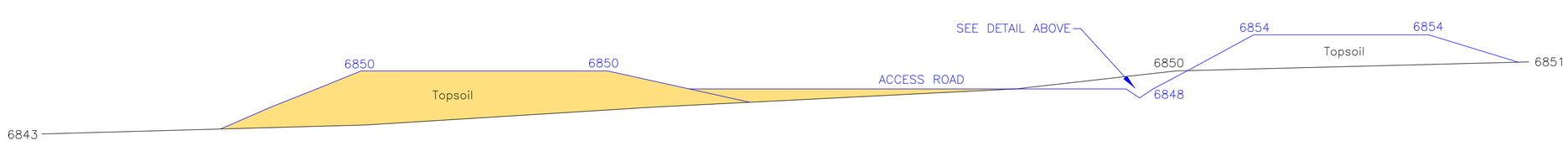
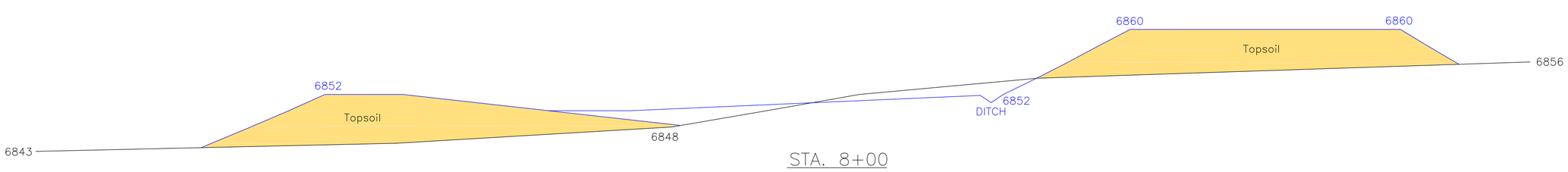
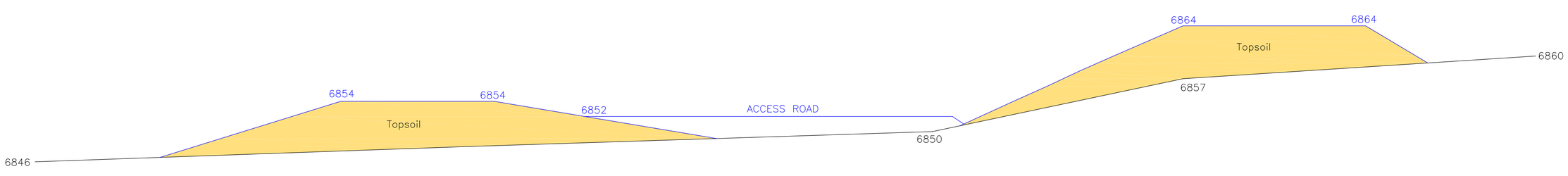


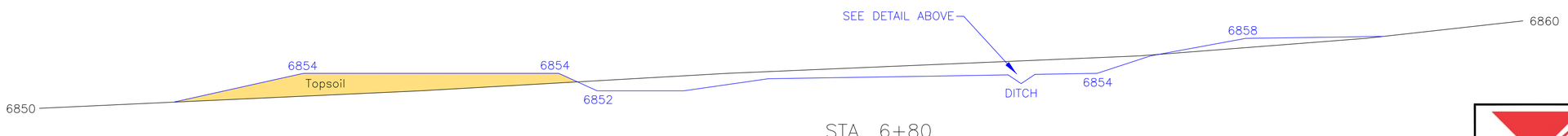
STA. 8+50



STA. 8+00



STA. 7+50



STA. 6+80

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10810-WB.DWG

4-8

REFER TO CM-10816-WB FOR
SUBSOIL AND TOPSOIL VOLUMES

PRE-EXISTING GRADE LINE

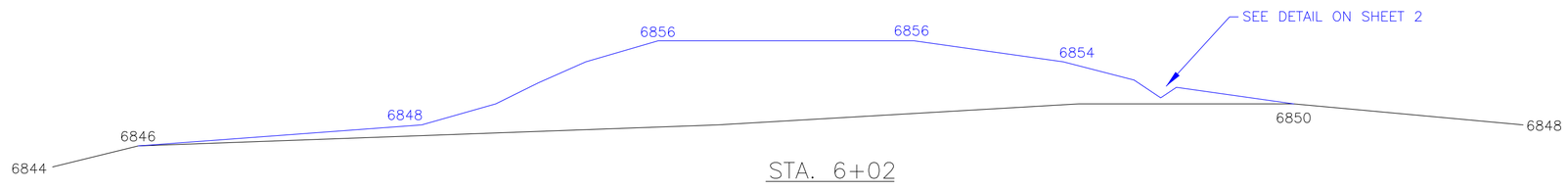
AS-BUILT GRADE LINE

DATE	REVISION	BY	CHK.
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT AND REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	
12/16/13	ACTUAL AS-BUILT UTILIZING NEW AEROQUEST TOPO	KJL	
1-9-02	REVISED TEXT HEIGHTS AND LINE TYPES FOR CLARITY	KJL	
3/21/90	GENERAL REVISIONS	TJF	

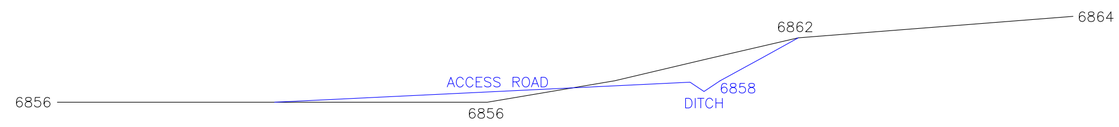
ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
ACCESS ROAD CROSS SECTIONS

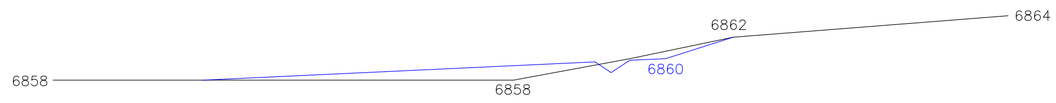
DRAWN BY: K. LARSEN
SCALE: 1"=10'
DATE: JANUARY 27, 2015
DRAWING #: CM-10810-WB
SHEET 2 OF 2
REV. ___



STA. 6+02

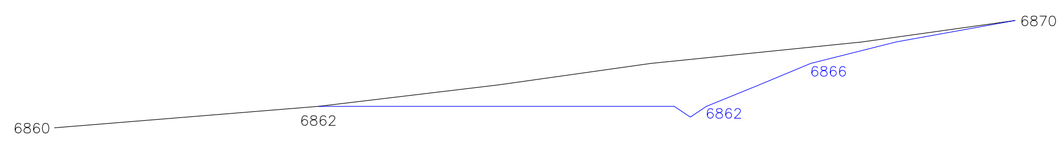


STA. 5+45

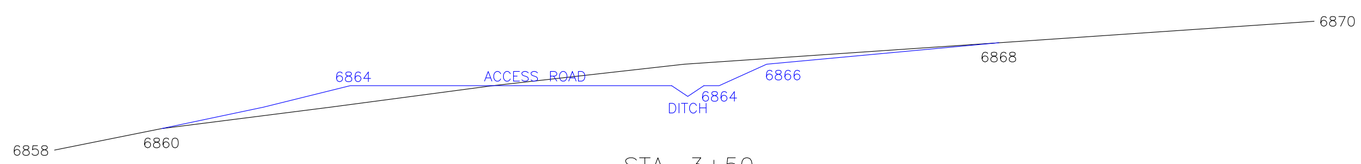


STA. 5+00

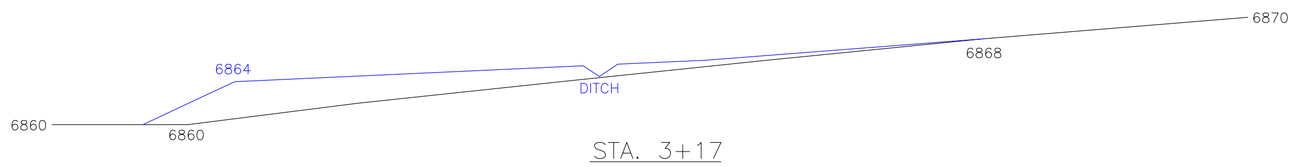
STA. 4+50



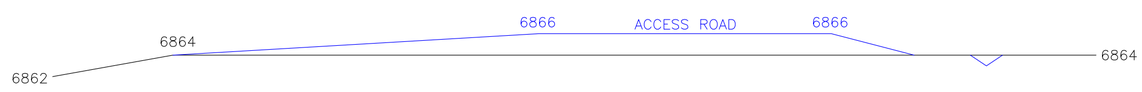
STA. 4+00



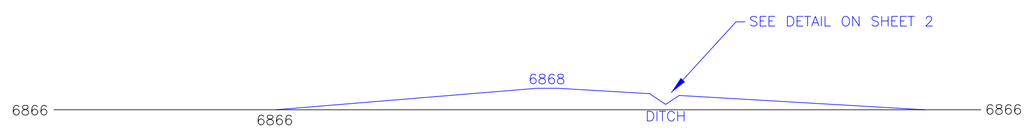
STA. 3+50



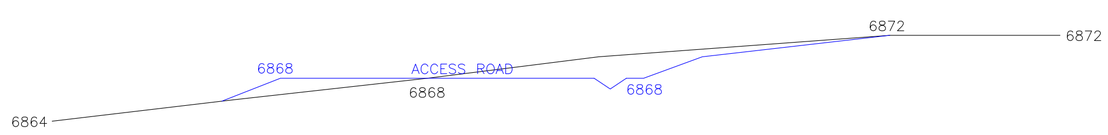
STA. 3+17



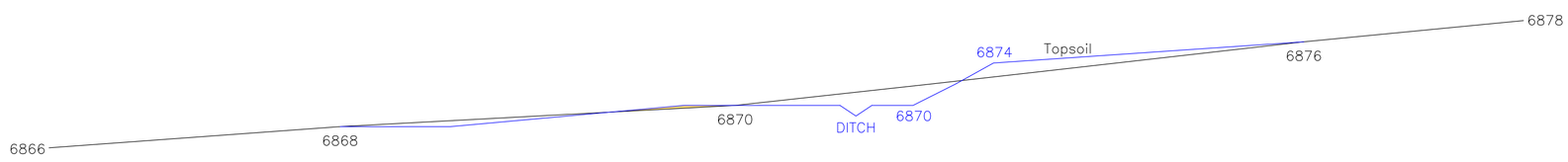
STA. 2+74



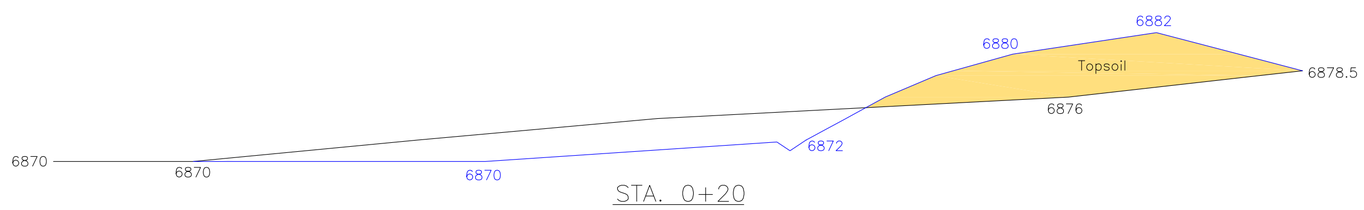
STA. 2+44



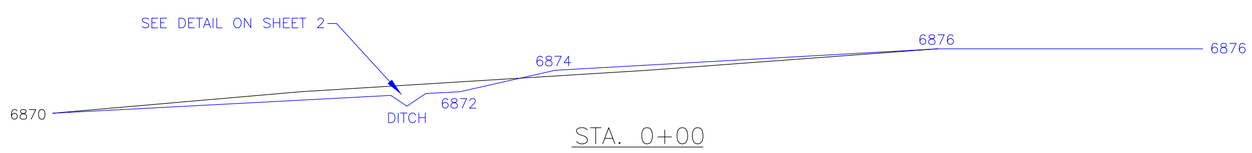
STA. 2+00



STA. 1+02



STA. 0+20



STA. 0+00

REFER TO CM-10816-WB FOR
SUBSOIL AND TOPSOIL VOLUMES

PRE-EXISTING GRADE LINE

AS-BUILT GRADE LINE

DATE	REVISION	BY	CHK.
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT AND REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	
12/16/13	ACTUAL AS-BUILT UTILIZING NEW AEROQUEST TOPO	KJL	
1-9-02	REVISED TEXT HEIGHTS AND LINE TYPES FOR CLARITY	KJL	
3/21/90	GENERAL REVISIONS	TJF	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10810-WB.DWG

4-8

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
ACCESS ROAD CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: 1"=10'
DATE: JANAURY 27, 2015
DRAWING #: CM-10810-WB
SHEET 1 OF 2
REV. ___

DATE	REVISION	BY
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL
1-10-14	REVISED UTILIZING AEROQUEST TOPOGRAPHY	KJL
1-9-02	CHANGED COLOR OF PROPOSED ROAD LINES TO RED FOR CLARIFICATION	KJL
9-18-89	ADDED STREAM FLOW CROSS SECTIONS	KJL

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
PROFILE/CENTERLINE OF ACCESS ROAD

DRAWN BY: K. LARSEN
CM-10820-WB
SCALE: 1"=50'
DRAWING #:
DATE: JANUARY 27, 2015
SHEET 1 OF 1
REV. ---

CAD FILE NAME/DISK#: CM-10820-WB.DWG

4-9

MARK A. REYNOLDS
LICENSED PROFESSIONAL ENGINEER
STATE OF UTAH
504909-2202

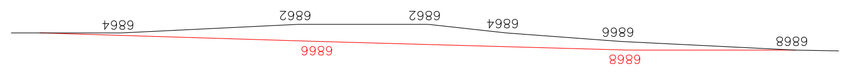
NOTE:
FINAL RECLAMATION WILL RETURN THE ROADWAY TO THE PRE-EXISTING GRADE

EXISTING NATURAL GROUND

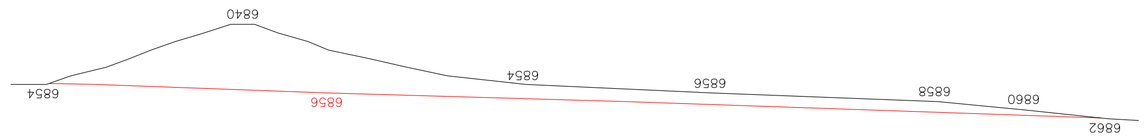
AS-BUILT ROAD GRADE

CULVERTS

Peak Flow	Diameter	Station	Thickness	Length	Cover Depth	Min. Culvert Slope
6.2 cfs	24" dia	-1+64	0.064	40'	min 12"	0.5%
.186 cfs	12" dia	2+85	0.064	60'	~6.5'	0.5%
5.08 cfs	24" dia	6+23	0.064	80'	~17'	0.5%
.589 cfs	12" dia	11+20	0.064	60'	~8'	0.5%

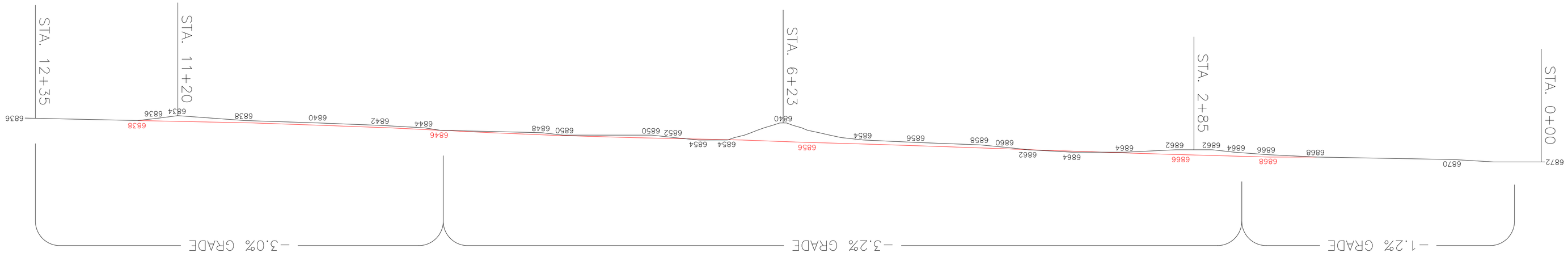


STREAM FLOW AT 2+85
NTS

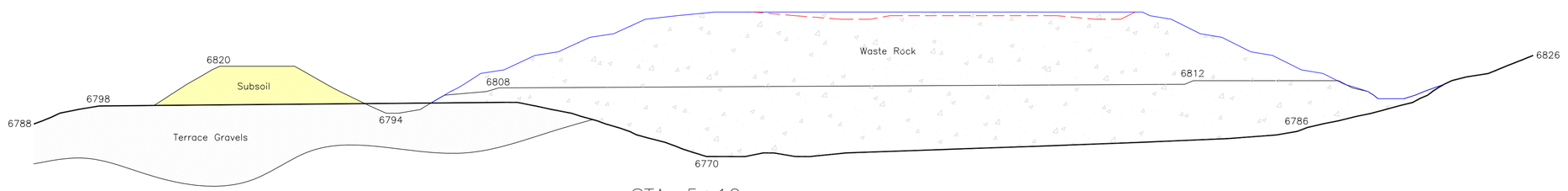


STREAM FLOW AT 6+23
NTS

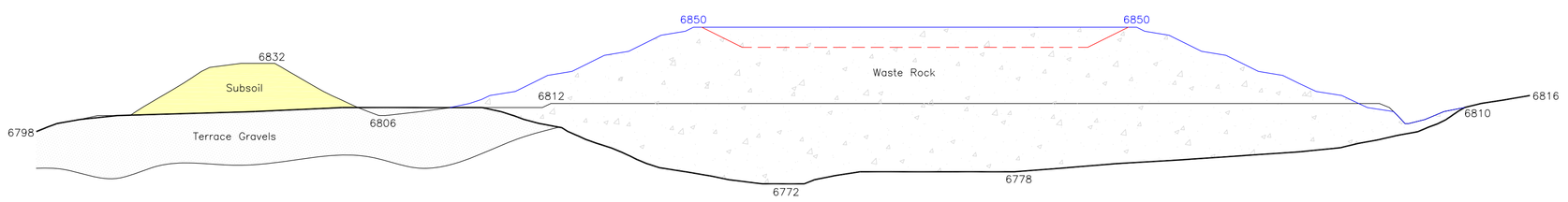
STREAM FLOW AT 11+20
NTS



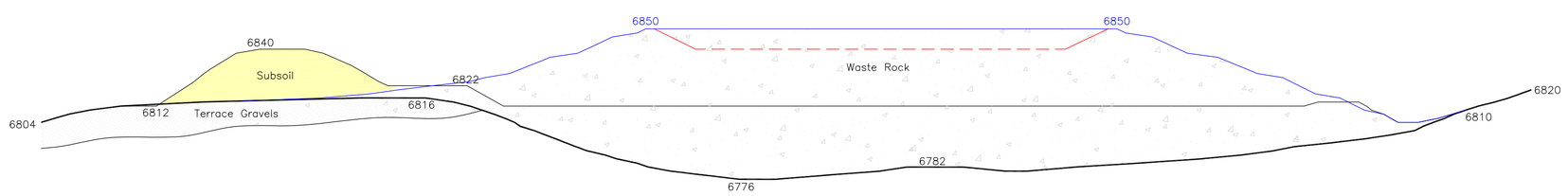
PROFILE/CENTERLINE OF ACCESS ROAD
SCALE: 1"=50'



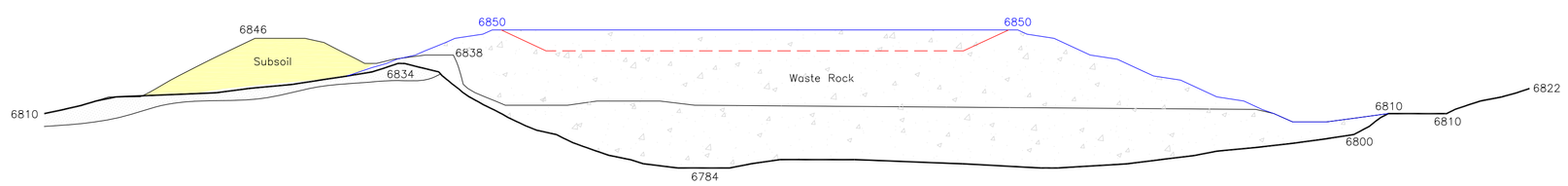
STA. 5+12



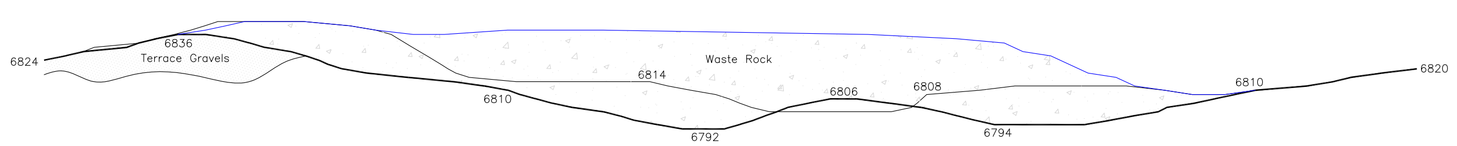
STA. 4+26



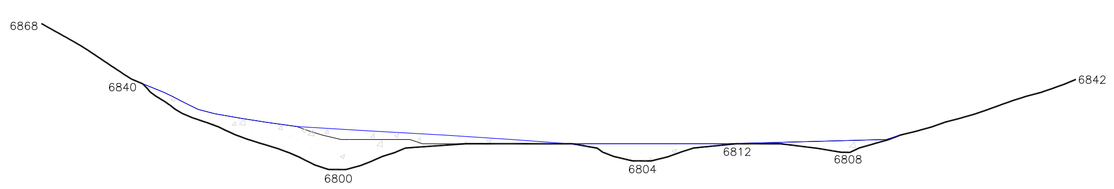
STA. 3+49



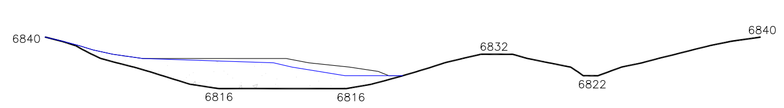
STA. 2+73



STA. 1+74

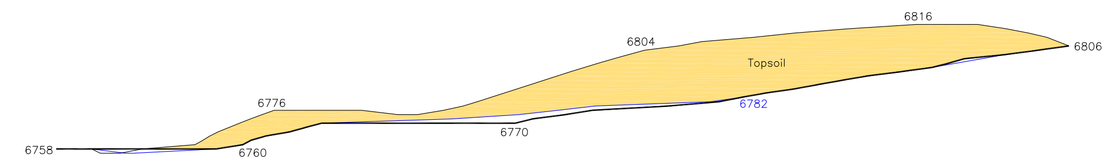


STA. 0+72

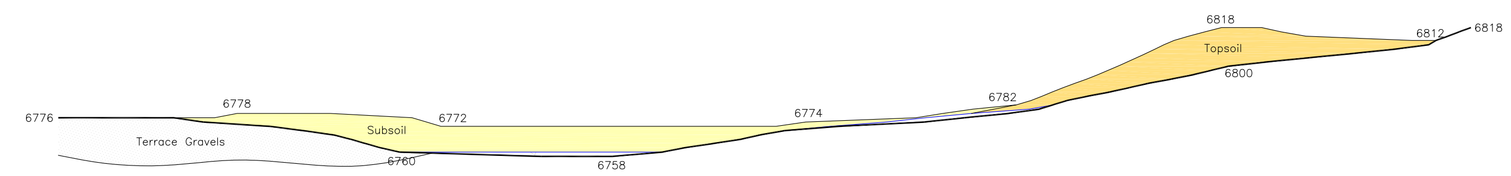


STA. 0+00

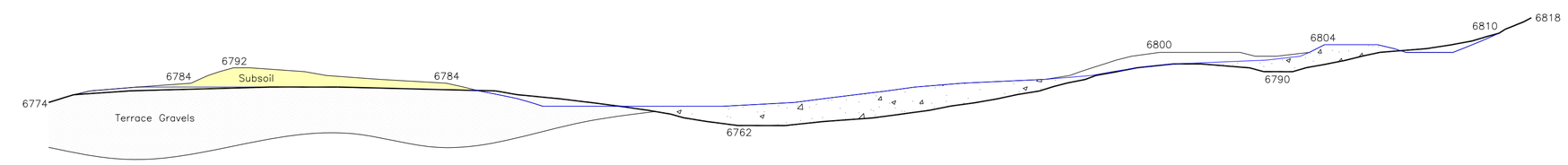
STA. 9+00



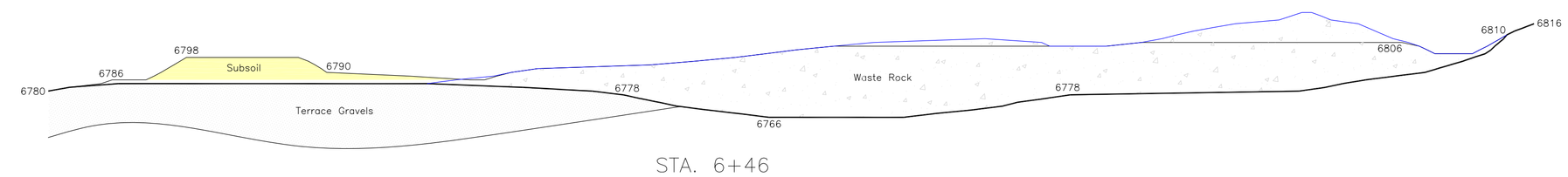
STA. 8+44



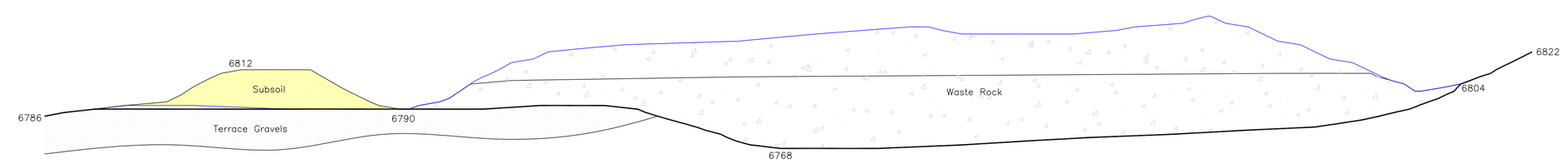
STA. 7+76



STA. 7+02



STA. 6+46



STA. 5+71

REFER TO CM-10816-WB FOR
SUBSOIL AND TOPSOIL VOLUMES

ORIGINAL GROUND LINE
COMPLETED CONSTRUCTION (AEROQUEST)
PHASE 1 RECLAMATION LINE
FINAL RECLAMATION LINE

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10811-WB.DWG

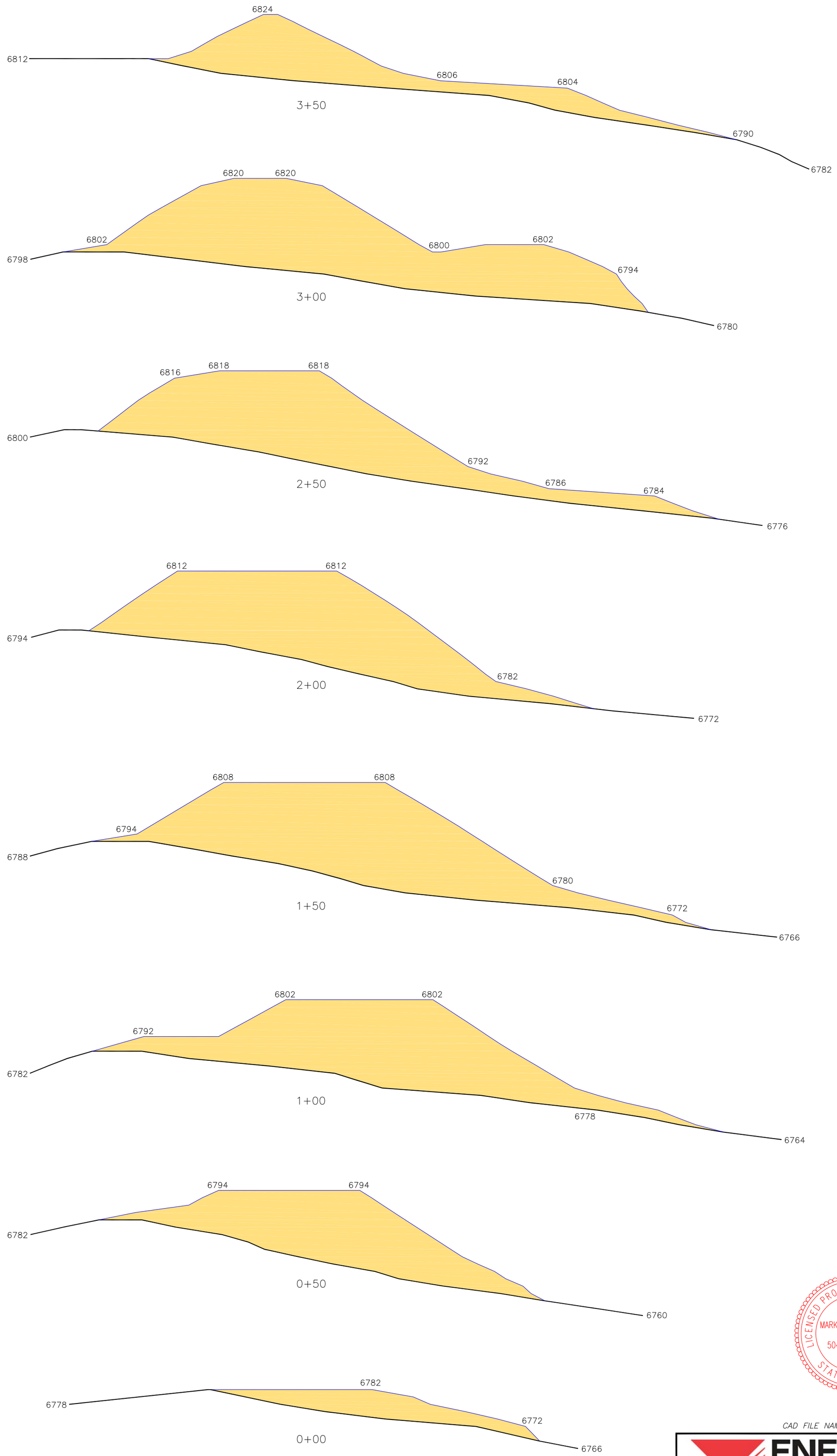
4-10

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT AND REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	
9-30-14	ADDED PHASE 1 & REVISED FINAL RECLAMATION PROFILES	KJL	
12-17-13	REVISED TO REFLECT ACTUAL AS-BUILT NEW AEROQUEST TOPO	KJL	
1-9-02	CHANGED NOTATIONS ED RD TO EDGE ROAD	KJL	
1-5-93	REVISED WASTE ROCK STORAGE PILE ELEVATIONS	KJL	
3-27-91	REMOVED TOPSOIL AND SUBSOIL ELEVATIONS	KJL	
7-20-90	ADDED TERRACE GRAVELS AREAS TO CROSS SECTIONS	KJL	
5-7-90	ADDED NOTE ON STA. 3+18.7	KJL	
9-19-89	REVISED TOP OF WASTE ROCK STORAGE PILE	KJL	

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: 1"=50'
DATE: JANUARY 27, 2015
DRAWING #: CM-10811-WB
SHEET 1 OF 1
REV. ___



REFER TO CM-10816-WB FOR
SUBSOIL AND TOPSOIL VOLUMES

PRE-EXISTING NATURAL GROUND

COMPLETED TOPSOIL PILE

DATE	REVISIONS	BY
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL
12/16/13	ACTUAL AS-BUILT UTILIZING NEW AEROQUEST TOPO	KJL
3/28/91	REPRESENTS THE AS BUILT CONDITIONS AS OF 8/1/90	KJL

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

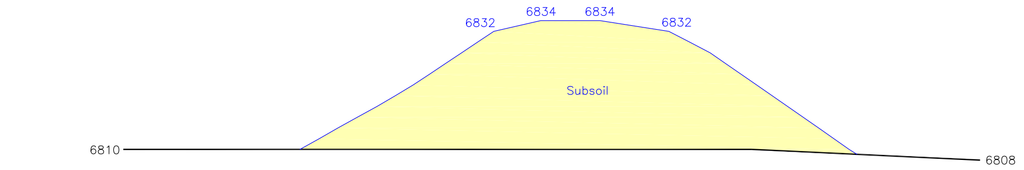
4-11A

CAD FILE NAME/DISK#: CM-10815-WB.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
TOPSOIL CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: 1"=20'
DATE: JANUARY 27, 2015
DRAWING #: CM-10815-WB
SHEET 1 OF 1
REV. ___



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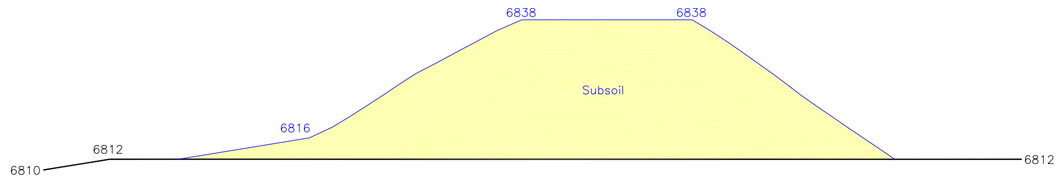

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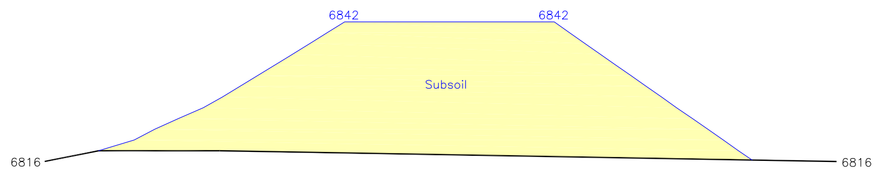

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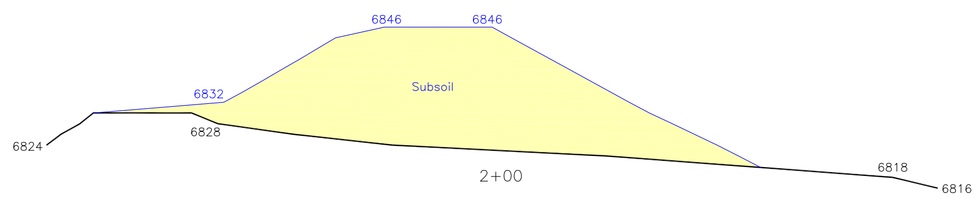

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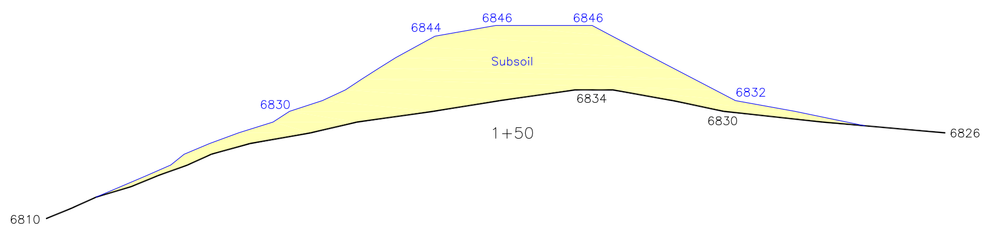

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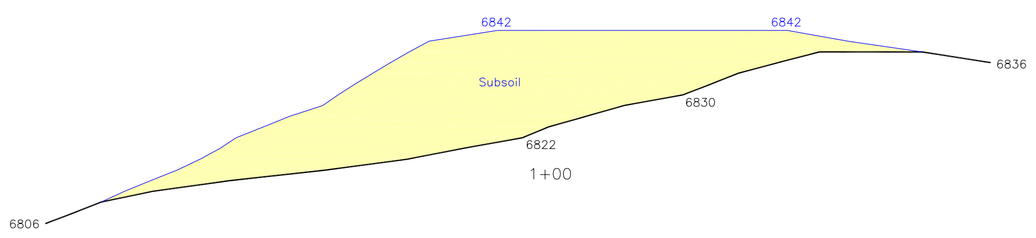
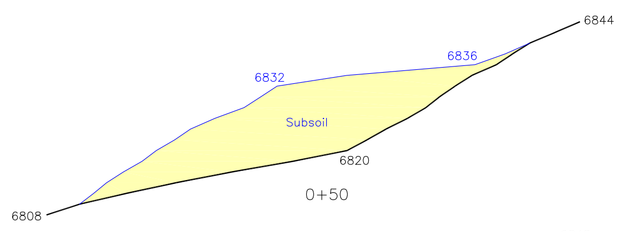
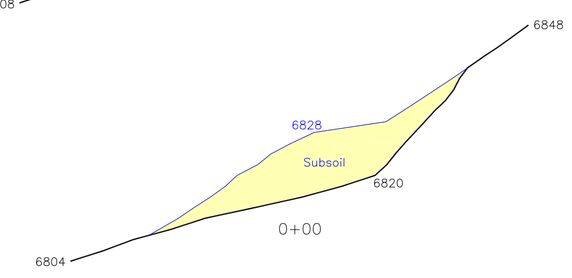


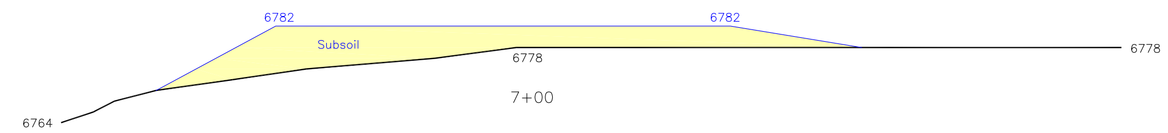
1+00



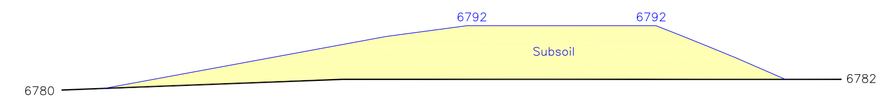
0+50



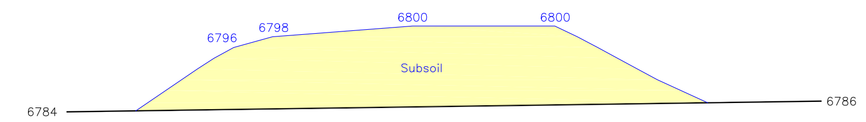
0+00



7+00



6+50



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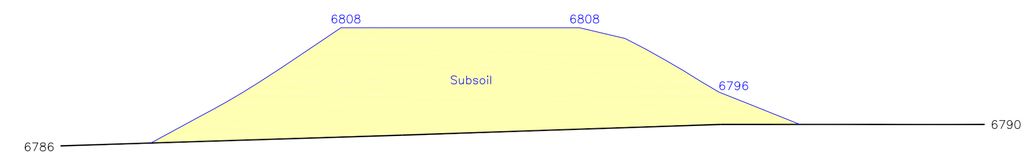

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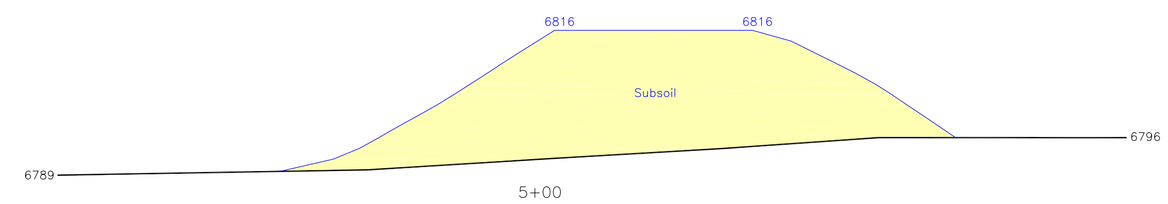

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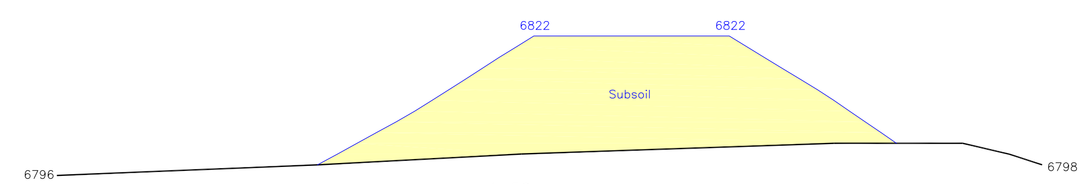

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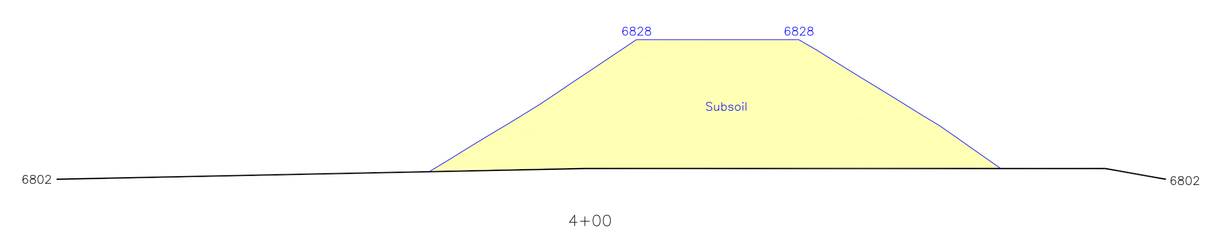


4+00

REFER TO CM-10816-WB FOR
SUBSOIL AND TOPSOIL VOLUMES

PRE-EXISTING GRADE LINE

COMPLETED SUBSOIL PILE

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10846-WB.DWG

4-11B

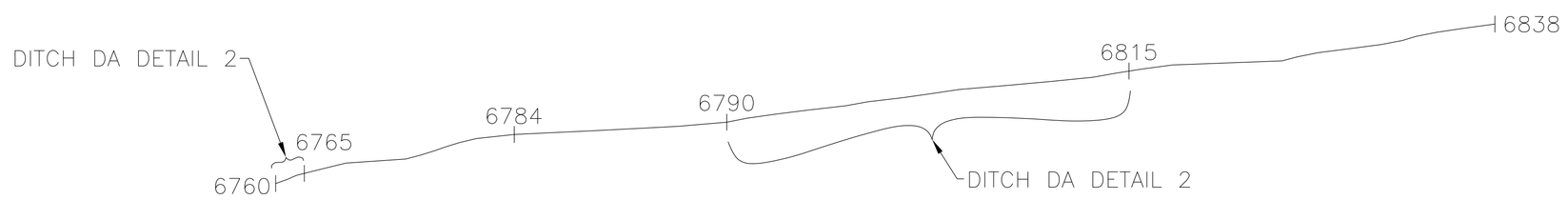
DATE	REVISIONS	BY
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL
12/16/13	ACTUAL AS-BUILT UTILIZING NEW AEROQUEST TOPO	KJL
3/28/91	REPRESENTS THE AS BUILT CONDITIONS AS OF 8/1/90	KJL

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

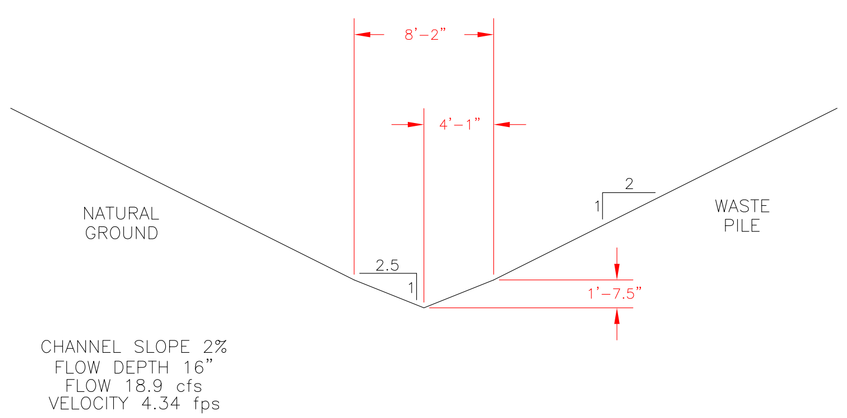
TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
SUBSOIL CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: 1" =20'
DATE: JANUARY 27, 2015
DRAWING #: CM-10846-WB
SHEET 1 OF 1
REV. ---

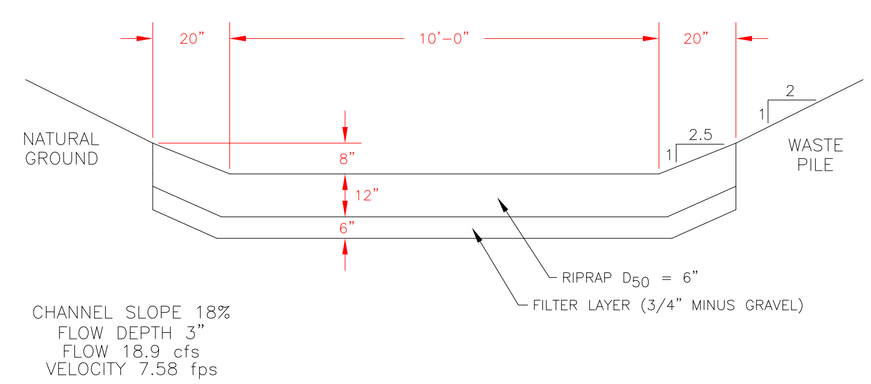
FINAL RECLAMATION PROFILE OF DIVERSION DITCH DA
SCALE: 1"=50'



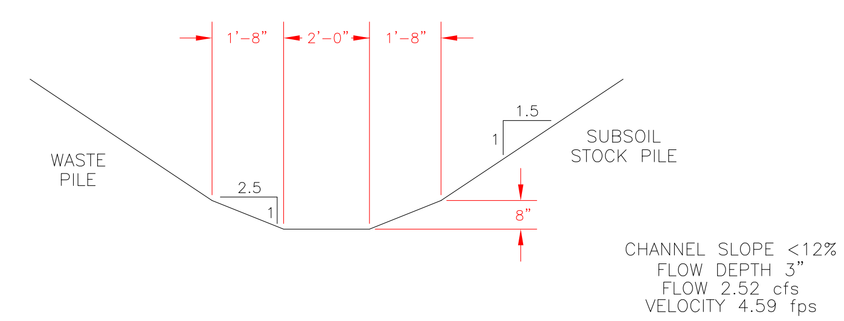
FINAL RECLAMATION PROFILE OF DIVERSION DITCH DB
SCALE: 1"=50'



DITCH DA DETAIL 1



DITCH DA DETAIL 2



DITCH DB

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10830-WB.DWG

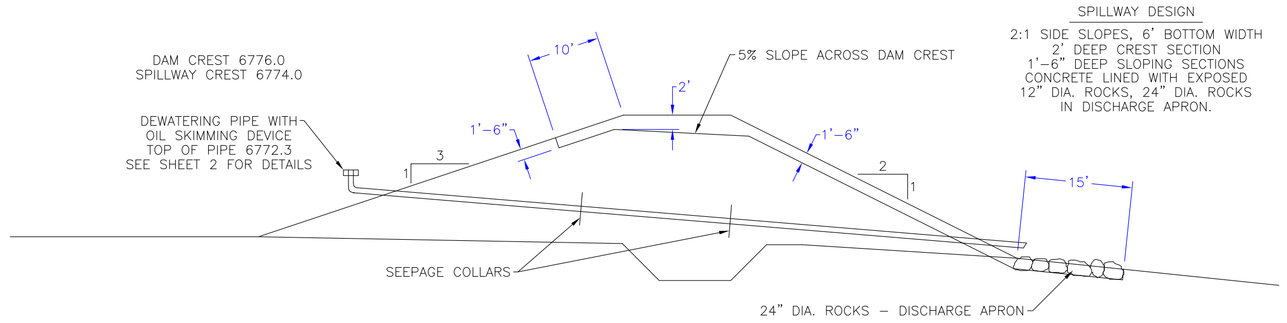
4-12

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
DIVERSION DITCH PROFILES & CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: AS NOTED
DATE: JANUARY 27, 2015
DRAWING #: CM-10830-WB
SHEET 1 OF 1
REV. ___

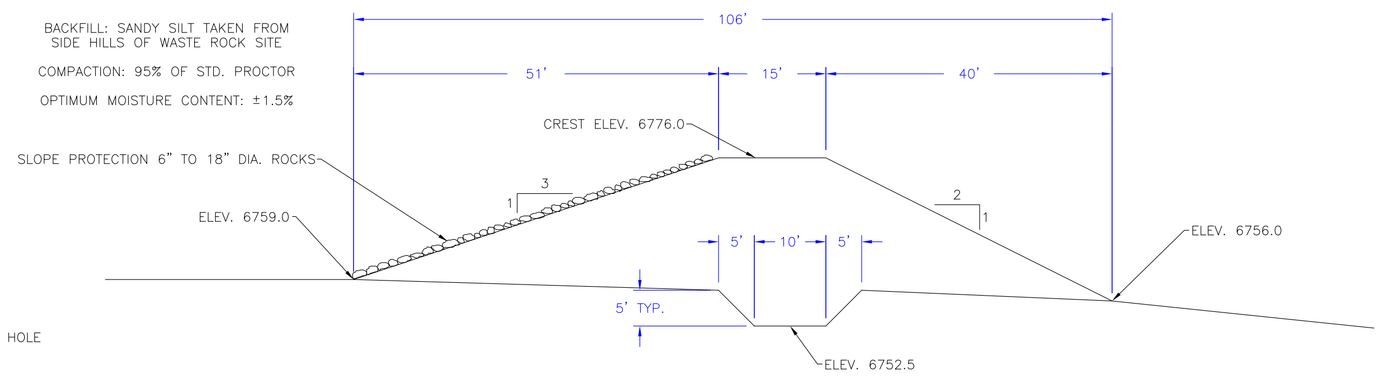
DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT AND REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	
1-13-14	UPDATED UTILIZING AEROQUEST TOPOGRAPHY LINES DATA		
1-4-93	REVISED DIVERSION DITCH DA AND DB PROFILES TO REFLECT FINAL RECLAMATION	KJL	



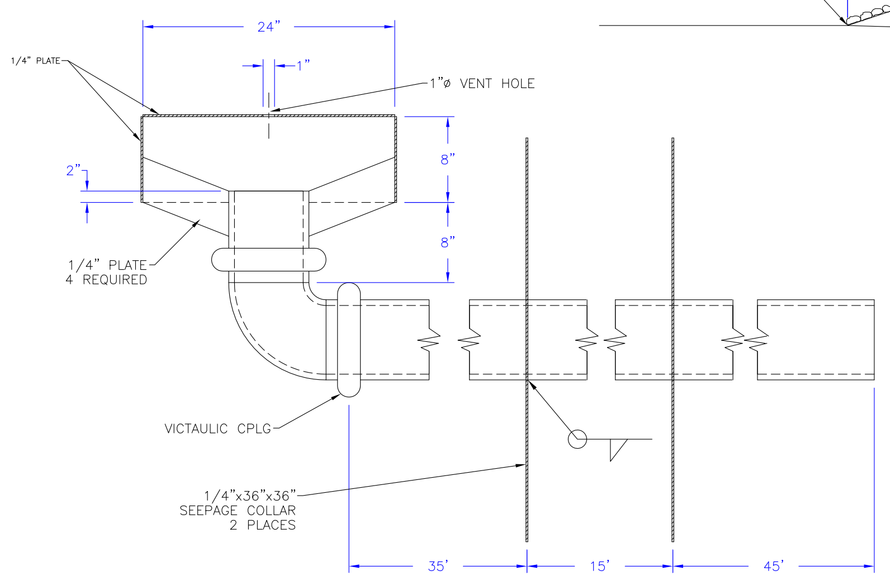
SPILLWAY DESIGN

2:1 SIDE SLOPES, 6' BOTTOM WIDTH
2' DEEP CREST SECTION
1'-6" DEEP SLOPING SECTIONS
CONCRETE LINED WITH EXPOSED
12" DIA. ROCKS, 24" DIA. ROCKS
IN DISCHARGE APRON.

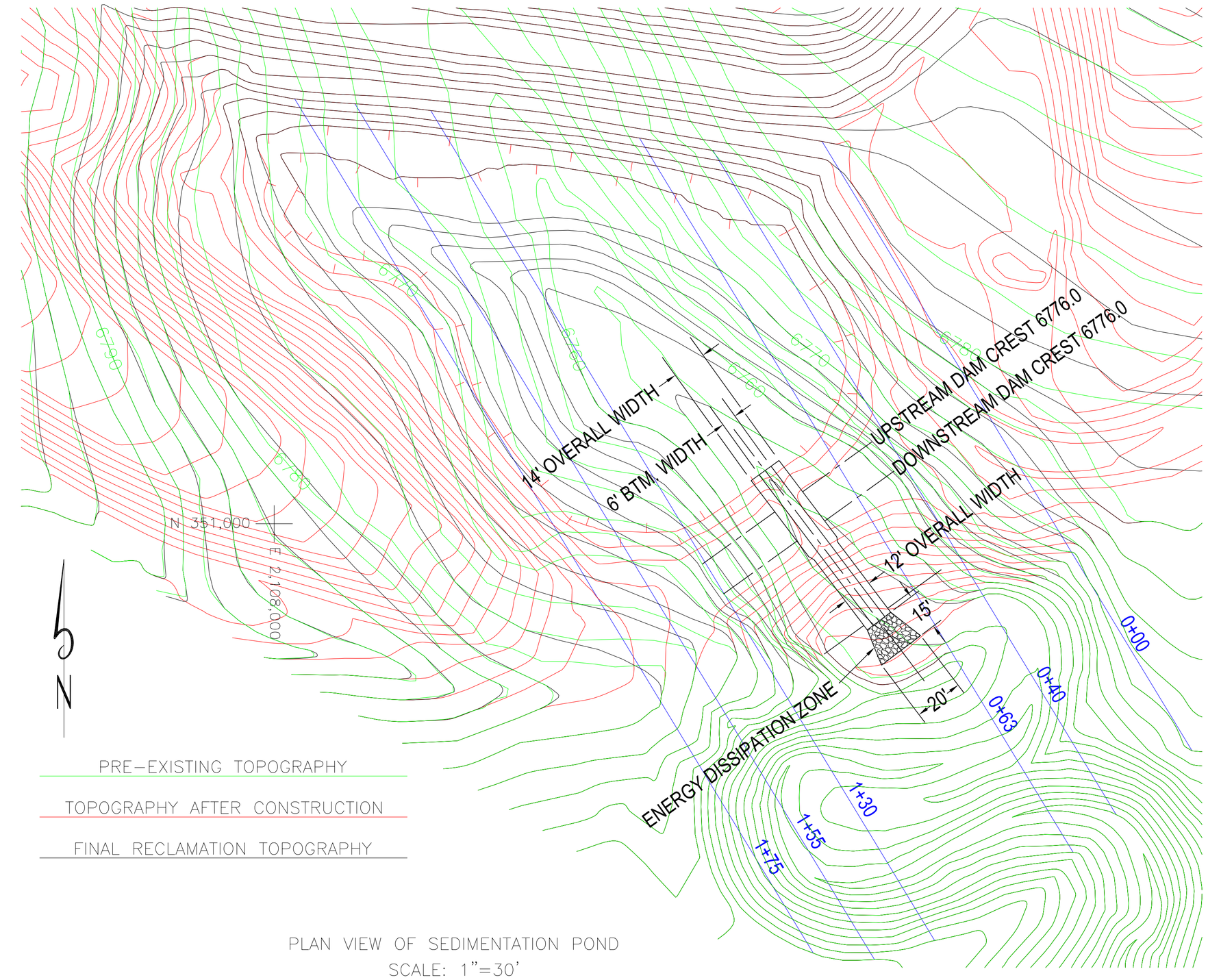
TYPICAL SPILLWAY CROSS SECTION



TYPICAL DAM CROSS SECTION



6" DEWATERING PIPE AND OIL SKIMMER

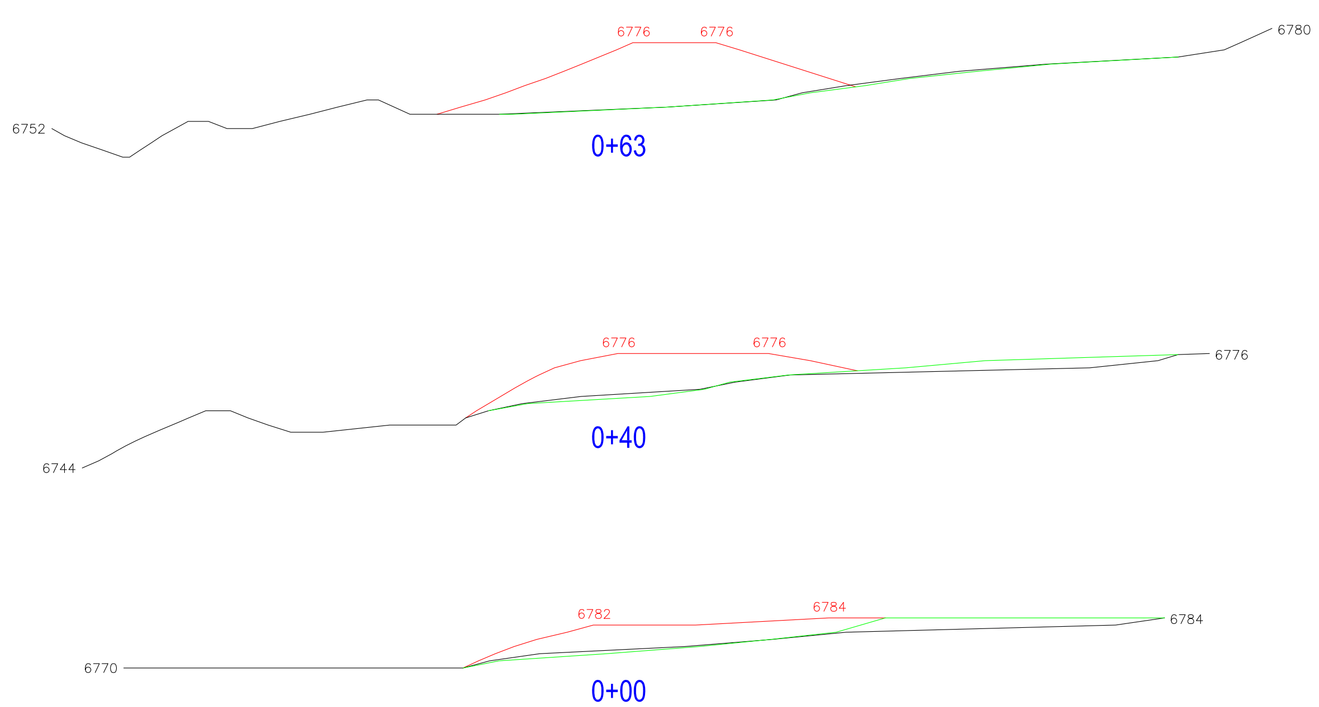


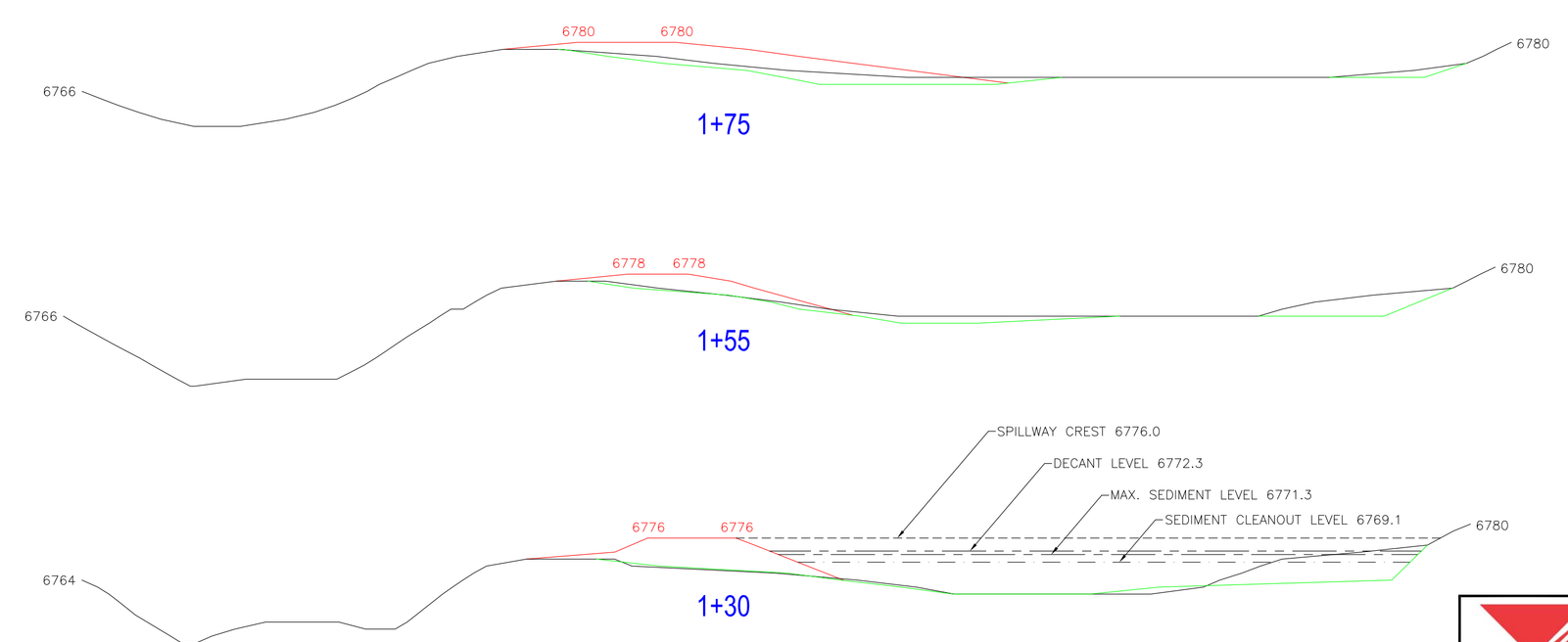
PRE-EXISTING TOPOGRAPHY

TOPOGRAPHY AFTER CONSTRUCTION

FINAL RECLAMATION TOPOGRAPHY

PLAN VIEW OF SEDIMENTATION POND
SCALE: 1"=30'





SEDIMENTATION POND – CROSS SECTIONS
SCALE: 1"=20'

DATE	REVISIONS	BY	CHK.
1/27/15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	
11/3/14	REVISED TO INCLUDE FINAL RECLAMATION CONTOURS AND COMBINED SHEETS 1 AND 2	KJL	
6/8/14	UPDATED UTILIZING AEROQUEST TOPOGRAPHY	KJL	
4/30/91	REVISED TO REFLECT THE AS-BUILT CONDITIONS OF THE WASTE ROCK POND AND DAM	KJL	
5/7/90	CHANGED DEWATERING PIPE ELEV. TO 6766.3	KJL	
3/24/90	REVISED CONTOUR LINES AT DAM; ADDED DECANT	TJF	

CAD FILE NAME/DISK#: CM-10837-WB.DWG

4-13

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD/WILBERG MINE
WASTE ROCK STORAGE FACILITY
DAM CROSS SECTIONS

DRAWN BY: K. LARSEN
SCALE: AS NOTED
DATE: JANUARY 27, 2015
DRAWING #: CM-10837-WB
SHEET 1 OF 1
REV. ___

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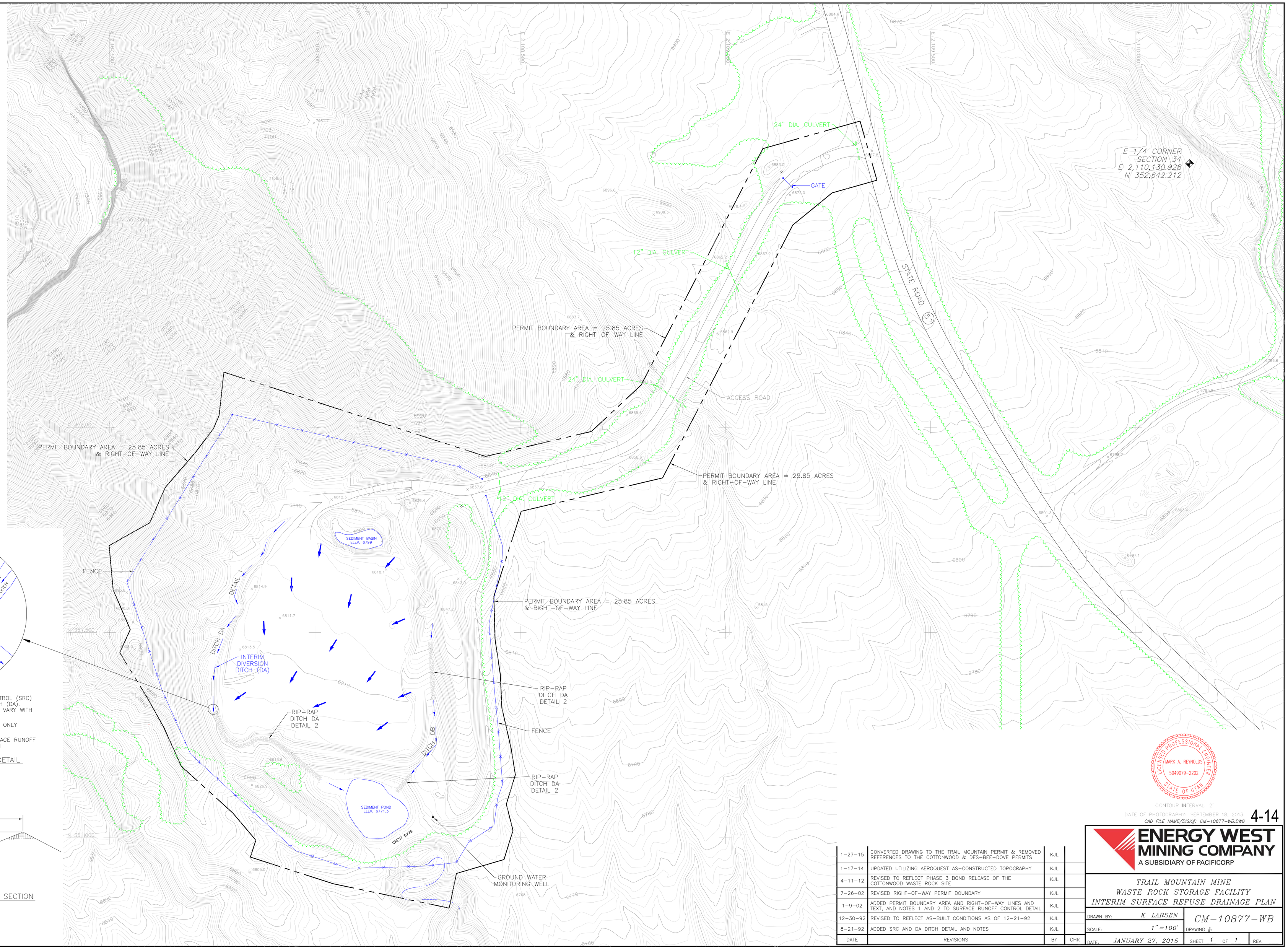
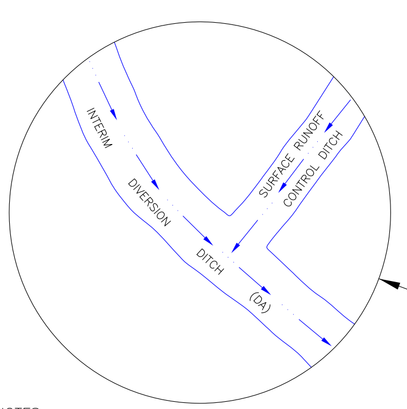
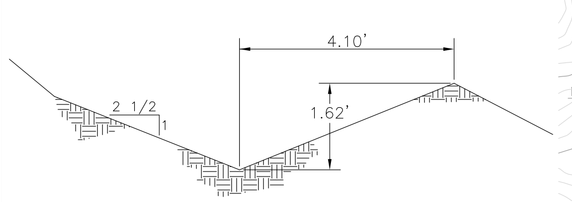




NOTES:

1. CROSS SECTION OF SURFACE RUNOFF CONTROL (SRC) DITCH WILL MATCH INTERIM DIVERSION DITCH (DA). LOCATION AND LENGTH OF SRC DITCH WILL VARY WITH THE ELEVATION OF THE REFUSE PILE.
2. SURFACE RUNOFF CONTROL DITCH UTILIZED ONLY DURING INITIAL REFUSE PLACEMENT
3. DURING CONSTRUCTION OF LIFTS THE SURFACE RUNOFF WILL FLOW IN A SOUTHWESTERLY DIRECTION

SURFACE RUNOFF CONTROL DETAIL
NTS



INTERIM DIVERSION DITCH CROSS SECTION
SCALE: 1"=2'-0"
CHANNEL SLOPE 2%
FLOW RATE 18.9 cfs
FLOW DEPTH 1.32 ft.
VELOCITY 4.34 fps

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL: 2'
DATE OF PHOTOGRAPHY: SEPTEMBER 18, 2013
CAD FILE NAME/DISK#: CM-10877-WB.DWG

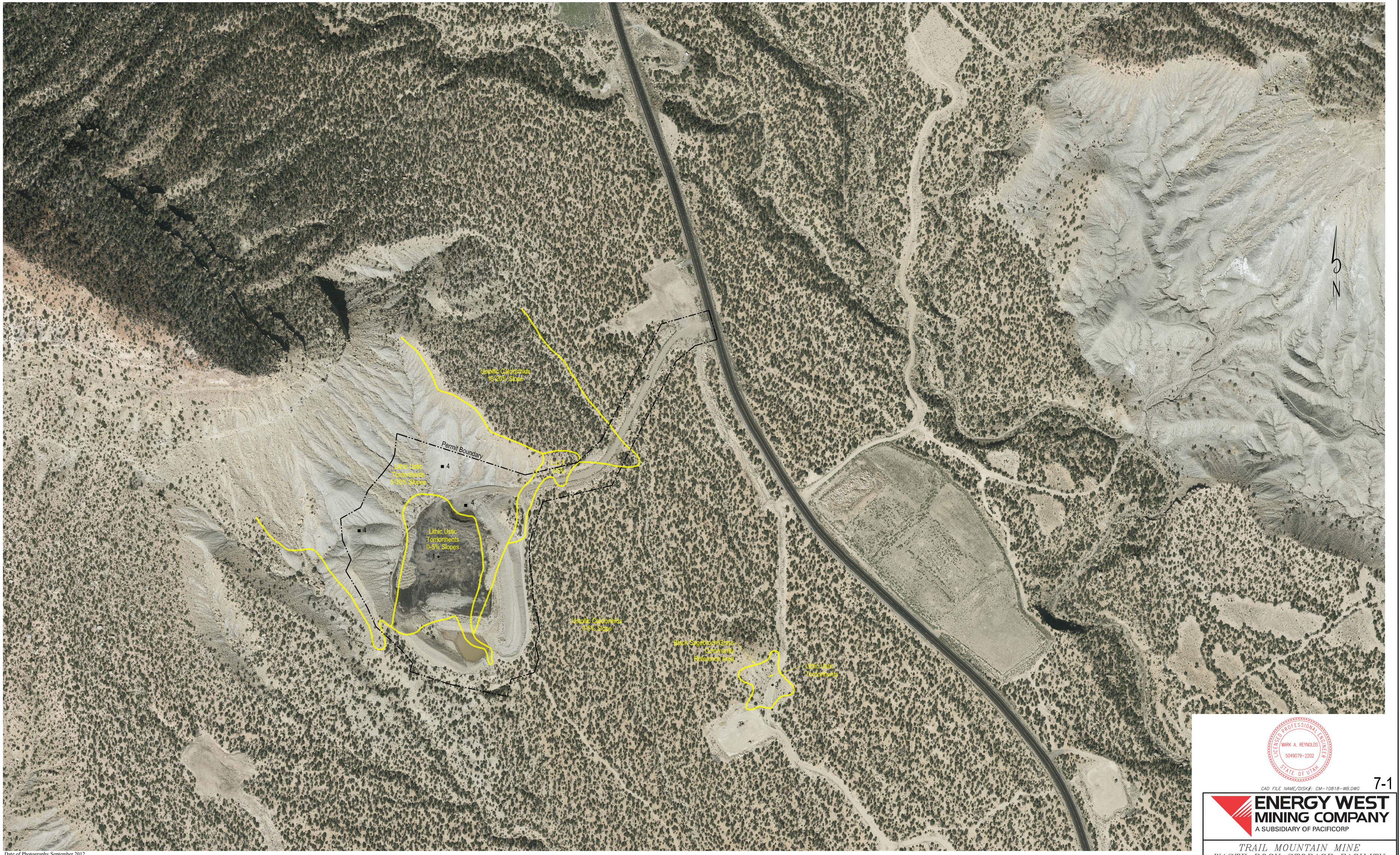
4-14

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
1-17-14	UPDATED UTILIZING AEROQUEST AS-CONSTRUCTED TOPOGRAPHY	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED PERMIT BOUNDARY AREA AND RIGHT-OF-WAY LINES AND TEXT, AND NOTES 1 AND 2 TO SURFACE RUNOFF CONTROL DETAIL	KJL	
12-30-92	REVISED TO REFLECT AS-BUILT CONDITIONS AS OF 12-21-92	KJL	
8-21-92	ADDED SRC AND DA DITCH DETAIL AND NOTES	KJL	

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
INTERIM SURFACE REFUSE DRAINAGE PLAN

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DRAWING #: CM-10877-WB
DATE: JANUARY 27, 2015
SHEET 1 OF 1
REV.



Date of Photography September 2012

Note

- • 1 Soil Pedon Excavation Site
- ■ Composite Sample Sites

DATE	REVISION	BY	CHK.
1-27-15	CONVERTED DWG. TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	

DATE	REVISION	BY	CHK.
1/6/14	ADDED MARK A. REYNOLDS P.E. STAMP	KJL	
7/26/02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1/9-02	REVISED DATE OF PHOTO	KJL	
9/22/89	REVISED SOILS BOUNDARIES	JRG	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CAD FILE NAME/DISK#: CM-10818-WB.DWG

7-1

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
SOILS MAP

DRAWN BY: K. LARSEN
SCALE: 1" =200'
DATE: JANUARY 27, 2015
DRAWING #: CM-10818-WB
SHEET 1 OF 1
REV. ___

TOPSOIL AND SUBSOIL MASS BALANCE TABLE

ZONE	AREA ACRES	TOPSOIL REMOVAL DEPTH INCHES	TOPSOIL REMOVAL QUANTITY YDS³	SUBSOIL REMOVAL DEPTH INCHES	SUBSOIL REMOVAL QUANTITY YDS³	TOPSOIL REDIST. DEPTH INCHES	TOPSOIL REDIST. QUANTITY YDS³	SUBSOIL REDIST. DEPTH INCHES	SUBSOIL REDIST. QUANTITY YDS³
A	1.6	6	1330	0	0	6	1330	0	0
B	2.95	9	4492	24	6365	6	2380	12	4784
C	4.98	18	12050	24	10720	6	4020	12	8073
D	7.25	0	0	28	16512	6	5850	12	11759
E	.78	0	0	0	0	6	630	12	1266
SUB TOTAL B,C,D,E			16542		33597		12880		25882

EXCESS TOPSOIL 3662 YDS³ OR 28%

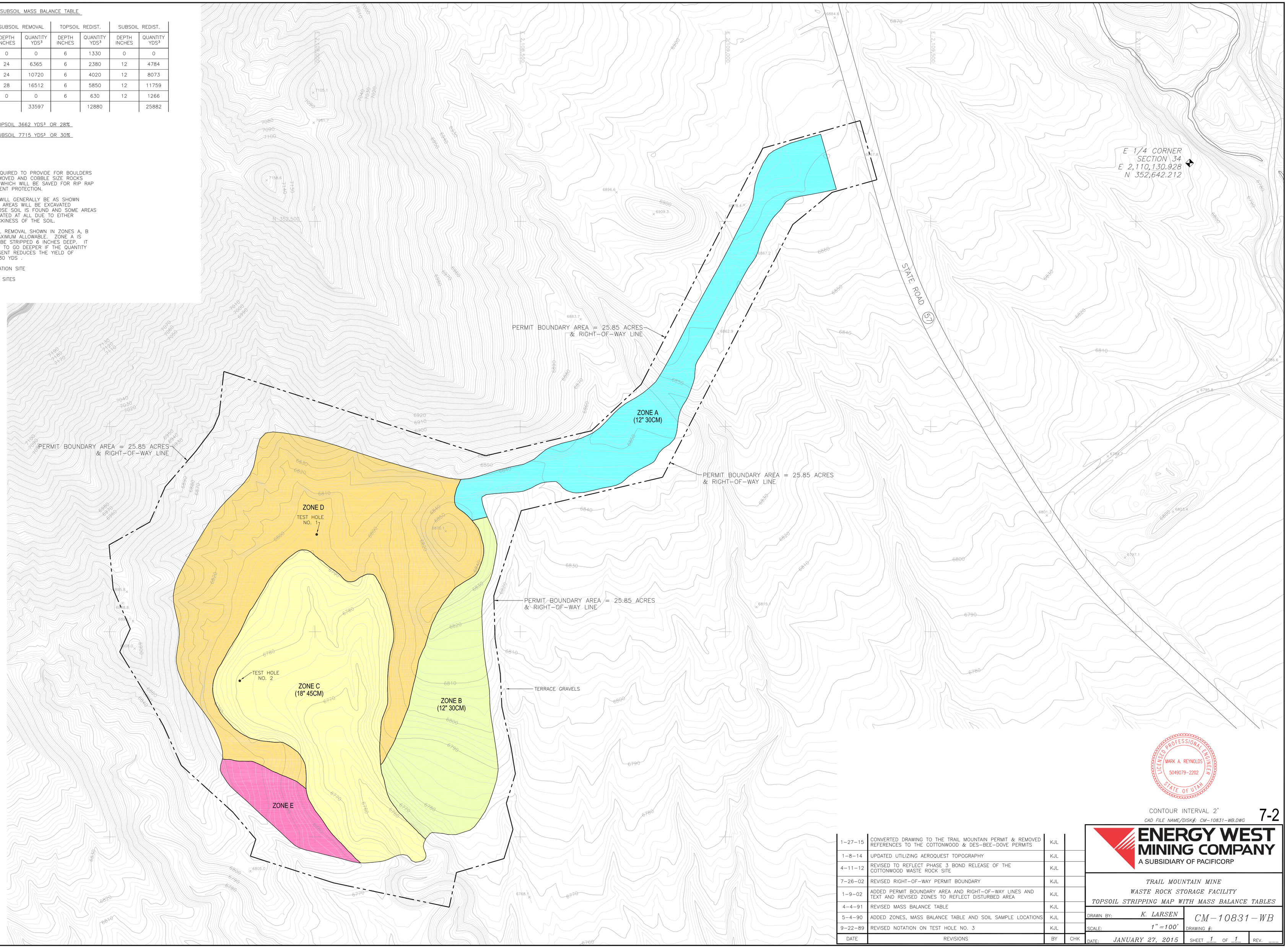
EXCESS SUBSOIL 7715 YDS³ OR 30%

NOTES

1. EXCESS SOIL IS REQUIRED TO PROVIDE FOR BOULDERS WHICH WILL BE REMOVED AND COBBLE SIZE ROCKS (3 TO 12 INCHES) WHICH WILL BE SAVED FOR RIP RAP AND DAM EMBANKMENT PROTECTION.
2. SUBSOIL REMOVED WILL GENERALLY BE AS SHOWN EXCEPT THAT SOME AREAS WILL BE EXCAVATED DEEPER WHERE LOOSE SOIL IS FOUND AND SOME AREAS MAY NOT BE EXCAVATED AT ALL DUE TO EITHER STEEPNESS OR ROCKINESS OF THE SOIL.
3. DEPTHS OF TOPSOIL REMOVAL SHOWN IN ZONES A, B AND C ARE THE MAXIMUM ALLOWABLE. ZONE A IS ONLY PLANNED TO BE STRIPPED 6 INCHES DEEP. IT MAY BE NECESSARY TO GO DEEPER IF THE QUANTITY OF BOULDERS PRESENT REDUCES THE YIELD OF TOPSOIL BELOW 1330 YDS .

● 1 SOIL PEDON EXCAVATION SITE

■ COMPOSITE SAMPLE SITES



LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

CONTOUR INTERVAL 2'

CAD FILE NAME/DISK#: CM-10831-WB.DWG

7-2

DATE	REVISIONS	BY	CHK
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD & DES-BEE-DOVE PERMITS	KJL	
1-8-14	UPDATED UTILIZING AEROQUEST TOPOGRAPHY	KJL	
4-11-12	REVISED TO REFLECT PHASE 3 BOND RELEASE OF THE COTTONWOOD WASTE ROCK SITE	KJL	
7-26-02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
1-9-02	ADDED PERMIT BOUNDARY AREA AND RIGHT-OF-WAY LINES AND TEXT AND REVISED ZONES TO REFLECT DISTURBED AREA	KJL	
4-4-91	REVISED MASS BALANCE TABLE	KJL	
5-4-90	ADDED ZONES, MASS BALANCE TABLE AND SOIL SAMPLE LOCATIONS	KJL	
9-22-89	REVISED NOTATION ON TEST HOLE NO. 3	KJL	

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
TOPSOIL STRIPPING MAP WITH MASS BALANCE TABLES

DRAWN BY: K. LARSEN
SCALE: 1"=100'
DATE: JANUARY 27, 2015
DRAWING #: CM-10831-WB
SHEET 1 OF 1
REV. ___

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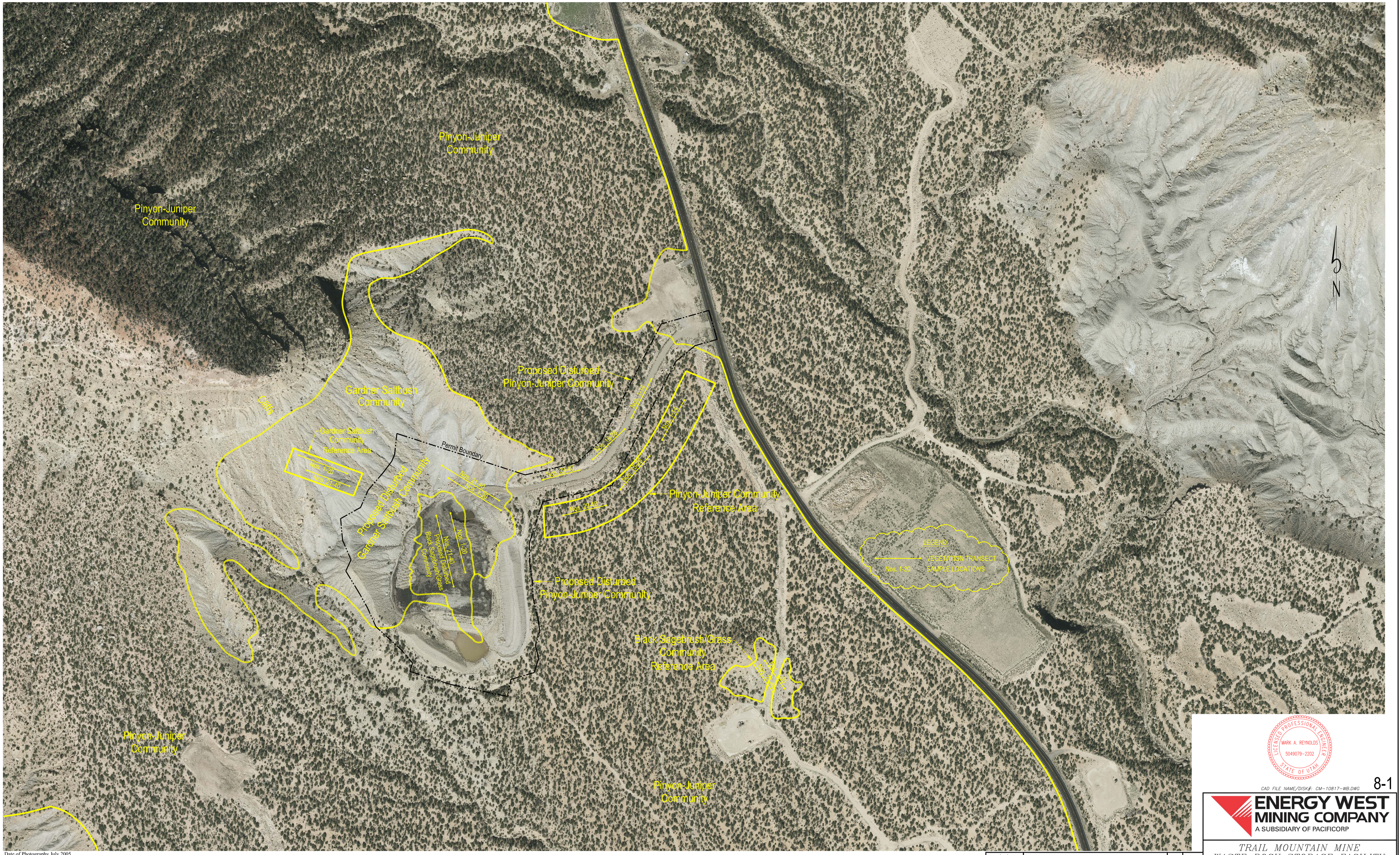


Date of Photography July 2005

DATE	REVISION	BY	CHK.
1-27-15	CONVERTED DWG. TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCE TO THE COTTONWOOD PERMIT	KJL	

DATE	REVISION	BY	CHK.
1/6/14	ADDED MARK A. REYNOLDS P.E. STAMP	KJL	
7/26/02	REVISED RIGHT-OF-WAY PERMIT BOUNDARY	KJL	
3/15/02	GPS BLACK SAGEBRUSH REFERENCE AREA	KJL	
1/9/02	REVISED DATE OF PHOTO, PERMIT BOUNDARY	KJL	
7/20/00	CONVERTED TO AUTOCAD AND REVISED TO DATE	KJL	

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

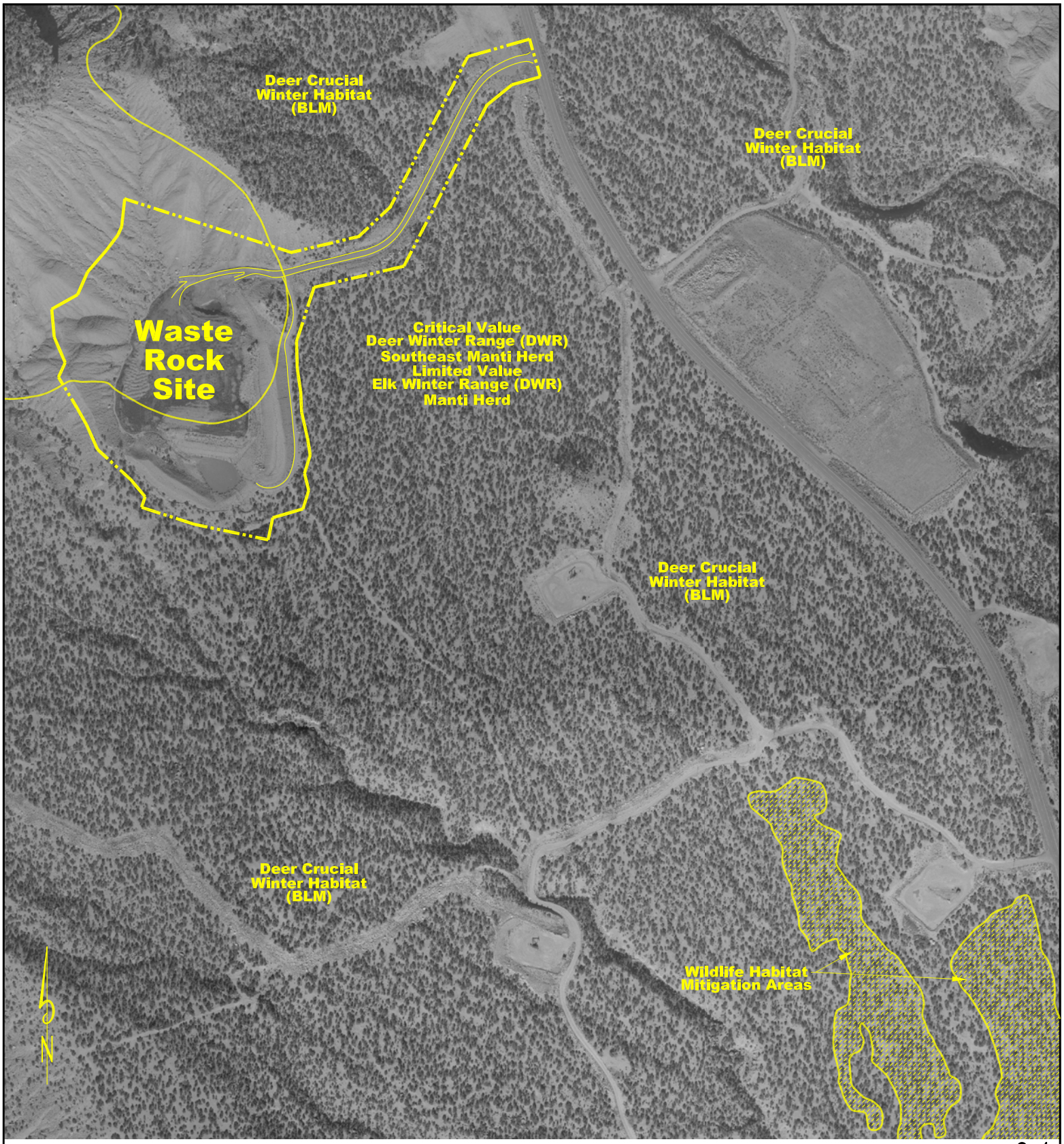
CAD FILE NAME/DISK#: CM-10817-WB.DWG

8-1

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
VEGETATION MAP

DRAWN BY: K. LARSEN
SCALE: 1"=200'
DATE: JANUARY 27, 2015
DRAWING #: CM-10817-WB
SHEET 1 OF 1
REV. ---



9-1

CAD FILE NAME/DISK#: CM-10819-WB.DWG

LICENSED PROFESSIONAL ENGINEER
MARK A. REYNOLDS
5049079-2202
STATE OF UTAH

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WASTE ROCK STORAGE FACILITY
WILDLIFE HABITAT MAP

DATE	REVISIONS	BY	CHK.
1-27-15	CONVERTED DRAWING TO THE TRAIL MOUNTAIN PERMIT & REMOVED REFERENCES TO THE COTTONWOOD PERMIT	KJL	

DRAWN BY: K. LARSEN
SCALE: 1"=500'
DATE: JANUARY 27, 2015
DRAWING #: CM-10819-WB
SHEET 1 OF 1
REV. ___

PacifiCorp

Energy West Mining Company

Trail Mountain Mine MRP

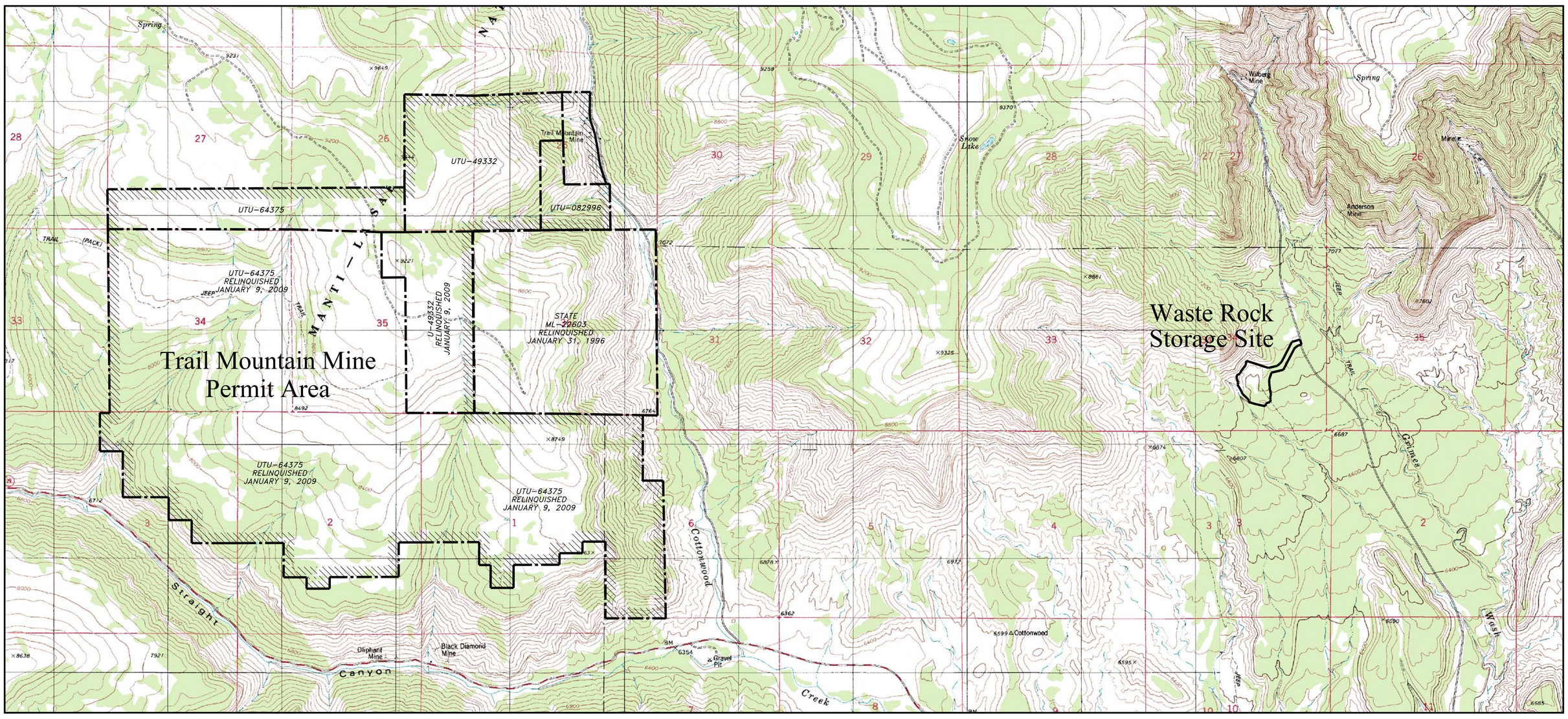
Appendix Volume, Appendix 7-1:

Replace Monitoring table and Location Map

TRAIL MOUNTAIN WATER MONITORING PROGRAM

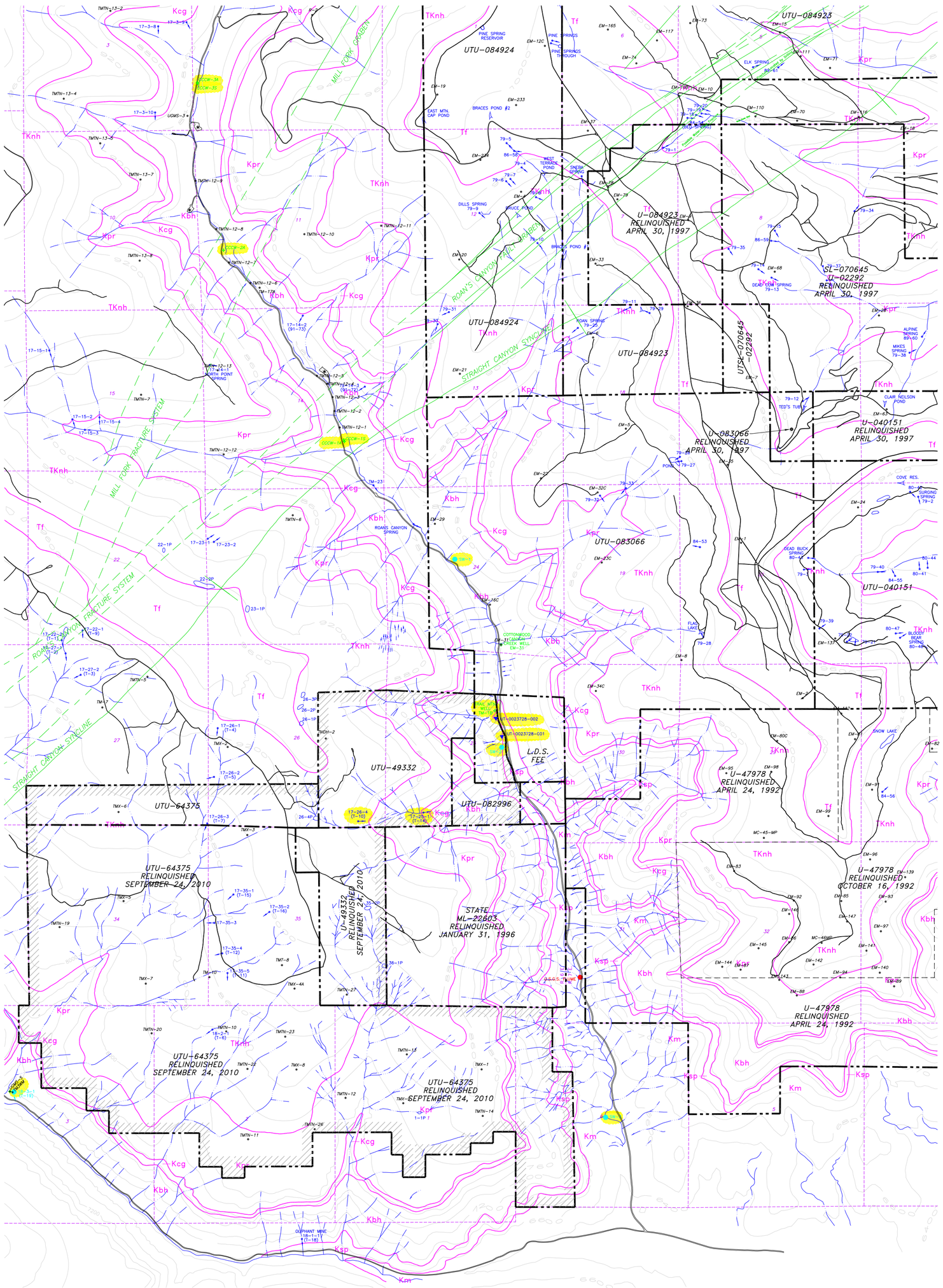
STATION	LOCATION	TYPE	GEOLOGIC OCCURRENCE	FREQUENCY	STATUS	RESULTS TO:	REMARKS
SW-1	Cottonwood Cyn	Intermittent	Surface Stream	Monthly-Field	Operational	DOGM	Oil & Grease
	Above Mine	Stream	Crossing Blackhawk	Quarterly-Quality			Quarterly
			Formation				
SW-2	Cottonwood Cyn	Intermittent	Surface Stream	Monthly-Field	Operational	DOGM	Oil & Grease
	Below Mine	Stream	Crossing Starpoint/Mancos	Quarterly-Quality			Quarterly
			Formation				
SW-3	Cottonwood Cyn	Intermittent	Surface Stream	Monthly-Field	Operational	DOGM	Oil & Grease
	Below Mine	Stream	Crossing Mancos	Quarterly-Quality			Quarterly
			Formation				
T-10	Trail Mountain	Spring	Spring in North Horn	Quality July/Oct	Operational	DOGM	Inaccessible During Winter
	Section 26		Formation	Field July-Oct			
T-14	Trail Mountain	Spring	Spring in Upper	Quality July/Oct	Operational	DOGM	Inaccessible During Winter
	Section 25		Price River / Castlegate SS	Field July-Oct			
			Formation				
CCCW-1A	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 14	Well	Alluvial Deposits	Monthly	Operational	DOGM	Level Only*
CCCW-1S	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 14	Well	Starpoint Sandstone	Monthly	Operational	DOGM	Level Only*
CCCW-2A	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 11	Well	Alluvial Deposits	Monthly	Operational	DOGM	Level Only*
CCCW-3A	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 2	Well	Alluvial Deposits	Monthly	Operational	DOGM	Level Only*
CCCW-3S U	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 2	Well	Blackhawk - Fluvial Sandstone	Monthly	Operational	DOGM	Level Only*
CCCW-3S L	Cottonwood Creek Cyn. T.17S, R.6E, Sec. 2	Well	Starpoint Sandstone	Monthly	Operational	DOGM	Level Only*
TM-1B	Mine Surface Near Bathhouse	Well	Starpoint Sandstone	Monthly-Field Quarterly Quality	Operational	DOGM	
TM-3	Straight Canyon	Well	Starpoint Sandstone	Monthly-Field	Operational	DOGM	Level Only
CWRW1	Grimes Wash Waste Rock Site	Well	Mancos Formation	Quarterly Quality/Level	Operational	DOGM	
UT-0023728-001	Trail Mountain Sediment Pond	Point Discharge		Monthly	Operational	DOGM/DWQ	Oil and Grease if Visible
UT-0023728-002	Trail Mountain Mine Discharge	Point Discharge		Monthly	Operational	DOGM/DWQ	Oil and Grease if Visible
UT-0023728-003	WRS Sediment Pond Discharge	Point Discharge		Monthly	Operational	DOGM/DWQ	Oil and Grease if Visible

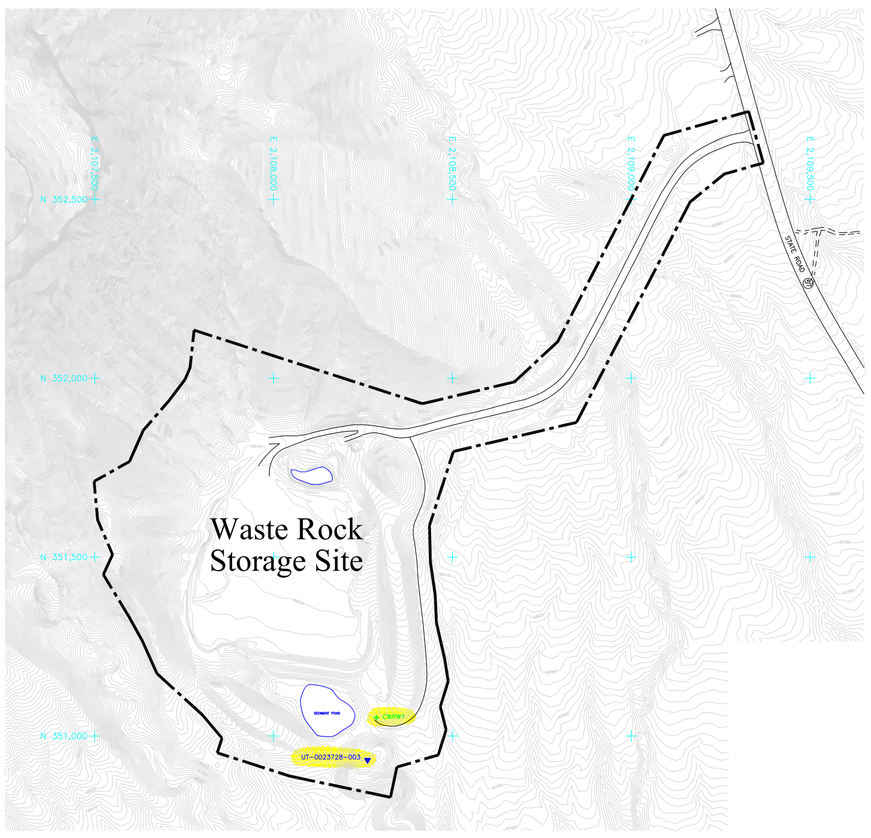
* refer to Appendix 7-17 for a full discussion the the Cottonwood Creek Canyon hydroloogy and the CCCW wells.



General Location Map

Scale: 1"=2000'





Waste Rock Storage Site

Scale: 1"=300'

LEGEND

- TRAIL MOUNTAIN PERMIT BOUNDARY
- LEASE BOUNDARY
- FAULT (DASHED WHERE INFERRED)
- WATER MONITORING STATION WITH FLUME
- WATER MONITORING STATION
- UT-0022896-004 UPDES DISCHARGE LOCATION
- GROUND WATER MONITORING LOCATIONS
- EM-73 DRILL HOLE
- LAKE
- TROUGH
- POND
- SPRING
- P-1 MONITORING WELL
- GAS WELL

- TKnh NORTH HORN FORMATION
- Tf FLAGSTAFF FORMATION
- Kpr PRICE RIVER FORMATION
- Km MANCOS SHALE
- Ksp STARPOINT SNADSTONE
- Kbh BLACKHAWK FORMATION
- Kcg CASTLEGATE SANDSTONE

STATE OF UTAH
REGISTERED
REFERENCE NUMBER
5234167-2250
CHARLES A. SEMBOWSKI
LICENSED PROFESSIONAL GEOLOGIST

CAD FILE NAME/DISK#: SPRING MAP FROM HM-4

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

TRAIL MOUNTAIN MINE
WATER MONITORING
LOCATION MAP

DRAWN BY: K. LARSEN	.....	
SCALE: AS NOTED	DRAWING #:	
DATE: NOVEMBER 17, 2014	SHEET 1 OF 1	REV. ___