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Des Bee Dove Mine

C/015/0017, Task ID #2176

Deficiency Response to Appendix XVI: Phase 3 Reclamation Plan

Replace R645-301-200: Soils Section

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DES-BEE-DOVE MINE
PHASE 3
RECLAMATION PLAN
C/015/017

200 Soils (R645-301-200)

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R645-301-200 SOILS

The material presented in the following sections of R645-301-200 Soils, represent the minimum requirements for information on soil resources which will be included with this reclamation plan.

R645-301-210 Introduction

The Des-Bee-Dove sediment pond is located below the reclaimed mine site in an unnamed canyon on the southern end of East Mountain. This area is characterized by nearly vertical sandstone cliffs which overlie less steep shale slopes. All bedding is nearly horizontal. The terrain near the site is distinguishable by its local exposures of rounded hills, where fresh shale outcrops occur. Flat shale and sandstone debris flow areas exist where storm runoff has eroded steep gullies. Access to the pond uses an existing Class III dirt road which spurs off the Des-Bee-Dove junction road (now Emery County road #412) and leads to the mine sedimentation pond. Approximate length of the road is 4,000 feet.

Construction of the Des-Bee-Dove sedimentation pond was completed in April, 1980. This pond was designed and built to impound the runoff from a 10yr/24hr storm event. The capacity of the pond is 19.8 ac. ft. (2 ac. ft. for sediment and 17.8 ac. ft for runoff). During development of the pond, subsoil was stored on-site. An interim vegetative cover was planted on this pile to control erosion and to enhance its biotic characteristics.

R645-301-220 ENVIRONMENTAL DESCRIPTION

R645-301-221 Prime Farmland Investigation

As discussed in Volume 1, Part 2, page 2-223, no lands withing the Des-Bee-Dove mine permit area qualifies as "Prime Farmlands" for the following reasons:

1. Historically the lands prior to construction were not used as a crop land.
2. The slopes of the surrounding the portal area exceed 10 percent.
3. There is no developed water supply qualifying as an irrigation source.

Appendix A includes a copy of the original determination from the Soil Conservation Service (now Natural Resource Conservation Service, NRCS) for the soils within the Des-Bee-Dove mine permit area.

R645-301-222 Soil Survey

A complete discussion of the soil surveys, sampling, and soil resources of the Des-Bee-Dove mine permit area are found in Volume 1, Part 2, pages 2-170 - 2-190 and 2-223 - 2-228 . A general discussion for the pond area is presented below.

At the pond site all bedrock is composed of the Masuk Shale Member of the Mancos Shale Formation. This rock is a blue-gray mudstone which weathers to a lighter colored clay material. Severe weathering penetrates roughly 5 feet into fresh shale outcrops and consists of a hard clay layer approximately 1 foot thick covering a fractured zone approximately 4 feet thick. The mudstone becomes slick when crushed to sand sizes and exposed to water. It has a tendency to slake in water, especially when weathered.

Overlying the Masuk Shale are loose materials consisting mostly of gravels and sands intermixed with cobbles and boulders. These represent debris flows which have stabilized above the previously eroded shale. Adjacent to outcrops of shale, the sands and gravels are overlain by silty clay derived from the shale. The top 10 feet of silty clay in the pond area is of such an origin. This material has a low permeability.

Soils in the pond area are classified as skeletal mixed mesic Lithic Ustorthents and Xerollic Calciorthids. The soil material above the shale is about 15 inches thick and is high in gypsum. Vegetation is dominated by saltbrush. No soil sampling has been conducted in the area of the pond. Refer to Map 2-16 in Volume 3. A pedon description for the two classifications is given below.

LU Lithic Ustorthents, 40 - 70% Slopes

Rock outcrop is dominantly from sandstone and shale. The boulders in the rubble land are from sandstone (75%).

Ustorthents soils are shallow and formed in material derived from sandstone. Permeability is moderately rapid in the soil material above the rock (25%).

Taxonomic classification[1] is loamy-skeltal mixed mesic Lithic Ustorthents. Pedon description follows:

A
0-4 inches; pale brown (10YR 6/3) very gravelly loam; olive brown (2.5YR 5/4) when moist; weak, fine granular structure; friable, slightly sticky. Slightly plastic; few fine,

[1]Reclassified by Dr. A. R. Southard in May, 1989.

medium and coarse roots; common fine and few medium pores; 55% gravel; moderately calcareous, carbonates are disseminated; moderately alkaline 9pH 8.3); abrupt wavy boundary.

C
4-14 inches; light gray (2.5YR 7/2) extremely flaggy. Fine sandy loam, light yellowish brown (2.5YR 6/4) when moist; massive; very friable; few fine, medium, and coarse roots; 40% flagstone; 30% channeres; strongly calcareous, carbonates are desseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

R
14 inches; sandstone.

XC Xerollic Calciorthid

A_1
0-3 inches; brown (10YR 5/3 when moist); silt loam/ gravelly with scattered rocks; granular, soft, loose, slightly sticky, slightly plastic; moderately calcareous, pH 8.2; few small and medium roots; boundary gradual.

A_2
3-18 inches, pale brown (10YR 6/3 when moist); loam, gravelly with scattered rocks; small angular blocky, friable, slightly sticky, slightly plastic; moderately calcareous; common small and medium roots, some large relic roots; some clay buildup at 14 inches, cobble bed at 18 - 20 inches.

C_{ca}
> 20 inches; light brownish gray (10YR 6/2 when moist) caliche; rocky; massive, very hard, strongly calcareous; few medium roots; a cemented caliche layer.

C
Depth varies but consists mainly of bedded cobbles and rocks.

A soil survey conducted by the Soil Conservation Service[2] describes this area as rock land. This land type moderately eroded with 50 to 70 percent of the surface covered with stones, boulders, and outcrops of shale and sandstone. Slopes are steep to perpendicular, but typically between 50 and 80 percent.

[2]Soil Survey, Carbon-Emery Area, Utah, December, 1970, SCS, et al.

This land type has no value for farming, though some areas have a sparse cover of grass, sagebrush, pinion and juniper, mostly on north and west exposers. Capability is rated at VIIIs-3 (non-irrigated) and described by the survey as bare, steep ledges of rock land on which plants do not grow. The only use is for wildlife habitat, water supply, and esthetic purposes.

R645-301-224 Substitute Topsoil

No separation of topsoil and subsoil occurred during the initial construction of the pond. Soil was moved and stored in the subsoil storage locations indicated on Map 200-1 in the Maps Section. During a pond cleaning exercise in 2004, sediment was piled and stored on the bank edges of the pond to comply with storage volume restrictions and to save this sediment for reclamation use. Additional sediment remains as an "island" in the middle of the pond. The sediment quantity is approximately 3,146 cubic yards.

As shown in the sample analysis results in Appendix B, the pond sediment material is characterized as having a clay loam to silty clay loam texture. SAR's are fair to very good. The subsoil material cut from the topsoil salvage area (Map 200-1) is characterized as a sandy loam. To enhance the permeability of the pond sediment material, the subsoil material will be mixed with the pond sediment material. This ~~sediment~~ enhanced material will be ~~used~~ utilized as a substitute ~~topsoil covering~~ B horizon (approximately 7.2 inches in depth) for ~~during~~ final reclamation ~~of the pond~~. The native topsoil salvaged from the topsoil salvage area will be redistributed and utilized as an A horizon growth medium. The volume of salvaged topsoil is estimated at 640 cubic yards which allows for a depth of approximately 1.5 inches.

Both disturbed and undisturbed sample locations are identified on Map 200-1 in the Maps Section. Samples of the pond sediment material ~~will be taken at one foot intervals (sampling procedures are found in Appendix B) throughout the depth of the pile prior to reclamation~~ and native topsoil material were collected to a depth of two feet and analyzed as a composite. Soil samples collected at the subsoil storage area (Map 200-1) were collected in two locations; DBD105 and DBD205. Samples were collected at one foot intervals to a depth of 14 feet and 11 feet, respectively. Sample analysis results are reported in Appendix B. ~~Undisturbed soil sampling will be conducted at one location. Samples will be taken at one foot intervals to a depth of two feet. Only those soils that chemically and physically compare to the surrounding native soils will be used as substitute topsoil. The parameters found on Tables 4 and 8 in the Division's *Guidelines for Management of Topsoil and Overburden, June 2003* will be analyzed. When results become available, it will be reported in Appendix B. Any toxic soil found during the soil sampling exercises will be buried on site with four feet or non-toxic soil material.~~

As shown in the mass balance table on Map 500-1, there is approximately 12,714 cubic yards of soil stored at the subsoil storage location. Sample analysis results show that the top two feet is suitable for use as a substitute topsoil. No topsoil was ever salvaged when soil was stored in this location. In order to successfully reclaim the site, subsoil removal operations will salvage the top one foot of the material and temporarily store it. The remainder of the subsoil will be excavated and redistributed as outlined in R645-301-241: Soil Redistribution, Table 5-1 and R645-301-553: Backfilling and Grading. Once excavation operations uncover native soil below the subsoil pile, and additional one foot will be excavated and redistributed. The stored substitute topsoil material will then be redistributed over the subsoil storage area and mix into the existing surface and pocked.

Side cast soils along the pond access road will be used to reclaim the road. A track-hoe or similar machine will be used to relocate this material. No sampling has been or will be conducted on these soils.

R645-301-230 OPERATION PLAN

During the initial construction phase of the sediment pond, it was determined that no topsoil existed in sufficient quantities to warrant separate removal and storage. Therefore, only subsoil has been stockpiled at the location indicated on Map 200-1 in the Maps Section. Approximately 12,714 cubic yards of material were removed using scrapers and transported to the stockpile location. The stockpile is protected by berms, diversions and sediment control structures.

The sediment pond was designed to store 2.0 ac. ft. of sediment. When this volume was reached, the pond was decanted and cleaned. Sediment cleaned from the pond was excavated using a track-hoe and transported by truck to the Cottonwood waste rock site.

The Des-Bee-Dove pond access road is an existing Class III dirt road which spurs off EC #412 and leads to the mine sedimentation pond. Approximate length of the road is 4,000 feet.

For mining purposes this road allows access to the pond for maintenance and inspections. The road has been constructed to follow the natural topography to the extent possible. Road width is approximately twelve (12) feet wide. The overall road grade is approximately 2.2 percent with a maximum pitch grade of 16.4 percent for a distance of 100 feet. Cross-sectional maps can be reviewed in the Engineering Section. The road will remain until reclamation.

R645-301-240 RECLAMATION PLAN

The following includes plans for redistribution of soils, use of soil nutrients and amendments and stabilization of the pond area.

R645-301-241 Soil Redistribution

The pond and access road areas will be recontoured to establish overland flow in all disturbed areas. Materials used to accomplish recontouring come from the dam, the subsoil pile, the pond sediment, and native topsoil. The materials used to construct the dam (approximately 13,166 cubic yard) will be used to fill the area along the steep cuts on the west side of the pond. Next, the ~~S~~subsoil (approximately 12, 714 cubic yards) from the subsoil storage area will be redistributed ~~and placed at the designated locations as indicated on Map 200-2~~ to develop the final contours as shown on Map 200-2 and maps in the Engineering Section. As mentioned in R645-301-224 Substitute Topsoil, ~~T~~the pond sediment material (approximately 3,146 cubic yards) will be used as a substitute ~~topsoil covering~~ B horizon and distributed over the fill ~~as backfilling and grading of~~ in the pond ~~is completed~~ area. The subsoil material (estimated at 5,500 cubic yards) cut from the topsoil salvage area will be redistributed evenly over the top of the pond sediment material and mixed using the ripper of the bulldozer. The native topsoil salvaged from the same area will be redistributed to serve as the substitute A horizon, bringing the reclaimed site to final grade. Map 200-2 illustrates a typical diagram of soil placement.

The pond access road will be regraded using a trackhoe to blend with the surrounding natural topography. ~~using~~ This will be accomplished utilizing the ~~existing~~ material which was side cast ~~used to~~ during the initial construction of the road.

Sediment Pond Area:

The sediment pond area (not including the access road) consists of a 4.6 acre area. This area will be contoured using the stored subsoil material and dam material. There is approximately 3,166 cubic yards of usable dam material (see discussion below) and 12,714 cubic yards of subsoil. Using ~~this~~ these materials and the remainder of the cut as outlined in R645-301-500: Engineering for recontouring totals approximately 32,12~~4~~3 cubic yards. Sediment pond fines and native topsoil (refer to Map 200-1 for soil sampling locations and Appendix B for sampling procedures and results) will be used as a final ~~substitute topsoil~~ covering (substitute A and B horizons) over the entire ~~4.6 acre site~~ soil distribution area. Total cover depth of ~~this cover~~ the A and B horizon is estimated at ~~7.2~~ 8.7 inches.

The dam consists of; 1) an outer armoring consisting of gravel, cobbles, and boulders (18" max. dia.), 2) an inner shell consisting of clay, silt, sand, gravel, and cobbles, and 3) an impervious liner between the outer armoring layer and inner shell consisting of severely weathered and decomposed shale. Dozers and trackhoes will be used to regrade this area and reestablish the natural

drainage. Reconstructed slopes will be placed on a 2H:1V or flatter configuration. Various sized rock and boulders will be place on prepared slopes and nested ~~into the material at~~ in random locations. Rock positioning will help provide a natural esthetic appearance ~~as well as slope containment.~~

Prior to excavating and redistributing the subsoil, the top one foot of the material will be stripped off and temporarily stored. The remainder of the subsoil will be excavated and redistributed as outlined in R645-301-241: Soil Redistribution, Table 5-1 and R645-301-553: Backfilling and Grading. Once excavation operations uncover native soil below the subsoil pile, and additional one foot will be excavated and redistributed. The stored substitute topsoil material will then be redistributed over the subsoil storage area and mix into the existing surface and pocked.

The drainage channel will be developed in its approximate original location. The channel bottom is Mancos shale bedrock and will not require riprap. The reconstructed channel will be morphologically similar to the segments above and below the disturbed area. The channel will be capable of handling a 100yr/6hr storm event (refer to the Hydrology Section for channel design).

Note on Map 200-2 that the disturbed boundary area will become ~~xxx~~ 0.13 acres larger at the completion of reclamation.

Access Road:

The main access road consists of approximately 2.27 acres of disturbed land. Final reclamation of the access road will include removal of concrete drainage controls (cross-mains). This material will be buried on-site and the natural drainage channels will be reestablished.

Because of the limited and dispersed nature of topsoil and vegetation in this area, recontouring of the slopes will be performed in a manner that will minimize additional disturbance. Fill slopes will be restored utilizing existing material that was used to construct the road. Minor cut slopes will be reshaped to blend with the natural contour of the area.

The major cut slopes located at stations 8+00 to 10+00 and 17+35 (refer to map #500-3 in the Engineering Section) will be left in place. These cut slopes are located in areas where similar slopes

occur naturally and reduction of the slopes would result in destruction of a significant amount of established vegetation. The area will be contoured and roughened by deep gouging and will model the existing topography.

R645-301-242.130 Erosion Control

Deep gouging or pocking will be used to control sediment at the Phase 3 area. These techniques require a track-hoe or similar machine to roughen the disturbed area in a random and discontinuous fashion using the bucket. Pockmarks created are approximately three (3) feet in diameter and one and one-half (1 ½) feet deep. The pockmarks are designed to capture or trap precipitation, promoting infiltration. Gouging serves to control erosion through water retention, thus enhancing vegetation growth. Because of the water retaining capabilities of deep gouging techniques, contribution of sediment above background levels are not expected. All exposed surfaces will be protected and stabilized as discussed in R645-301-300.

R645-301-243 Soil Nutrients and Amendments

Nutrients and soil amendments will be applied to the redistributed material when deemed necessary by assessment of the laboratory analyses. Laboratory analyses for the redistributed topsoil will be compared to soil samples collected from the undisturbed areas. Nutrients and amendments will be added, to make the redistributed soil similar to the undisturbed soils and aid in establishment of the vegetative cover. The nutrients can be added when hydroseeding or by broadcasting. If the nutrients and amendments are broadcast to the ground surface they will be intermixed with the soil during placement.

R645-301-244 Soil Stabilization

Various sized rocks and boulders (litter) will be randomly positioned throughout the Phase 3 Area and along the access road to enhance vegetation establishment, create micro habitats and to help provide natural esthetic 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 incorporated into the reclamation process to stabilize soil material.

R645-301-244.300 Rills and Gullies

Rills and gullies, which develop in areas that have been regraded and topsoiled and which either; 1) disrupts the approved postmining land use or the reestablishment of the vegetative cover, or 2) causes or contributes 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.

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C/015/0017, Task ID #2176

Deficiency Response to Appendix XVI: Phase 3 Reclamation Plan

Add R645-301-200: Soils Section Appendix B

Soil Sample Results

DES BEE DOVE SEDIMENT POND
SOIL SAMPLING RESULTS
SAMPLE DATE - MARCH 14, 2005

SAMPLE SITE ID	QC*	SAMPLE_ID	DEPTH (ft)	PH	SATURATION (%)	EC (mmhos/cm)	CA (meq/L)	MG (meq/L)	NA (meq/L)	SAR	COURSE FRAGMENTS (%)	SAND (%)	SILT (%)	CLAY (%)	TEXTURE	FIELD CAPACITY (%)	WILT POINT (%)	TOTAL SULFUR (%)	AB (t/1000t)	NP (t/1000t)	ABP (t/1000t)	BORON (ppm)	SELENIUM (ppm)
DBD105		DBD 0105	0-1	7.5	36.9	2.16	12.1	7.11	2.39	0.77	24.4	22	56	22	SILT LOAM	21.7	11.9	0.28	8.75	133	124	0.61	<0.02
DBD105		DBD 0205	1-2	7.2	39	4.47	17.5	19.8	13.9	3.23	60.7	26	52	22	SILT LOAM	21.3	13.2	0.35	10.9	139	128	0.78	0.02
DBD105		DBD 0305	2-3	7.5	38.3	6.93	16.3	25.5	38.9	8.51	60.5	28	48	24	LOAM	20.3	13.8	0.39	12.2	150	138	0.76	0.04
DBD105		DBD 0405	3-4	7.6	41.7	8.42	16.7	27.7	51.6	11	64	30	44	26	LOAM	21	14.9	0.39	12.2	159	147	0.81	0.04
DBD105		DBD 0505	4-5	7.4	46.1	7.16	14.3	20.9	42.8	10.2	67.3	30	44	26	LOAM	20.4	15.2	0.4	12.5	156	144	0.8	0.02
DBD105		DBD 0605	5-6	7.8	42	7.78	14.3	20.7	51	12.2	42.3	30	44	26	LOAM	21.2	15.8	0.37	11.6	158	146	0.87	0.02
DBD105		DBD 0705	6-7	7.6	39.8	7.69	13	16.9	41	10.6	46.8	30	44	26	LOAM	22.1	15.2	0.36	11.2	150	138	0.81	0.02
DBD105		DBD 0805	7-8	7.9	42.7	8.19	14.3	20.9	55	13.1	55.6	30	44	26	LOAM	21.9	14.7	0.29	9.06	151	142	0.67	0.02
DBD105		DBD 0905	8-9	8.1	42.8	9.11	12.6	20.7	59.4	14.6	61.5	28	46	26	LOAM	20.3	14.5	0.47	14.7	150	135	0.7	0.02
DBD105		DBD 1005	9-10	8	41.4	10.8	12.2	24.3	73.2	17.1	62	28	45	27	CLAY LOAM	21.7	15.4	0.54	16.9	152	135	0.64	0.02
DBD105		DBD 1105	10-11	7.9	39.4	9.69	12.7	21.4	69.5	16.8	70.1	28	46	26	LOAM	20.5	15.1	0.5	15.6	150	134	0.62	0.04
DBD105		DBD 1205	11-12	7.8	37.6	8.69	11.7	20.3	62.7	15.7	61	28	46	26	LOAM	21.2	14.2	0.49	15.3	149	133	0.64	0.06
DBD105		DBD 1305	12-13	7.9	37.2	10.6	12.9	26.3	76.4	17.3	54.9	34	41	25	LOAM	20.8	13.3	0.51	15.9	169	153	0.49	0.06
DBD105		DBD 1405	13-14	8.1	37.2	10.2	13.1	25.4	72	16.4	59.4	42	37	21	LOAM	21.2	12.4	0.41	12.8	184	171	0.57	0.06
DBD205		DBD 1505	0-1	7.3	35.1	1.94	12	5.83	0.93	0.31	32.6	24	52	24	SILT LOAM	21.9	12.8	0.3	9.37	140	131	0.52	<0.02
DBD205		DBD 1605	1-2	7.2	35.4	3.22	17.2	15.4	5.15	1.28	62.7	27	49	24	LOAM	22.8	13.1	0.38	11.9	145	133	0.61	0.02
DBD205		DBD 1705	2-3	7.6	37.3	5.56	15.7	19.3	26.7	6.4	53.8	27	46	27	CLAY LOAM	23	14.5	0.37	11.6	151	139	0.58	0.02
DBD205		DBD 1805	3-4	7.8	40	7.92	13.9	21.7	47.8	11.3	58.4	29	45	26	LOAM	23	14.1	0.48	15	156	141	0.66	0.02
DBD205		DBD 1905	4-5	7.9	39	9.69	15	27.9	66.1	14.3	65.6	34	40	26	LOAM	23.1	13.5	0.38	11.9	157	145	0.91	0.02
DBD205		DBD 2005	5-6	8	41.4	9.59	14	26.9	64.5	14.2	71.7	36	40	24	LOAM	22.6	13.8	0.48	15	157	142	0.96	0.02
DBD205		DBD 2105	6-7	8	40.2	8.59	14.6	24.3	61.4	13.9	72.2	33	41	26	LOAM	22.3	13.7	0.48	15	152	137	1.04	0.02
DBD205		DBD 2205	7-8	7.9	36.8	8.74	13.1	21.1	58.4	14.1	60.6	30	44	26	LOAM	21.5	13.3	0.51	15.9	151	135	1.04	0.04
DBD205		DBD 2305	8-9	7.9	36.7	9.79	14.6	21.6	65.6	15.4	51.6	31	43	26	LOAM	19.5	11.3	0.48	15	150	135	1.04	0.02
DBD205	D	DBD 2305	8-9	7.9	36.2	8.13	14.7	17.7	51.1	12.7		30	44	26	LOAM			0.48	15	150	135	0.79	0.04
DBD205		DBD 2405	9-10	8	37.1	10.8	15	24.9	76.1	17	63.4	30	45	25	LOAM	19	11.7	0.6	18.7	151	133	0.75	0.02
DBD205		DBD 2505	10-11	7.9	37.8	10.4	13.8	23	70	16.3	65.2	34	42	24	LOAM	19.3	11.6	0.44	13.7	156	142	0.61	0.02
DBD305		DBD 2605	0-2	7.6	47.3	6.56	18.2	16.3	33.4	8.02	18.6	19	53	28	SILTY CLAY LOAM	25.7	16.6	0.3	9.37	168	159	0.57	0.02
DBD305	D	DBD 2605	0-2	7.6	48	6.31	17.2	15.4	31.4	7.79		21	51	28	CLAY LOAM	25.2	15.5	0.3	9.37	168	159	0.54	0.02
DBD405		DBD 2705	0-2	7.6	50.7	4.47	17.7	12.8	16.7	4.27	12.8	20	50	30	CLAY LOAM	25.4	16.5	0.24	7.5	162	154	0.69	<0.02
DBD405	D	DBD 2705	0-2	7.6	50.9	4.29	17.3	12.6	16.5	4.27		22	48	30	CLAY LOAM	26.9	16.5	0.24	7.5	158	151	0.7	<0.02
DBD505		DBD 2805	0-2	7.5	32.8	2.69	19.9	7.73	3.19	0.86	30.6	53	28	19	SANDY LOAM	19.5	9.4	<0.01	0	567	567	0.39	<0.02

*D = DUPLICATE

SAMPLED BY: CHUCK SEMBORSKI AND DON SHURTZ

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500 Engineering (R645-301-500)

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R645-301-500 ENGINEERING

The material presented in the following sections of R645-301-500 Engineering, represent the minimum requirements for engineering information which will be included with this reclamation plan.

R645-301-510 INTRODUCTION

The Des-Bee-Dove pond is located below the reclaimed mine site in an unnamed canyon on the southern end of East Mountain. Because of limited space of the Des-Bee-Dove mine complex, the sediment pond was located away from the surface facilities area and placed at the mouth of the dry wash that drain the mine site. The pond was designed to collect runoff waters from a 10yr./24hr. storm event from the entire drainage area. The dam was constructed of native material found on site. It consists of; 1) an outer armoring consisting of gravel, cobbles, and boulders (18" max. dia.), 2) an inner shell consisting of clay, silt, sand, gravel, and cobbles, and 3) an impervious liner between the outer armoring layer and inner shell consisting of severely weathered and decomposed shale. Construction of the Des-Bee-Dove sedimentation pond was completed in April, 1980.

Subsoil was stored south of the pond along side the access road. This material will be used to recontour the pond area. A siltation structure remains to treat runoff off of the subsoil pile. This structure will be left in place until reclaimed.

The main access road consists of approximately 2.27 acres of disturbed land. Final reclamation of the access road will include removal of concrete drainage controls (cross-mains). This material will be buried on-site and the natural drainage channels will be reestablished.

R645-301-540 RECLAMATION PLAN

This section will address pertinent criteria for reclaiming the Phase 3 area.

R645-301-541 General

The surface area of the Des-Bee-Dove sediment pond area contains very few surface structures. These structures include a fence surrounding the pond, a concreted spillway, decanting structure, and concrete ditches that cross the access road. All structures will be dismantled and either removed from the area and disposed of off-site, or used as backfill on-site. Only concrete structures will be used as a backfilling material. The entire area will then be recontoured according to design and roughened by deep gouging.

R645-301-542 Narratives, Maps, and Plans

The reclamation plan for the sediment pond area includes procedures and a time table for each major step of the reclamation process. Maps that show the extent of the disturbed area, as well as, proposed final surface configurations are included for review. Table 5-1 establishes procedures for reclamation activities. Table 5-2 establishes a time table for each step in those procedures.

Table 5-1: Procedural Steps of Reclamation Time Table.

Reclamation Procedure	Task
1. Non-coal waste clean-up.	Remove and dispose of off-site all non-coal waste in and around the disturbed area.
2. Fencing Removal.	Remove and dispose of off-site all fencing that surrounds the pond area.
3. Remove drainage control structures in pond area.	Break-up and remove concrete spillway and bury on-site.

4. Backfilling and Grading. Materials will be handled as required by R645-301-242.100 through R645-301-242.130.	Material Usage in Pond Area Develop channel in pond area to its close approximate location as shown on Map 700-1. Channel will be excavated to bedrock eliminating the need for riprap. Contour area as designed (see maps 500-2 through 500-5) and utilize materials as outlined below. Native Topsoil Native topsoil will be salvaged from the area outlined on Map 200-1. The top 18" will be stripped and redistributed and utilized as the substitute A horizon Sediment in Pond The ~~Clean~~ sediment cleaned from the pond ~~and~~ will be ~~use as substitute topsoil material~~ redistributed over the subsoil material. ~~Material will be evaluated to determine acid/toxic characteristics prior to utilizing.~~ Volume of this material is approximately 3,146 cubic yards. The subsoil material excavated from the topsoil salvage area will be salvaged and redistributed over the sediment pond material. Boulders will be salvaged. The material will be mixed by ripping in two directions. The mixed material will act as a substitute B horizon. Subsoil Pile ~~Excavated this material and use in pond area for backfilling to recontour area.~~ Prior to excavating and redistributing the subsoil, the top one foot of the material will be stripped off and temporarily stored. The remainder of the subsoil will be excavated and redistributed as outlined in R645-301-241: Soil Redistribution, Table 5-1 and R645-301-553: Backfilling and Grading. Once excavation operations uncover native soil below the subsoil pile, and additional one foot will be excavated and redistributed. The stored substitute topsoil material will then be redistributed over the subsoil storage area and mix into the existing surface and pocked Volume of this material is approximately 12,714 cubic yards. If boulders exist in this pile, they will be salvaged and used as riprap. Dam Material Excavate boulder material and use in pond area for top covering material and riprap. The remainder of the dam material will be used as fill against the pond cut bank. The combined volume of this material is approximately 13,166 cubic yards. Recontour slope below sediment storage area to blend in with surrounding topography.

	Access Road Prior to backfilling, concrete ditches will be removed and disposed of on-site. The road will be backfilled and graded utilizing existing berms and material in fill areas of the road. Topsoil material was not stripped or stored on-site, therefore, fill will be distributed along the access road to resemble the surrounding environment to achieve approximate original contour and cut elimination. See Figure 5-1 on page 5-7. Sub-drainages will be replaced utilizing non-designed riprap channel bottoms.
5. Fill Compaction/Soil Stabilization.	Compaction will be applied as horizontal lifts of material are placed. Lifts are not to exceed specifications listed in RB&G's Slope Stability Analysis (refer to Appendix XIV Phase 1 Reclamation R645-301-500 Engineering Section : Appendix C). Final slope preparation (blending 2H:1V slope to the cutwall) will be accomplished with a track hoe. Large boulders will be removed to allow compaction in the separate lifts. Various sized rock and boulders will be placed on prepared slopes and nested into the material at random locations. Rock distribution will be positioned to help provide natural esthetic appearance ~~as well as slope containment~~. Overall reconstructed slopes will be placed on a 2H:1V or flatter configuration (refer to Map 500-3).
6. Reestablishment of Minor Drainages	Pond Area Two minor drainages will be reestablished in the pond area: 1) drainage area off the sediment storage area north of the pond, and 2) minor drainage east of pond. 1) Construction of this drainage will involve restoring to a v-shaped channel. Bottom of channel will be lined with 6"-minus riprap at least 1' in depth. Riprap will be covered with at least 6" of soil. Channel will merge into main channel. Refer to Map 500-3. 2) Construction of this drainage will involve restoring to a v-shaped channel over fill area. Bottom of channel will be lined with 6"-minus riprap at least 1' in depth. Riprap will be covered with at least 6" of soil. Channel will merge into main channel. Refer to Map 500-3.

Reestablishment of Major Drainage	Main drainage will be placed in its approximate original location. Drainage will be excavated to bedrock which will eliminate the need for riprap. Toe of slopes will be armored with boulders and covered with soil to protect against bank erosion. Channel bottom width will mimic channel bottom width above and below disturbed area. Refer to R645-301-700: Hydrology for channel design. If an instant occurs that the bedrock does not exist in the channel bottom, these areas will be riprapped as outlined in R645-301-700: Hydrology.
7. Seed Area (refer to Biology Section)	Seeding will be conducted contemporaneously with items 5, 6 and 7 (refer to R645-301-300 for seed mixture). Pocking techniques will be used to control erosion from occurring on the slopes. The seed mixture will be broadcast using a "hurricane spreader" or applied using a hydro seeder. If the seed mixture is broadcast, the area in question will be seeded immediately prior to hydro mulching. If the seed mixture is hydro seeded, a small amount of wood fiber mulch will be added to mark the area of coverage during application. After seeding, the entire area will be hydro-sprayed with a wood fiber or other acceptable mulch and will be applied at a rate of at least 2000 lbs./acre. A tackifier (plantago or other similar tackifier) will be added to the mulch and applied at a rate recommended by the manufacture. Mulch and tackifier will be applied simultaneously
8. Fugitive Dust	Traffic control measures will be implemented to regulate traffic speeds to ten (10) miles per hour maximum within the construction and road haulage areas. Fugitive dust will be controlled by spraying construction roadways with water on an as needed basis.

Table 5-2. Reclamation Schedule

Activity	Month							
	1				2			
1. Remove Non-Coal Waste								
2. Backfill/Grading								
3. Reestablishment of Drainage								
4. Seed Area								
5. Hydromulch								

R645-301-542.800 Reclamation Costs

Reclamation costs associated with the pond have not been recalculated since a substantial portion of the current reclamation bond includes costs for reclaiming the haul road (EC#412). These individual costs are no longer appropriate.

R645-301-550 RECLAMATION DESIGN CRITERIA AND PLANS

Backfilling and grading will be conducted as outlined on maps 500-2 through 500-5. Channel construction will follow the design procedures outlined in R645-301-700: Hydrology. Sedimentation from the main mine disturbed (final reclamation completed June 2003) has been modeled using RUSLE to justify the removal of the sediment pond (refer to Appendix XIV, R645-301-700: Hydrology).

R645-301-552 Permanent Features

All reclaimed slopes will be roughened by deep gouging and will model the surrounding topography. Pocks are constructed to retain moisture, minimize erosion and create and enhance wildlife habitat.

If available, various sized boulders will be randomly placed on prepared slopes to help provide a natural esthetic appearance ~~as well as slope containment~~. Rock piles will be constructed and randomly placed throughout the reclaimed site to create habitat for small mammals.

R645-301-553 Backfilling and Grading

Backfilling and grading processes in the pond area will utilize existing material. No importation will be required. Prior to and backfilling and grading, large boulders from the

dam surface will be segregated and stored for use on slopes or as riprap. The material that was stored on the bank of the pond during previous cleaning operations will be moved to allow for backfilling of the dam and subsoil material. ~~The sediment in the pond consists of approximately 3,146 cubic yards (1.95 ac. ft). This material will be has been sampled to identify if it qualifies for a substitute topsoil material for the pond area. If usable, This material will be segregated and stored in a location that does not interfere with reclamation activities . The substitute topsoil material will be placed as backfilling and grading is completed. If it is determined that the material is not a suitable substitute topsoil material, it will be used as fill and the stored subsoil will be used as the topsoil layer.~~

~~There is approximately 12,714 cubic yards of subsoil material that will be used to fill the cut of the pond. The dam material consists of approximately 13,166 cubic yards of usable backfill material. Approximately 30% of this material is boulders. The boulders will be segregated and stored in a location that does not interfere with reclamation activities. The mass balance on map 500-3 shows approximately 19,410 cubic yards of cut and 31,544 cubic yards of fill. With the addition of 12, 714 cubic yards of stored subsoil material, there will be approximately 580 cubic yards of excess material. This material will be evenly blended into the pond area during recontouring.~~

~~Large boulders from the dam material will be segregated and used as channel side slope armoring. Excess boulders will be randomly placed on the regraded slopes to provide a natural esthetic appearance as well as slope containment. Overall reconstructed slopes will be placed on a 2H:1V of flatter configuration. Slope stability will be achieved based on the results of the Phase 1 Reclamation Project (refer to Appendix XIV, Phase 1 Reclamation Plan).~~

The dam material consists of approximately 13,166 cubic yards of usable backfill material. Approximately 30% of this material is boulders. The boulders will be segregated and stored in a location that does not interfere with reclamation activities. The remainder of the material will be used initially to backfill the pond area.

There is approximately 12,714 cubic yards of subsoil material that will be used to fill the cut of the pond. As mentioned above and in the Soils Section, the top one foot will be stripped off and temporarily stored for use as a substitute topsoil in this area. The remainder of this material will be over-excavated one foot into the native and redistributed using a dozer or other similar equipment. Overall reconstructed slopes will be placed on a 2H:1V of flatter configuration. Slope stability will be achieved based on the results of the Phase 1 Reclamation Project (refer to Appendix XIV, Phase 1 Reclamation Plan).

Topsoil will be excavated from the area shown on Map 200-1. This material will be temporarily stored out of the way of the reclamation activities for future use. The segregated sediment pond material will then be evenly redistributed over the fill to a depth of 7.2 inches.

The area where the topsoil was removed will then be regraded as shown on the cross-sections of Map 500-2. Large boulder from this area will be segregated out. The material excavated from this area will be redistributed over sediment pond material. A dozer will rip this material into the sediment pond material in two directions to mix the two materials together.

As a final covering, the stored topsoil material will be redistributed over the entire regraded site. Large boulders, segregated from the dam and topsoil salvage area, will be placed randomly to provide a natural esthetic appearance. The substitute topsoil will also be redistributed over the area of the subsoil storage and mixed into the native soil.

The channel will be constructed on bedrock. No riprap channel bottom or filter will be required. As mentioned above, channel side slopes will be protected using boulders segregated from the dam. Only the side slope of the outside radius of the channel will require protection since higher flow rates will occur here. Protection will be used on both sides of the channel in straighter sections if sufficient material exists. A 0.5 foot freeboard will be included in the channel design. See R645-301-700: Hydrology for channel design.

Backfilling and grading along the access road will utilize the existing material used in the construction of the road. Fill acquired from below the road will be transferred (refer to Figure 5-1) to the road cut with a track-hoe. The access road is approximately 4000 feet long and covers 2.27 acres of disturbance.

Compaction to the fill slopes will be applied as horizontal lifts. Lifts are not to exceed specifications listed in Stability Analysis Report in Appendix XIV, Phase 1 Reclamation Project. Fill slopes will be constructed at 2H:1V or flatter. If available, various sized boulders will be randomly placed on prepared slopes to help provide a natural esthetic appearance as well as slope containment. Rock piles will be randomly placed to create habitat for small mammals. The reclaimed slopes will be roughened by deep gouging and will model the surrounding topography.

Minor channels passing through the access road area will be armored with rock to provide protection against erosion. The rock will then be covered with soil to provide a growth medium for a vegetative cover. Minor channel construction will mimic the contour of the channel above and below the disturbed area.

R645-301-553.110 Approximate Original Contour

All cut and fill slopes of the Des-Bee-Dove sediment pond and access road areas will comply with the AOC provisions as outlined in the Utah Coal Regulations R645-301-553.100 through R645-301-553.150. The main drainage channel will be reconstructed in the approximate location that it was located prior to mining and reclamation activities. All designs follow prudent engineering design practices.

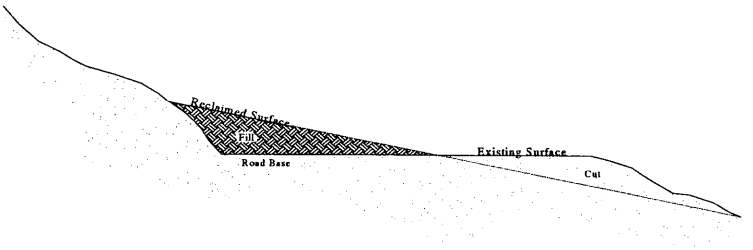

Figure 5-1: Typical Cross-Section
Sediment Pond Access Road

R645-301-553-130 Slope Safety

All reclaimed slopes will be constructed to obtain a safety factor of 1.3. Compaction to the fill slopes will be applied as horizontal lifts. Lifts are not to exceed specifications listed in Stability Analysis Report in Appendix XIV, Phase 1 Reclamation Project. Fill slopes will be constructed at 2H:1V or flatter. Using this slope construction method, as recommended in the Stability Analysis Report, will result in the achievement of a factor of safety of at least 1.3.

R645-301-560 PERFORMANCE STANDARDS

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

PacifiCorp

Energy West Mining Company

Des Bee Dove Mine

C/015/0017, Task ID #2176

Deficiency Response to Appendix XVI: Phase 3 Reclamation Plan

Replace R645-301-700: Hydrology Section

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DES-BEE-DOVE MINE
PHASE 3
RECLAMATION PLAN
C/015/017

700 Hydrology (R645-301-700)

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R645-301-700 HYDROLOGY

The material presented in the following sections of R645-301-700 Hydrology, represent the minimum requirements for engineering information which will be included with this reclamation plan

R645-301-710. INTRODUCTION

The Des-Bee-Dove pond is located below the reclaimed mine site in an unnamed canyon which contributes to the Grimes Wash. Construction of the sedimentation pond was completed in April, 1980. The pond was designed and built to impound the runoff from a 10yr/24hr storm event. The capacity of the pond is 19.8 ac. ft. (2 ac. ft. for sediment and 17.8 ac.ft. for runoff) and contains sediment from not only the disturbed area but also from a large undisturbed area between the main mine site and the sediment pond. Most sediment that reaches the sediment pond originates from the undisturbed Mancos Shale slopes above the pond.

Reclamation of the pond will reestablish the drainage in its approximate original location. Minor drainages will be recontoured to allow overland flow from above the disturbed areas to flow freely into the main channel. These drainages will be rock armored (if needed) to protect against erosion, covered with soil and vegetated.

All hydrologic information for the Des-Bee-Dove mine site can be reviewed in Appendix XIV (Phase 1 Reclamation Plan) and Appendix XV (Phase 2 Reclamation Plan). These references contain detailed hydrologic information that include; surface and ground water information, climatological information, PHC determinations, etc. of the Des-Bee-Dove mine site and surrounding area. The disturbed area of the sediment pond and access road consists of approximately 6.9 acres.

Justification to reclaim the pond prior to the establishment of vegetation has been conducted through the use of the Revised Universal Soil Loss Equation (RUSLE). RUSLE is a set of mathematical equations that estimate soil losses and sediment yields resulting from rill and interrill erosion. Sediment loss and sediment yield was compared for both the undisturbed and disturbed areas at the Des-Bee-Dove mine site. The model shows that by utilizing deep gouging techniques during recontouring operations along with broad employment of mulches and tackifiers, erosion is controlled to a point that runoff is minimized and does not contribute additional sediment to stream flow above the background levels. Refer to Appendix XIV, Phase 1 Reclamation Plan for details.

R645-301-112 Certification

All reclamation cross-sections, maps and plans required by R645-301-722 as appropriate, and R645-301-731.700 will be prepared and certified according to R645-301-512.

R645-301-720 ENVIRONMENTAL DESCRIPTION

R645-301-721 General Requirements

The existing pre-mining hydrologic resource of the East Mountain property is detailed in Volume 9 - Hydrologic Section. The following section will discuss the hydrologic resources pertinent to the Des-Bee-Dove Phase 3 Reclamation Area.

A. Existing Groundwater Resources

1. Groundwater Resources
2. Post Mine Gravity Discharge

B. Existing Surface Resources

1. Surface Water Resources
2. Surface Water Quality

A. **Existing Groundwater Resources**

1. Groundwater Resources

The characteristics and usefulness of a groundwater resource are dependent upon the geology of the water-bearing strata and on the geology and hydrology of the recharge area. Groundwater movement and storage characteristics are dependent on the characteristics of the substratum. To facilitate an understanding of groundwater of the East Mountain property including the Des-Bee-Dove Mines refer to Volume 9 - Hydrologic Section for a complete discussion of pertinent regional hydrologic and geologic features.

No groundwater resources have been documented associated with the Des-Bee-Dove Phase 3 Reclamation Area.

2. Post Mine Gravity Discharge

As discussed previously, the Des-Bee-Dove Mine area is one of the oldest developments within the region. The strata east of the Deer Creek Canyon fault (separates Wilberg/Deer Creek from the Des-Bee-Dove operations) are dry. Post mine gravity discharge will not occur at the Des-Bee-Dove breakouts that could potentially impact the reclamation of the Phase 3 area.

B. Existing Surface Water Resources

1. Surface Water Resources

The PacifiCorp permit area including the Des-Bee-Dove Mine area is located in the headwater region of the San Rafael River Basin. The surface drainage system of the Des-Bee-Dove Mine area is confined exclusively to the Cottonwood Canyon Creek drainage system (refer to Vol. 9 - Hydrologic Section: Map HM-1). For a complete discussion of the surface water systems of the East Mountain property including the Des-Bee-Dove Mine area refer to Volume 9 - Hydrologic Section.

The Des-Bee-Dove Mine Phase 3 reclamation area consists of approximately 6.9 acres located on a south to southeast facing slope in an un-named canyon which reports to the Grimes Wash drainage. Surface flow prior to any mine development consisted of sheet flow downslope, intersecting the un-named wash which bisected mine development area. As part of the Beehive/Little Dove breakouts development, all undisturbed runoff was diverted away from the main mine facility to the undisturbed drainage through the use of berms, ditches, and culverts. Drainage, both undisturbed and disturbed, reported to the natural drainage below the tipple pad which flowed to the sediment pond.

As of June 2003, final reclamation has been completed and sheet flow returned on the main mine area of the Little Dove/Beehive Mine area (Phase 1 Area), and Deseret Mine area (Phase 2 Area). The reclamation plan for each area is found in Appendix XIV and Appendix XV of the Des-Bee-Dove MRP.

2. Surface Water Quality

As discussed above, water from the portal terrace disturbed area was diverted through a culvert which reported to the sediment pond located below the mine site. Flow from the un-named drainage of the Des-Bee-Dove area is ephemeral and is normally restricted to storm events. Runoff from the entire area, including disturbed and undisturbed areas, flows to the sediment pond. Discharge from the sediment pond is very infrequent.

R645-301-723 Sampling and Analysis

Water quality sampling and analysis of samples collected by PacifiCorp will be conducted according to the "Standard Methods for the Examination of Water and Wastewater." However, at the completion of the Phase 3 reclamation, the permitted UPDES discharge point (UTG040022) will be eliminated. Future monitoring of the site will be determined after appropriate consultation with local, state, and federal agencies.

R645-301-724 Baseline Information

PacifiCorp maintains an extensive groundwater and surface monitoring program to characterize pre-mining and any mining-related impacts both to quality and quantity (refer to Volume 9 - Hydrologic Section, for baseline information collected in and adjacent to the East Mountain property). As an integral part of the permit application, an annual Hydrologic Monitoring Report is prepared by PacifiCorp and submitted to appropriate government agencies.

R645-301-724.100 Groundwater Information

No groundwater resources have been documented in or near the Des-Bee-Dove Phase 3 Reclamation area.

R645-301-724.200 Surface Water Information

A detailed description of all surface water bodies, i.e., streams and lakes, including quality, quantity, and usage is given in section R645-301-711 of Volume 9 - Hydrologic Section.

R645-301-724.300 Geologic Information

Applicable geologic information can be reviewed in the Geologic Section (R645-301-600).

R645-301-724.400 Climatological Information

PacifiCorp operates a network of weather stations, including two at low elevations (Hunter and Huntington power plants) and two at high elevations (Electric Lake and East Mountain). Refer to Volume 9 - Hydrologic Section, and the Annual Hydrologic Reports for a complete climatological description of the East Mountain permit area.

R645-301-725 Baseline Cumulative Impact Area Information

Hydrologic and geologic data required to assess the probable cumulative impacts of the coal mining and reclamation activities are presented in the Hydrologic (including the Annual Hydrologic reports), Operational, and Reclamation sections of the permit applications.

R645-301-728 Probable Hydrologic Consequences Determination

Probable hydrologic consequence (PHC) determinations are based on extensive investigations conducted to determine existing groundwater and surface water resources, along with ongoing hydrologic research and comprehensive monitoring programs including hydrology and subsidence. Data utilized to arrive at the conclusions presented in this section were discussed earlier, and specific information pertaining to impacts to the hydrologic balance will be discussed under the appropriate sections.

Description of the Mining Operation

Mining occurred at the Des-Bee-Dove mining area from 1890 through 1987. The Des-Bee-Dove mines were a room and pillar operation mining from both the Hiawatha and Blind Canyon seams (refer to Des-Bee-Dove MRP, Volume 2 Part 3 for complete details).

Geology

A detailed description of the geology (structure and stratigraphy) has been presented in a previous section and will not be duplicated here. (Refer to Appendix XIV or XV, R645-301-600 Geology).

Surface Water System

A detailed description of the regional and permit area surface water resources has been presented previously. In general, the surface drainage system of the Des-Bee-Dove mine area is within the an un-named drainage which reports to Grimes Wash.

Impacts to surface water due to the reclamation of the Des-Bee-Dove Phase 3 Reclamation area will be minor, both in terms of quality and quantity. A detailed analysis of the associated impacts is described in the Hydrologic Balance section below.

Hydrologic Balance - Surface Water System

As mentioned previously in this report, the drainage conveying runoff away from the Des-Bee-Dove Phase 3 Reclamation area is an un-named drainage which reports to Grimes Wash, a tributary of Cottonwood Creek. Protection of the hydrologic balance from additional contribution of sediment solids will be addressed in the Mitigation and Control Plan discussed below.

Mitigation and Control Plans

Sediment control measures will be implemented on the disturbed area to minimize additional contributions of sediment solids to the receiving drainage. Sediment control will include; surface contour manipulation (rough gouging), rock litter utilization (various sized rock and boulders will be randomly positioned throughout the reclaimed area to enhance vegetation establishment, create micro habitats, ~~provide slope containment~~ and to help provide natural esthetic appearance), and soil stabilization additives (alfalfa mulch, soil tackifer and bonding agents). During routine monitoring (regular monitoring for environmental compliance conducted on a monthly basis and special monitoring during and after precipitation events), if erosion is identified silt fences will be installed and the surface will be enhanced and seeded if necessary.

Hydrologic Balance - Groundwater

As discussed in previous sections, no groundwater sources have been documented and post mine gravity discharge will not occur.

Mitigation

Due to the lack of groundwater resources a mitigation plan is not necessary for the Des-Bee-Dove Phase 3 Reclamation area.

R645-301-729 Cumulative Hydrologic Impact Assessment

The Division will provide an assessment of the probable cumulative hydrologic impacts (CHIA) of the proposed coal mining and reclamation operation and all anticipated coal mining and reclamation operations upon surface and groundwater systems in the cumulative impact area.

R645-301-730 OPERATION PLAN

Historically the Des-Bee-Dove sediment pond has been used to contain sediment from the mine site disturbed areas. The pond has an associated discharge (although discharge was rare) that is regulated through the Utah Pollution Discharge Elimination System (UPDES) and administered by the Utah Division of Water Quality. This discharge point is monitored monthly of the water quality parameters required by the State. These parameters are outlined in the mine's UPDES permit. Monitoring of this discharge point will be conducted as required until it is approved by the Division of Water Quality that the site be eliminated. PacifiCorp will promptly notify the Division by letter informing them of this elimination.

Water Monitoring Location Map: refer to Vol. 9 - Hydrologic Section: Map HM-1.

R645-301-731 General Requirements

This section contains plans to minimize disturbance to the hydrologic balance, to prevent material damage, and to support approved post-mining land use.

R645-301-731.100 Hydrologic Balance Protection

Groundwater Protection

Although the analysis of the overburden samples tested has shown that no toxic or hazardous materials are present, groundwater quality will be protected by handling earth materials and runoff in a manner that minimizes infiltration to the groundwater system. Two exceptions are anticipated to this generalization as part of the reclamation plan including 1) the allowance for ponding and retention of water within disturbed areas during the reclamation construction period to help control runoff and protect downstream quality, and 2) the potential construction of small pools within reclaimed channel sections. These issues will be discussed further in Section R645-301-760.

Surface Water Protection

Surface water quality will be protected by handling earth materials, groundwater discharges, and runoff in a manner that minimizes the potential for pollution.

R645-301-731.200 Water Monitoring

Groundwater

Due to the lack groundwater resources no groundwater plan is necessary for the Des-Bee-Dove Phase 3 Reclamation area.

Surface Water

PacifiCorp has conducted baseline monitoring of surface waters within and adjacent to the Des-Bee-Dove Mine Phase 3 Reclamation area (refer to Annual Hydrologic Monitoring Reports). Long-term monitoring sites in Grimes Wash area have been monitored quarterly since 1979. Monitoring equipment, structures used in conjunction with monitoring the quality and quantity of surface water on-site and off-site will be properly installed, maintained, operated, and will be removed by PacifiCorp when approved by the Division.

Surface water will be monitored and data will be submitted at least every three months for each monitoring location. Monitoring submittals will include analytical results from each sample taken during the quarter. When the analysis of any surface water sample indicates noncompliance with the permit conditions, PacifiCorp will promptly notify the Division and immediately take actions provided for in R645-300-145 and R645-301-731.

For point source discharges, monitoring will be conducted in accordance with 40 CFR Parts 122 and 123, R645-301-751 and as required by the Utah Division of ~~Environmental Health~~ Water Quality for the ~~National~~ Utah Pollutant Discharge Elimination System permit until removal of the pond is complete. The sediment pond discharge is the only point source that will be affected. This point source will be eliminated with the removal of the pond. PacifiCorp will notify the Division of Water Quality in writing when this site has been eliminated. PacifiCorp will then notify the Division of Oil, Gas, and Mining when permission is granted to eliminate monitoring from this site.

R645-301-731.300 Acid and Toxic-Forming Materials

Analysis of the overburden samples tested has shown that no toxic or hazardous materials are present (refer to R645-301-600 Geology Section, Volume XIV Phase 1 Reclamation for analytical results). Sampling of the pond sediment will be conduct prior to placement of this material (see detailed sampling information in R645-301-200: Soils). Should this material be found to be acid and/or toxic, it will be buried on-site or hauled to the waste rock site for disposal.

R645-301-731.500 Discharges

Refer to UPDES information in Appendix B in Vol. 9 - Hydrologic Section of the Des-Bee-Dove Mine MRP. No post-mining discharges are planned within the Phase 3 area.

R645-301-731.600 Stream Buffer Zones

The Des-Bee-Dove Mine Phase 3 Reclamation area is located within 100 feet of an un-named drainage which reports to Grimes Wash. Based on data collected by PacifiCorp, the un-named drainage as well as Grimes Wash are ephemeral (refer to Volume 9 Hydrologic Section). Flow in the un-named drainage is extremely rare and short lived. Buffer zones will not be required.

R645-301-731.800 Water Rights and Replacement

No water rights will be affected by the reclamation activities conducted at the Des-Bee-Dove sediment pond.

R645-301-732 thru R645-301-764 Sediment Control

Sediment control and sediment control measures will be developed to comply with the Utah Coal Regulations R645-301-732 through R645-301-764. Plans are presented and discussed in more detail in the following sections.

R645-301-750 PERFORMANCE STANDARDS

R645-301-751 Water Quality Standards and Effluent Limitations

Discharges if any, 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 EPA set forth in 40CFR Part 434 (refer to Vol. 9 - Hydrologic Section). No post-mining discharges are planned within the Phase 3 area.

R645-301-752 Sediment Control Measures

Sediment transport will be controlled by the use of basins, traps, straw bales, etc. during the construction phase of reclamation. When reclamation is complete, pocking (roughening) of the surface material, as described in R645-301-500, will be the only form of control on the reclaimed site. The contractor will also be directed to develop a construction plan during reclamation that maximizes sediment control. Straw bales will be placed within the stream channel below the reclamation area to reduce the potential for off-site impact. The bales will be removed at the completion of all reclamation activities.

Sediment Loss

Sediment loss predictions were calculated using RUSLE ver. 1.06 to determine if reclamation practices would cause or contribute to the degradation of downstream water quality. RUSLE is a set of mathematical equations that estimates soil loss and sediment yield resulting from rill and interrill erosion. Sediment loss and sediment yield was compared for both the undisturbed and disturbed areas at the Des-Bee-Dove mine site. A map showing the location of the hillslope profiles is provided in Appendix XIV Phase 1 Reclamation Plan R645-301-700: Hydrology, Appendix B. A 3.5 inch floppy disk containing all the input parameters used in calculating sediment loss is also provided in Appendix B of the Phase 1 plan. Sediment loss from the Phase 3 area is negligible with respect to the Phase 1 and Phase 2 areas.

R645-301-760 RECLAMATION PLAN

Before abandoning the Des-Bee-Dove mine Phase 3 area or seeking bond release, PacifiCorp will ensure that all temporary hydrologic structures are removed and reclaimed.

R645-301-762 Roads

The pond access road will be reclaimed throughout the entire length and blended in the surrounding area as shown in the typical cross-section of Figure 5-1. The natural drainages which cross the existing road will be dimensioned to mimic the drainage immediately above and below the reclaimed area. No designed drainage system will be necessary as these areas are secondary ephemeral drainages. However, to control flow, these drainages will be graded to channel flow during a storm event and riprapped to protect against erosion. Riprap material will be sized to 6" minus. The channel bottom will be covered with soil and seeded to encourage plant growth and sedimentation.

R645-301-762.100 Restoration of Natural Drainage Patterns

Cut and fill slopes will be reshaped to be compatible with the post mining land use and to complement the drainage pattern of the surrounding area. The main channel and minor drainages within the sediment pond and access road area will be restored to their approximate original locations. The main channel will be designed using prudent engineering design techniques.

Channel Design

Discharge Methodologies

Before channel design can begin, peak runoff flows must be determined. Runoff depth resulting from a given rainfall event was determined utilizing the United States Soil Conservation Service (SCS) methods. 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 (inches)
CN = Curve Number

Determination of runoff from Equation 1 is only valid when $P \geq 0.2S$. Below this point, no runoff can occur.

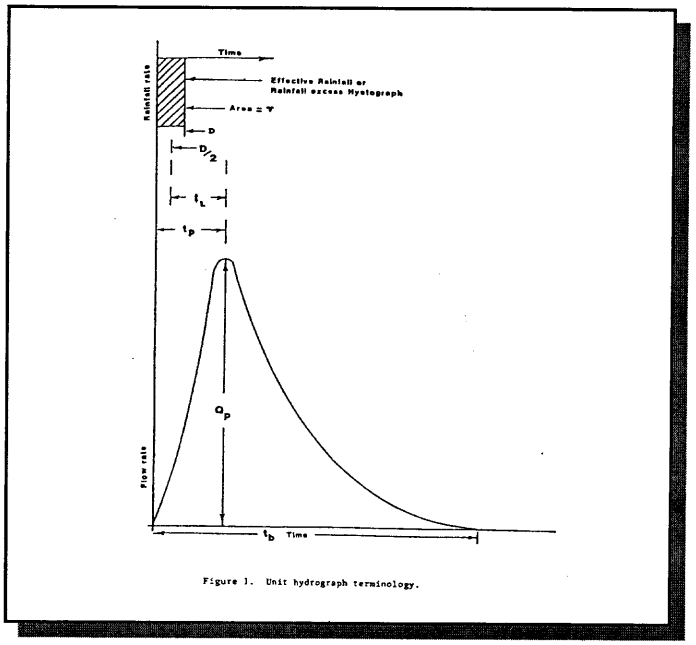


Figure 1. Unit hydrograph terminology.

Estimates of the peak discharge were made using the unit hydrograph procedure developed by the SCS. Figure 7-1 shows a runoff hydrograph and the associated terminology.

Use of Equations 1 and 2 require the selection of a curve number, which is a function of vegetative cover, hydrologic soil groups, and Antecedent Moisture Conditions (AMC). Curve number information for the area was taken from previous permitting efforts including the Phase 1 and Phase 2 reclamation plans. These curve numbers were based upon information found using Table 7-1 of the SCS National Engineering Handbook (1972), Section 4, Chapter 7. Vegetation information contained in the MRP indicates that the cover type is Pinyon-Juniper with approximately 20% ground cover density. Figure 7-2, also obtained from the SCS handbook, illustrates the relationship of curve number to ground cover density for a Juniper-Grass complex.

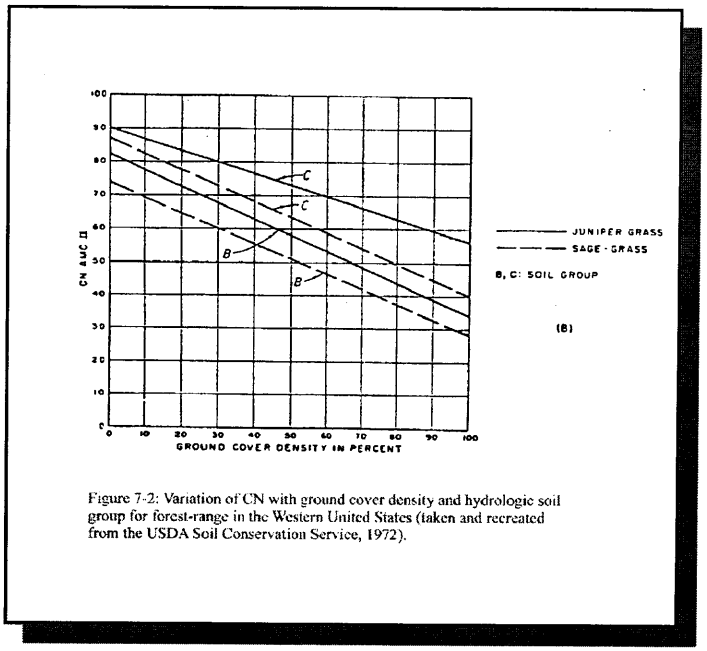


Figure 7-2: Variation of CN with ground cover density and hydrologic soil group for forest-range in the Western United States (taken and recreated from the USDA Soil Conservation Service, 1972).

The P value was determined using the NOAA Atlas 2, Volume VI-Utah, Precipitation - Frequency Atlas of the Western United States (1973). This value was found to be 2.2 inches for the designed 100 year / 6 hour storm event. The P value was adjusted based on a recorded event of 2.5 inches (August 12 ,

1983 - East Mountain Weather Station).

A hyetograph of a single block of rainfall excess with duration D is shown in the upper portion of Figure 7-1. The lower portion of the figure contains the resultant runoff hydrograph. For runoff from excess rainfall, the area under the hydrographic curve and the area enclosed by the rainfall hyetograph represent the same volume of water Q. The peak flow rate for the hydrograph is represented by Q_p. The base time t_b is the duration of the hydrograph. The time from the center of mass of rainfall excess to the peak of the runoff hydrograph is the lag time t_L. The time of concentration t_c, (not shown on Figure 7-1) is defined as the time required for flow from the hydraulically most remote point in a basin to reach the basin outlet.

The time to peak t_p, is assumed to be a function of watershed lag t_L, which is determined according to the equation:

$$t_L = \frac{l^{0.8}(S+1)^{0.7}}{1900\sqrt{Y}} \qquad (3)$$

Where,

t_L = watershed lag time (hrs.)
l = hydraulic length of the main stream to the farthest divide (ft)
Y = Average watershed slope (%)

and S is as previously defined. Values of Y and hydraulic length were obtained using previous hydrologic information related to the mine area as included within the existing permit and USGS topographic mapping as shown in the calculations included within Appendix A. A value for S was determined from Equation 2 once the curve number had been estimated.

According to the SCS, the watershed lag time is equal to $0.6t_c$ and the time of concentration t_c is equal to $1.5t_p$. By combining these two expressions, it can be seen that:

$$t_p = 1.11t_L \qquad (4)$$

where both variables are as previously defined.

The peak discharge constant used in the dimensionless unit hydrograph method is determined according to the equation:

$$q_p = \frac{484AQ}{t_p} \qquad (5)$$

Where,

q_p = unit hydrograph peak flow rate (cfs)
A = drainage area (sq. mi.)
Q = runoff depth (Equation 1)
484 = conversion factor

and t_p is as previously defined in hours.

The drainage area and hydraulic length for the Phase 3 area (refer to Volume 5, Appendix VII) is approximately 0.47 square miles or 297.7 acres and 7200 feet respectively.

For modeling, the hydrograph for the 100yr/6hr storm event was prepared using STORM 6.21 Curve Number Runoff software developed by the Office of Surface Mining. The storm hydrograph has been included in Appendix A of this chapter and enlists a flow of 152.2 cfs. The channel dimensions utilized employs the information gathered from this hydrograph. For safety purposes, however, a flow of 200 cfs will be used. See Appendix ~~A~~ B for all channel design calculations.

Open Channel Design

Open channel design is achieved by the use of on-site investigations to mimic the existing conditions of the channel above and below the area of the channel portion to be reclaimed. Flowmaster (ver. 3.21) is then used to size the reclaim channel utilizing the Manning's Equation for open channel flow.

The idea during channel design was to determine appropriate channel parameters by taking in account the natural dimensions of the channel. First, site investigations were conducted of the undisturbed channel above and below the reclaim site. Map 700-1 show the locations where profiles were taken. Appendix B presents the cross-sections of the upper and lower sections that were measured. The dimensions of the channel above shows a total width of approximately 15.0' and depth of 2.5'. The bottom width is approximately 2.5'. The channel section below measures approximately 35.0' wide x 8.5' deep. Bottom width is approximately 12.0'.

Trapezoidal channel design results are included in Appendix B for above, below, and for the designed channel. The above and below channel was evaluated using the measured dimensions to find depth of flow. Calculation were made using the average depth of the above and below channel sections to find the bottom width for the designed channel. Table 7-1 summerizes the channel dimensions and expected flow characteristics of the Phase 3 reclaimed channel along with the results of the channel sections above and below. The channel bottom will use the existing bedrock, therefore, no riprap bottom will

be needed. If a need arises to riprap portions of the channel bottom, riprap will be sized according to Table 7-2. Filter material will consist of 1" minus washed gravel material where ~~75%~~ 50% of the filter will be 1", 25% will be ½", and 25% will be ¼"in size.

Table 7-1: Table summarizing the designed watershed drainage channel for Phase 3 Reclamation.

Channel Section	Channel Slope	Bottom Width	Left Side Slope	Right Side Slope	Flow Depth (ft)	Mannings n	Flow Area (ft^2)	Wetted Parameter (ft)	Velocity (ft/sec)	Froude Number	Calc'ed D_{50}	Channel Depth
Channel through Pond Area - Excavated to Bedrock: 200 cfs												
Above	0.06	3.0	2.4:1	0.9:1	1.87	0.35	11.37	10.37	17.59	2.78	N/A	N/A
Below	0.06	12.0	1.8:1	1.4:1	1.5	0.45	21.62	17.67	9.25	1.44	N/A	N/A
Designed	0.06	6.63	2:1	2:1	1.7	0.35	17.05	14.23	11.73	1.84	2.75*	2.75

* The D_{50} calculation is used to design armored side slopes for protection against erosion. Refer to Factor of Safety calculations below. If channel bottom requires riprap, D_{50} will be consistent with the armored side slopes.

As illustrated by the results on Table 7-1, the bottom width of the designed channel is 6.63 feet with a 1.7 foot flow depth. The actual design will incorporate dimensions of side slopes of 2 horizontal and 1 vertical, a bottom width of 7.0 feet and a maximum protected channel depth of 2.75 feet. Channel bank protection is in the form of boulder riprap. This armored protection will be placed on the inlet and outlet ends of the designed channel as well as along the outside radius of the channel.

Map 500-5 and 700-1 presents final contours of the pond area. The area nearly mimics the pre-existing contour configuration and channel location. Figure 7-3 illustrates the typical design of the drainage cross-section that will be used to construct the channel. Typical channel side slopes will be constructed with rock riprap and lined to protect against slope erosion and failure. No filter material will be used on the side slopes.

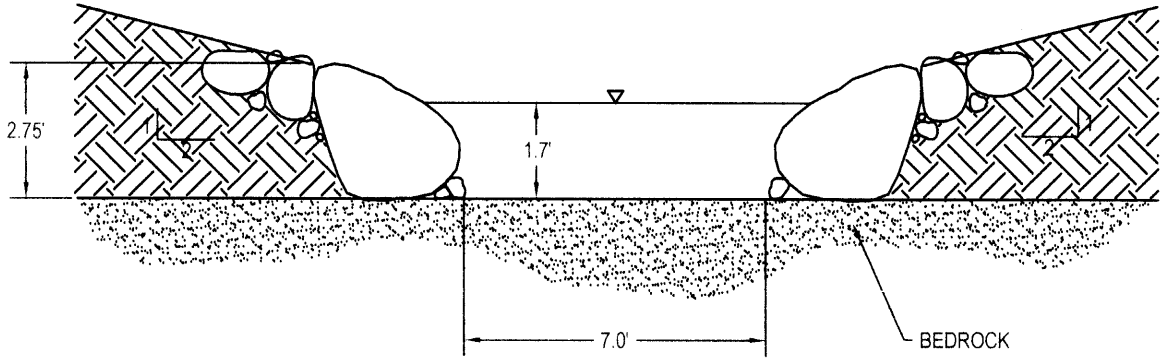
NOTES

BOULDERS TO PROTECT RECONSTRUCTED FILL SLOPES

DESIGN FLOW DEPTH IS 1.7 FEET

FREEBOARD IS 1.05 FEET

REFER TO CHANNEL INFORMATION IN APPENDIX B



Typical Cross Section
(Design on Bedrock)

Figure 7-3

CAD FILE NAME/DISK#: PHASE 3 DRAINAGE CROSS-SECTION.DWG

ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

DES-BEE-DOVE MINE
2005 RECLAMATION PHASE 3
TYPICAL DRAINAGE CROSS SECTIONS

DRAWN BY: D. OAKLEY	###	
SCALE: NONE	DRAWING #:	
DATE: FEBRUARY 11, 2005	SHEET 1 OF 1	REV.

Channel Bank Stability

Rock riprap for the channel banks were designed according to the safety factor methodology developed by Colorado State University and as presented in Haan, et. al. (1994) as follows:

$$SF = \frac{\cos\alpha \tan\Phi}{\eta' \tan\Phi + \sin\alpha\cos\beta} \quad (6)$$

$$\eta = \frac{21\tau}{\gamma(SG - 1)\, D_{50}} \quad (7)$$

$$\beta = \tan^{-1}\left(\frac{\cos\lambda}{\frac{2\sin\alpha}{\eta\tan\phi} + \sin\lambda} \right) \quad (8)$$

$$\eta' = \eta\frac{1 + \sin(\lambda + \beta)}{2} \quad (9)$$

Where:

SF = factor of safety against channel bank failure
λ = slope of channel bed (degrees)
Φ = angle of repose for riprap (degrees)
α = arctan(1/sideslope) (degrees)
β = force component (degrees)
η = stability parameter
η' = channel wall stability factor
γ = specific weight of water
τ = maximum shear on channel bank
SG = specific gravity of rock
D_{50} = mean riprap size (ft)

Riprap linings were designed to have a minimum factor of safety of 1.3. It was assumed in the design that the specific gravity (SG) of the rock was 2.65. The maximum tractive force (τ) on the channel wall is given by K γd λ, where K =0.76 for a 2:1 side slope. The specific weight of water used was 62.4 lbs/ft^3. The factor of safety results are included in Table 7-2 below where various sizes were analyzed.

Table 7-2: Table summarizing channel bank stability factor of safety results.

D_{50}	η	β	η'	SF
1.0	0.870	39.71	0.733	0.73
1.25	0.697	33.88	0.560	0.92
1.5	0.581	29.40	0.450	1.01
1.75	0.498	25.89	0.371	1.09
2.0	0.435	23.07	0.315	1.16
2.25	0.387	20.79	0.273	1.21
2.5	0.348	18.89	0.244	1.26
2.75	0.317	17.34	0.215	1.30
3.0	0.290	15.98	0.193	1.33

R645-301-763 Siltation Structures

Upon completion of reclamation of the Phase 3 Area all siltation structures will be removed, regraded, and revegetated in accordance with the reclamation plan of R645-301-500 and R645-301-300.

R645-301-765 Permanent Casing and Sealing of Wells

No wells exist within or adjacent to the Des-Bee-Dove Phase 3 Reclamation area.

PacifiCorp

Energy West Mining Company

Des Bee Dove Mine

C/015/0017, Task ID #2176

Deficiency Response to Appendix XVI: Phase 3 Reclamation Plan

Replace Maps: 200-1, 200-2, 300-1, 500-1, 500-1 (1of 3 and 2 of 3), 500-5, 700-1