0044

File
ACT/015/018-B
ACT/015/017
Folder No. 3
Route to Mary

UTAH POWER & LIGHT COMPANY

1407 WEST NORTH TEMPLE STREET
P. O. BOX 899
SALT LAKE CITY, UTAH 84110

May 20, 1983

JIM

MAY 23 1983

Mr. James W. Smith, Jr.
State of Utah
Department of Natural Resources
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Smith:

SUBJECT: Waste Rock Disposal Site
Des-Bee-Dove Mine
ACT/015/017
Wilberg Mine
ACT/015/018B

Our original estimates of waste rock generated by the South Wilberg portal construction have been far exceeded and we are faced with developing additonal areas for rock disposal.

Enclosed are five (5) copies of our application to construct six (6) additional containment structures to be developed as additional waste rock is generated.

This application has been submitted to the Bureau of Land Management for their approval and modification of the right-of-way grant.

Should you require more information please contact this office.

Yours truly,

C. E. Shingleton

C. E. Shingleton
Director of Services
Mining and Exploration

CES:BMcQ:bb:3914
Encl.

WILBERG WASTE ROCK STORAGE SITE

Introduction

Waste rock generated from the Des-Bee-Dove and Wilberg Coal Mines has exceeded our original estimates to the point where additional storage areas are needed. In this application we propose to add a series of six additional interconnected storage sites to be utilized sequentially as waste rock is generated.

784.19 - Description

784.19 (b) (1) - Geology - The proposed waste rock storage site is an area of low relief paralleling the Wilberg Mine road with a gently sloping topography. The elevation of the site varies from 6890 feet in the northwest corner down to 6700 feet in the southeast. Grimes Wash, an intermittent stream, passes near the site cutting a steep sided channel along a portion of the NE boundary. Along these steeply cut banks, good exposures of the strata are found.

The site is situated upon colluvium ranging in thickness from approximately 50 feet in the northwest corner to 35 feet in the southeast and lying unconformably upon the Mancos Shale. Depths of colluvium are projected from outcrop in Grimes Wash nearby. The colluvium is conglomeratic consisting primarily of cobble sized sandstone material ranging down to pebble and cemented with a friable sandy mud. Boulders in excess of eight feet in diameter are randomly interspersed within the colluvium. The fabric and cementing material of the colluvium render it moderately permeable.

The colluvium weathers to a loose sandy soil, light brown in color with sand particles ranging from fine to medium grained. The soil tends to be low in compactability and of moderate permeability. The loose soil can be eroded during major precipitation events but the permeability of the soil counteracts this by allowing for the infiltration of runoff.

Soils at the proposed site were sampled on the north and south ends. Results of these analyses are shown in Table 1 and in the enclosed soil description.

TABLE I

WASTE ROCK DISPOSAL SITE

	North End	South End
pH	7.90	8.25
ECe (mmhos/cm)	.9	.85
SAR	1.85	1.76
Sand	20%	20%
Silt	60%	65%
Clay	20%	15%
Sodium	110	95
Calcium	210	150
Magnesium	34	42

784.19 (b) (2) - Hydrology - The hydrology of the site is limited to surface water. The natural drainages in the area (as shown on Drawing CM-10361-WB) trend NW/SE terminating into Grimes Wash. Rainfall projections for this area predict a 2.0 inch rainfall for the 100 year/24 hour precipitation event.

Geologic studies of the area (Hintze) identify the Ferron Sandstone as the first possible water bearing member in the Mancos Shale Formation. Oil and gas wells drilled in the area report no water when drilling through the Mancos Shale Formation. One well drilled on the proposed site encountered no water down to 4900 feet

from the surface. Another well drilled three miles south of the site encountered no water drilling through the Mancos Shale down to 11,500 feet from the surface (GR elev. 6023'). These wells are the nearest to the proposed site on record. Records are on file at the Division of Oil, Gas and Mining.

817.71 (a) - Proposed Disposal Plan - The proposed disposal structures will utilize a maximum of 16 acres, including storage of excavated soils, and retaining berms.

The basic disposal plan is to remove the top layer of weathered materials and to form these materials into three connected berms as shown on CM-10361 and Figure 1. This will involve removing some one foot of material at each site which will be utilized to form the berms some 5.5 feet high at a 2 horizontal to 1 vertical slope.

The berm structure will be compacted and revegetated to minimize erosion.

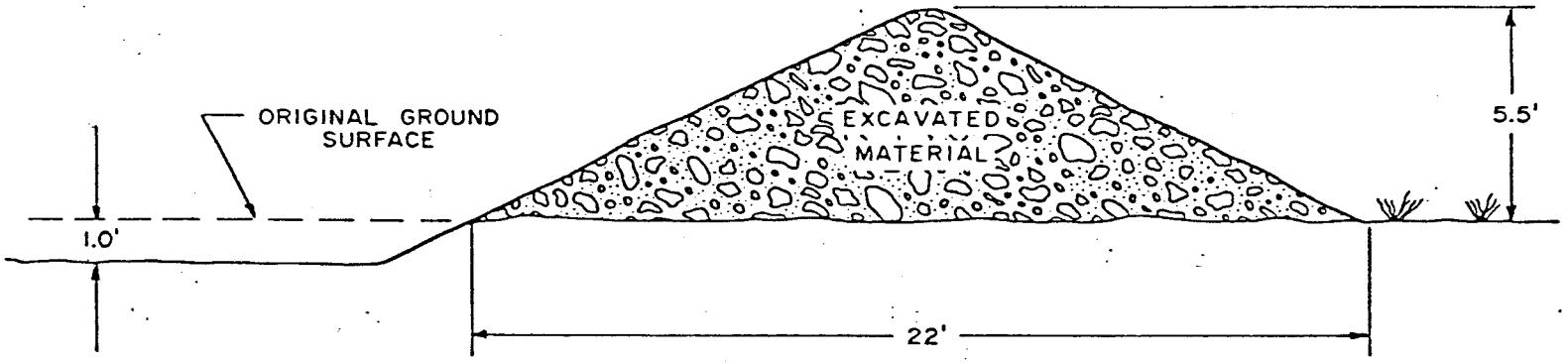
The underground development waste will be stored in the excavation starting at the southeast end and progressing northwesterly.

The fill will be placed in a single horizontal lift, 4 feet high, until placement is completed.

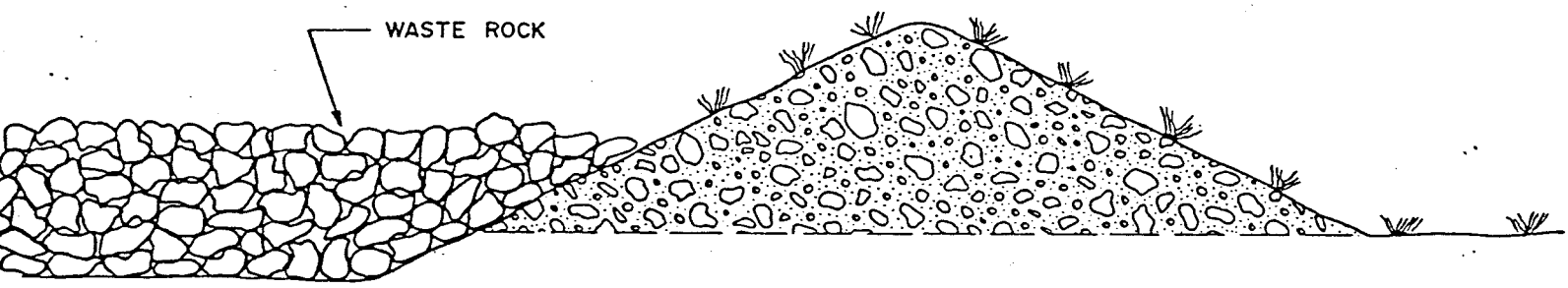
The berms will then be removed and the material will be used to cover the stored rock and the site will again be reseeded.

The final slope of the disposal pile will approximate the original contours and will be about 3.6 feet higher than the existing ground with 2:1 outslopes as shown in Figure 1.

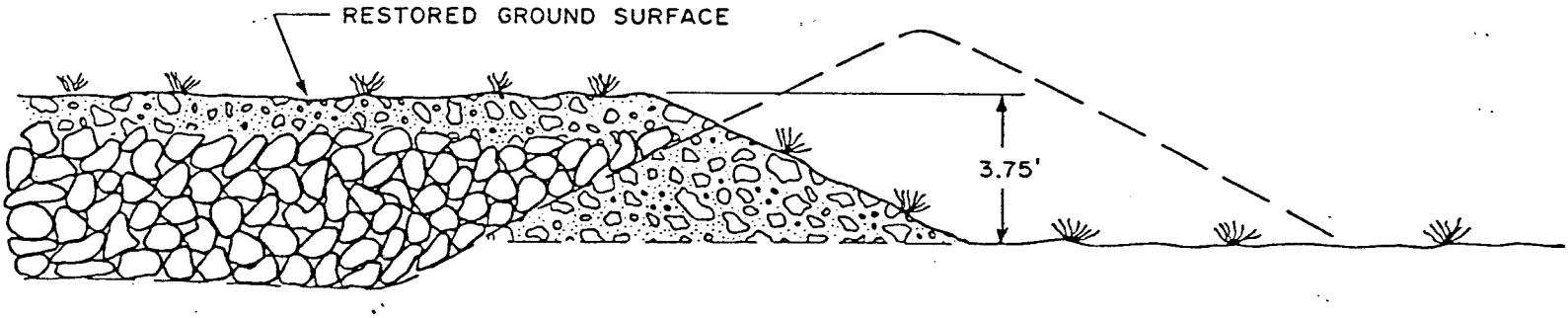
I. EXCAVATION AND BERM CONSTRUCTION



II. PLACEMENT OF FILL



III. COVERED FILL



SCALE: 1" = 5'

FIGURE 1

WASTE ROCK DISPOSAL: BERM DETAIL

Development of each new structure will require construction of two additional berms to form the containment site as shown on Drawing CM-10361-WB. This material will be excavated as previously described. Approximately half the material (1200/cu.yds) will be used to construct the two new berms. The remaining 1200 cubic yards, together with the interior berm, will provide sufficient soil medium to cover the previous disposal site with approximately one foot of cover. This method will be utilized to develop all the sites.

784.19 (a) 817.71 (b) - Disposal Structure - Drawing CM-10359-WB shows present topography and approximate excavation cross-sections.

The proposed excavation will be approximately 1 foot below the existing soil surface. The excavation will be banked on three sides by the excavated material. The open (unbanked) end of the excavation will be on the upslope side.

Construction of the disposal excavation and berms will be accomplished by standard earth construction practice.

Maintenance of the facility will involve annual inspections and required repair. Should the inspection identify a need for repairs, repairs will be made as requested by the inspector.

Waste rock will be transported from the mines and placed on the site by truck. Once disposal is complete and fill leveled, the surrounding berms will be pushed over the fill and graded. The approximate final slope is shown in the cross-sections of Drawing CM-10359-WB.

After replacement of the excavated material over the fill, the site will be reseeded to control erosion. The access road will be removed and interim revegetation completed.

817.73 (a) - Hydrologic Balance Protection - The proposed design includes procedures for protecting the hydrologic balance on the site. Drawing CM-10361-WB shows the berms proposed to be constructed.

Water within the waste dump site will be limited to rainfall. All rainfall within the dump and inslope of surrounding embankments will be retained until it evaporates or seeps into the subsurface. This could be as much as the 10 yr./24 hr. event of 2.0 inches.

817.71 (c) - Stockpiling of Excavated Material - The site proposed for waste disposal is covered with a very thin layer of topsoil. The proposed site was utilized for employee parking during construction of the Wilberg Mine facilities. The Wilberg facility was completed in late 1978. Some vegetation removed has since regenerated. Because the topsoil layer is so thin, segregation of topsoil and other soils is not practicable during excavation of the proposed waste structure. One foot of soil will be excavated and stored in the embankments bounding the excavation and serves two purposes: (1) Berms will contain mine development waste rock and waste water run-off during the operational life of the Des-Bee-Dove/Wilberg Mines, and (2) Berms are in effect overburden storage piles.

817.71 (a) (2) - The soil storage berms will be constructed with inslopes and outslopes of one vertical to two horizontal. To hold the excavated material anticipated, the berms will be 5.5 feet high with a 22 foot base. The typical length of the berm surrounding each excavation is 400 feet. Typical berm calculations are included.

The berm stockpiles will be stabilized in tact until disposal is complete. The berms will be stabilized by compaction and temporary revegetation. Once waste rock is disposed as planned, the excavated soil stored in the berms will be used as cover for the deposited waste rock.

Background Information

817.71 (a) (1) - Composition of Fill Material - The underground development waste rock from Des-Bee-Dove Mine has been analyzed and shows the material to be non-toxic and non-acid forming. The results of the analyses are contained in Table 1.

The anticipated waste from Wilberg Mine will be generated from construction of a rock slope and excess rock developed during mining. The expected rock types encountered in the rock slope construction will be approximately 70% sandstone, 20% interbedded mudstone and siltstone, and 10% bony coal. Analyses of these materials taken from drill cores are contained in Table 3. This analysis indicates the materials to be non-toxic and non-acid forming.

The analysis of the waste rock from Des-Bee-Dove and Wilberg Mines shows clearly that leachate and/or surface runoff from the fill should not degrade surface or ground waters. As a matter of fact, the alkaline nature of the soils in this region could benefit from introduction of acids, neutralizing the soil and making it more viable for support of vegetation.

784.19 (b) (1) - Geotechnical Investigation - The character of bedrock at the proposed waste rock disposal was obtained from outcrop exposures in Grimes Wash nearby. The bedrock is part of the Masuk Shale member of the Mancos Shale Formation. The composition consists

Table 2

Lithology	Number of Samples: Chemical Tests	Number of Samples: Physical Tests	Chemical Tests: Ca Meq/L	Mg Meq/L	Na Meq/L	SAR[1]	Fe ppm	Zn ppm	SO_4-S ppm	Mo ppm	B ppm	pH (Paste)	E.C.[2] mmhos/cm	Sat. %	Physical Tests: Pyrite FeS_2	Sand %	Silt %	Clay %	Texture
lin_ Canyon oof	3	Mean	4.10	1.20	0.87	0.50	5,825	64.42	205.27	<0.1	0.33	7.7	0.83	32.27	8.15	--	--	--	--
		S.D.	1.30	0.56	0.21	0.17	2,528	56.32	61.31	0.00	0.20	0.25	0.25	5.17	10.82	--	--	--	--
lind Canyon Splits	1	Mean										8.9				--	--	--	--
		S.D.	0.8	0.1	9.2	14.3	5,905	40.69	145.0	<0.1	0.94		1.1	20.9	0.2	--	--	--	--
lind Canyon Floor	5	Mean	3.90	1.86	18.54	17.36	10,342	55.38	593.58	<0.1	0.55	8.34	2.22	26.46	1.50	--	--	--	--
		S.D.	4.02	1.72	25.43	25.14	4,263	43.90	454.96	0.00	0.60	0.64	2.11	6.57	1.41	--	--	--	--
Hiawatha Roof	3	Mean	4.57	4.30	3.43	1.83	10,925	184.93	198.07	<0.1	0.11	7.80	1.07	32.17	3.3	--	--	--	--
		S.D.	2.54	3.20	3.96	2.14	7,110	203.10	153.48	0.00	0.10	0.17	0.31	7.18	0.00	--	--	--	--
Hiawatha Split	1	Mean	4.9	2.3	1.3	0.7	7,841	69.88	246.1	<0.1	0.26	7.70	0.8	37.5	NA*	--	--	--	--
		S.D.														--	--	--	--
Hiawatha Floor	3	Mean	10.23	16.23	1.27	0.47	3,873	16.32	777.23	<0.1	0.04	5.87	3.03	29.07	NA*	--	--	--	--
		S.D.	1.50	12.53	0.70	0.21	1,394	14.08	313.16	0.00	0.05	2.24	0.90	4.48		--	--	--	--

*NA = Not Available

Table 3

WILBERG DRILL CORE - SOIL ANALYSES

SEPTEMBER, 1979

Sample #	pH (paste)	E.C. mmhos/cm	Sat. %	Ca meq/l	Mg meq/l	Na meq/l	SAR	Fe ppm	Zn ppm	SO_4-S ppm	Mo ppm	B ppm	Pyrite (FeS_2)	Sand %	Silt %	Clay %	Texture
EM-23C-14	8.2	0.9	21.5	2.3	3.5	1.4	0.9	24223	23.11	20.2	.1	.01		86	5	9	LS
EM-23C-15	8.1	0.6	23.1	1.9	1.6	1.5	1.1	15092	53.77	98.7	.1	0.06					
EM-23C-16	8.0	0.9	19.8	1.7	3.4	1.8	1.1	23064	34.37	148.1	.1	.01					
EM-23C-17	8.1	0.7	19.1	1.7	2.5	1.3	0.9	15423	23.47	67.7	.1	.01					
EM-23C-18	7.7	3.1	19.8	8.4	23.6	2.9	0.7	21730	74.49	1029.6	.1	0.02					
EM-23C-19	7.9	2.5	19.8	7.0	17.9	2.2	0.6	18272	9.17	863.5	.1	.01					
EM-23C-20	8.0	1.6	20.1	3.7	8.9	1.9	0.8	18463	17.49	548.6	.1	.01					
EM-23C-21	7.8	4.1	21.6	11.9	20.8	1.9	0.9	14607	22.38	1089.1	.1	.01					
EM-23C-22	8.0	3.1	25.6	11.8	17.5	2.4	0.6	3122	7.29	1089.1	.1	0.02					
EM-23C-23	8.1	1.6	20.7	4.2	8.2	2.2	0.9	6942	14.23	566.4	.1	0.06					
EM-23C-24	8.1	3.1	22.0	9.8	17.7	3.2	0.9	6527	8.08	999.8	.1	.01					
EM-23C-25	8.3	1.0	20.5	2.0	2.7	1.7	1.1	6085	23.47	204.5	.1	0.06					
EM-23C-26	8.3	0.6	19.9	1.4	0.7	1.3	1.3	572	23.84	79.7	.1	0.10					
EM-23C-27	8.1	1.4	20.3	3.8	6.7	1.5	0.7	10635	55.65	435.8	.1	0.48					
EM-23C-28	7.2	4.1	27.7	13.2	25.5	4.3	1.0	9788	62.40	1207.7	.1	0.55	0.9				
EM-23C-29	8.1	0.8	18.2	1.7	3.4	2.3	1.5	28237	17.16	139.2	.1	0.15					
EM-23C-30	8.3	1.0	16.2	1.2	5.8	2.6	1.4	23064	11.18	198.2	.1	.01					
EM-23C-31	8.1	0.5	33.9	1.4	0.9	1.9	1.8	18272	113.10	38.4	.1	0.40	4.2				
EM-23C-32	8.0	0.7	19.2	1.7	2.7	2.7	1.8	12219	20.95	20.2	.1	0.10					
EM-23C-33	8.3	1.2	18.6	1.4	5.0	3.5	1.9	6195	7.29	97.4	.1	0.06					
EM-23C-34	8.2	0.4	43.1	1.6	8.9	1.9	1.7	2275	13.08	39.8	.1	0.13					
EM-23C-35	8.3	0.5	26.0	1.3	1.0	3.0	2.9	7761	49.14	8.6	.1	0.36					
EM-23C-36	7.8	2.5	21.7	7.4	10.5	6.6	2.2	9788	29.55	798.2	.1	0.36					
EM-23C-37	8.2	1.2	23.8	2.4	8.0	3.4	1.5	11144	7.04	382.6	.1	.01					
AVERAGE	8.05	1.58	22.59	4.37	8.64	2.48	1.26	13062	30.07	423.7	.1	0.13					

FRL #79125

of light to medium blue-gray sandy shale. It usually weathers readily forming debris covered slopes. This member of the formation is devoid of water.

784.19 (b) (2) - A survey of the proposed disposal area has shown the hydrology to be limited to surface runoff from snow melt and rainfall. As discussed in the description, the nearest possible aquifer, the Ferron Sandstone, is devoid of water at this location.

784.19 (b) (3) - No minable coal seams exist beneath the proposed disposal site. The nearest mining operations (past, present or future) are located more than a mile away. Subsidence will have no effect on the disposal site.

784.19 (b) (5) - An investigation of the site by a registered professional engineer was conducted to determine the stability of the site. The site slopes gradually (max. 7%) to the southeast. The site is stable. The minimal amount of surface relief change due to the proposed disposal of waste will not affect that stability. A statement of site investigation findings is attached.

Design of the facility is based upon efforts to minimize surface alteration and control surface runoff while maintaining the most stable possible disposal method feasible. The shallow excavation proposed minimizes the amount of surface relief alteration in a single-lift disposal pattern. The excavated material berms provide a means of controlling runoff in the disposal structure and covering the waste once the disposal is complete. The need to construct separate runoff controls is eliminated. Also, by design, hauling large amounts of topsoil and cover material is unnecessary.

The low profile nature of the proposed fill ensures its stability. By clearing the surface and emplacing the fill in a single four-foot lift, slope stability is assured.

817.71 (i) - Inspections - As required by the Division, inspections will be conducted at least quarterly throughout the construction period. Inspections will also be conducted during the following critical construction periods in accordance with the proposed disposal plan: (1) removal of all organic material and soil, (2) final placement and leveling of fill materials, and (3) revegetation. Reports will be submitted to the Division within two weeks of inspection and a copy will be retained at Wilberg Mine.

Temporary Revegetation - Temporary vegetation practices to stabilize berm slopes will be similar to the final revegetation using grasses only. The seeding rate will be 20 lbs. per acre, 5 lbs. per acre per specie. Fertilizers, ammonium nitrate and triple superphosphate, will be spread at 50 lbs. per acre, or as approved by the Division of Oil, Gas and Mining and the Bureau of Land Management.

817.71 (d) - Vegetation Information

A pinyon-juniper vegetation type was identified within the permit area and adjacent areas and mapped. Field reconnaissance was utilized to construct the vegetation map. The vegetation of the area adjacent to the proposed storage site was used to infer what species composition and plant cover were before the disturbance occurred.

The reference area was located as close to the disturbed site as feasible. Differences in species composition, plant cover, slope, aspect, soil and geology were minimized. The reference area was marked in the field with metal T-posts and located on the vegetation map.

Vegetal analysis of the reference area consisted of developing a list of plant species by life form, measuring ground cover of plants less than one-meter tall, and determining woody plant density.

Cover of plants less than one-meter tall was measured with a one-half square meter (0.5x1.0 m) quadrat. Plant cover was measured for each species occurring within the quadrat. In addition, total plant cover, rock, litter and bare ground were measured. The location of each sampling point was randomly determined.

The point-center quadrat method was used to measure woody plant density. At each sampling point two perpendicular lines were inscribed to delineate four quarters centered over the sampling point. The distance from the nearest woody plant in each quarter to the sampling point was measured and then the shrub or tree was identified. Woody plant density was determined by the following equations:

$$A_j = (Y_1 = Y_2 + Y_3 + Y_4/4)^2 \quad (1)$$

$$D = U/\Sigma A_j/n) \quad (2)$$

where: Y_i = distance from point to nearest woody plant in the ith quarter,

A_j = mean area per sampling point,

N = sample size,

D = density, the number of woody plants per unit area,

U = unit area.

Five sampling points were placed 15 paces apart along a transect. The starting point and direction of each transect was randomly located.

Statistical adequacy for sample size for aerial plant cover and woody plant density was determined by the following formula:

$$N_{min} = t^2 s^2 / (d\bar{x})^2 \quad (3)$$

where: N_{min} = minimum sample size,

t = t-value for a 2-tailed test,

s = standard deviation,

d = allowable change in sample mean,

$\bar{x}$ = sample mean.

Sample size for plant cover and woody plant density size was tested at the 80 percent confidence level ($t_{0.10,\infty}$=1.282) with 10 percent error of the mean (d=0.10). Adequacy for plant cover and plant density was calculated after 20 samples. Sample size for density was determined using mean area per plant. Table 1 gives the minimum sample size and observed sample size for the reference area. Data presented hereafter will be based on the observed sample number.

Woody plant composition based on density was determined as follows:

$$C = S_i / T \quad (4)$$

$$T = \Sigma S_i \quad (4a)$$

where: S_i = total individuals of the ith species,

T = total number of shrubs sampled,

C = shrub composition.

Jaccard's Community Coefficient was used to quantify the similarity in plant species between the reference and disturbed area. The equation is:

$$I.S. = (C/A+B-C)100\% \quad (5)$$

where: I.S. = similarity index,

A = total species in community A,

B = total species in community B,

C = number of species common to both.

Data for plant cover and woody plant density were collected June 16, 1982 and analyzed June 23-25, 1982.

Bureau of Land Management and Utah Division of Wildlife Resources personnel, located in Price, Utah, were consulted on June 18, 1982 with regard to livestock and big game vegetal use within the permit area. Soil Conservation personnel, located in Price, were consulted with regard to soil classification, range site, and plant productivity of the reference area.

Personnel involved with vegetal sampling, data analysis and report writing:

Jerry R. Barker
Bio-Resources, Inc.
P.O. Box 3447
Logan, Utah 84321

Marianne Barker
Bio-Resources, Inc.
P.O. Box 3447
Logan, Utah 84321

Personnel consulted in preparation of the information:

Christian Shingelton
Utah Power & Light Company
P.O. Box 899
Salt Lake City, Utah 84110

Gary Moreau and George Cook
Soil Conservation Service
350 N. 400 E.
Price, Utah 84501

Laurelle Hughes and Neil A. Simmons
Bureau of Land Management
P.O. Drawer AB
Price, Utah 84501

John Livesay and Larry Dalton
Division of Wildlife Resources
P.O. Box 840
Price, Utah 84501

Permit Area Vegetation

The permit for the Waste Rock Storage Site is 48.6 acres (Fig. 1, Vegetation Map). A pinyon-juniper vegetation was identified within the permit area. Common plants are pinyon-pine, Utah juniper, curlleaf mountain mahogany, and cutler ephedra. Grasses are rare within the permit area.

Disturbed Area

The disturbed area of the Waste Rock Storage Site is about 7.5 acres (Table 2). Elevation varies around 6,780 ft. The area has a six percent slope with a southern exposure. The previously disturbed vegetation was pinyon-juniper (Table 3). Pinyon-pine, Utah juniper, cutler ephedra, and curlleaf mountain mahogany were the important woody plants. Herbaceous plants included several mustards, sky rocket gilea, pensteman, wolly groundsel, Indian ricegrass and bottlebrush squirreltail. Total aerial plant cover varied around 35 to 40 percent. Soils probably belonged to the Kenilworth series of the loamy-skeletal, mixed, mesic, Xerollic Calciorthid. The range site was an Upland Stony Loam (Pinyon-Juniper).

Reference Area

A reference area was established to represent the disturbed pinyon-juniper vegetation type (Table 4). Differences between soils, geology, vegetation, etc. were minimized between the two sites.

The reference area (4800 m^2) has a southern exposure with an elevation of 6,810 ft. Slope varies around six percent. Common plants include pinyon pine, Utah juniper, cutler ephedra, curlleaf mountain mahogany and assorted forbs (Table 5). There is a paucity of grasses within the reference area. Total aerial plant cover is 35 percent. Total cover of plants less than one-meter tall is 3.3 percent (Table 6). Woody plant density is 1,495 plants per acre (Table 7). Pinyon-juniper has the greatest density while black sagebrush has the least. The soil belongs to the Kenilworth series of loamy-skeletal, mixed, mesic Xerollic Calciorthid. The range site is Upland Stony Loam (Pinyon-Juniper) in fair condition and producing 700 pounds of herbage per acre (see Soil Conservation letter in Appendix).

Livestock and Wildlife

The permit area is located within the West Grimes Grazing Allotment managed by the Bureau of Land Management. A range survey prior to 1966 indicated that Sections 34 and 35 had a carrying capacity of 9.7 and 18.2 animal unit months, respectively. Cattle grazing occurred from April 1 to June 10. However, for the past several years, there has not been any significant grazing due to the lack of water (see Bureau of Land Management letter in Appendix).

The area of the Waste Rock Storage Site is considered high-priority winter range for mule deer by the Division of Wildlife Resources (see Division of Wildlife Resources letter in Appendix).

Endangered or Threatened Plants

During the vegetal sampling, no endangered or threatened plant species were identified.

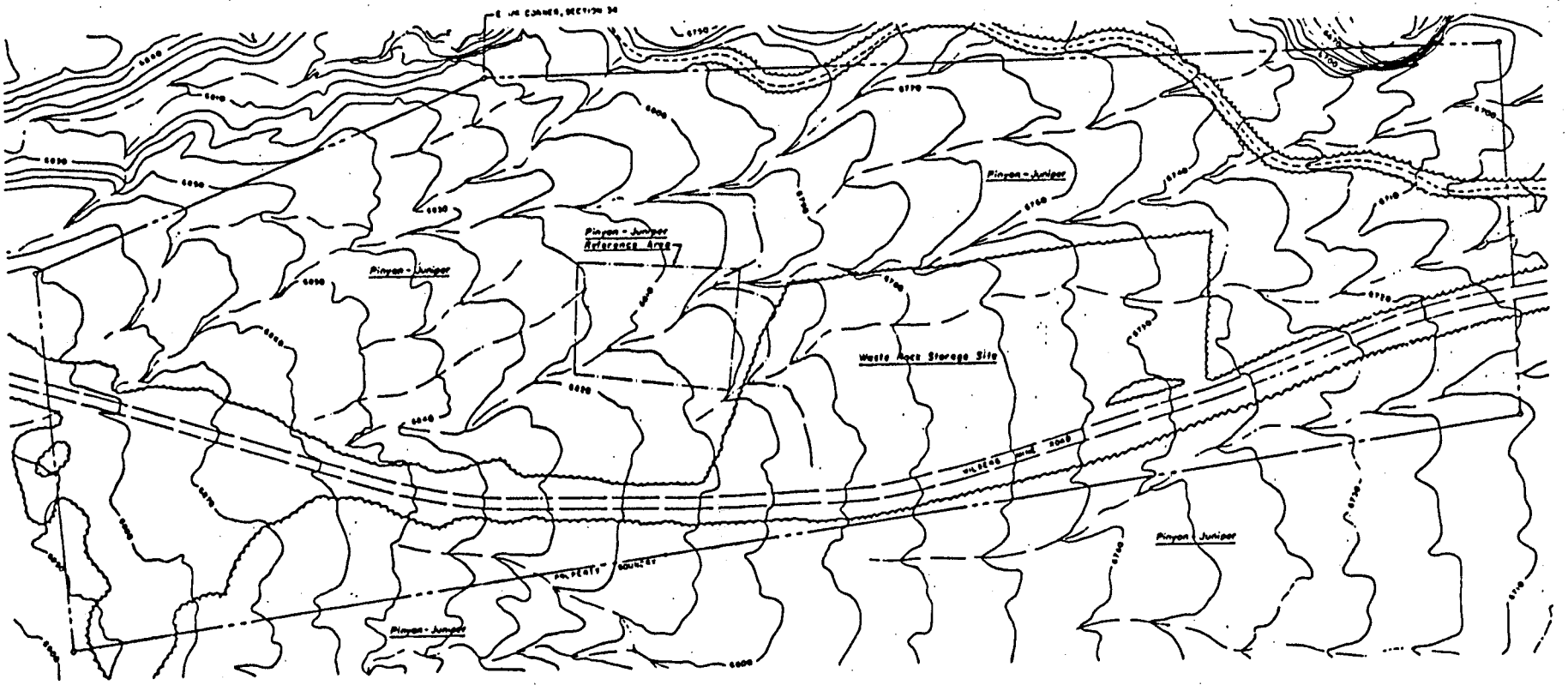


Fig. 1. Vegetation map for the Waste Rock Storage Site permit area (wavy line indicates existing vegetation).

BIO-RESOURCES, INC.
VEGETATION MAP
Waste Rock Storage Site (T17S, R6E SL B&M
Wilberg Coal Mine, Emery County, Utah
Utah Power & Light Company
D | 820-1001

Table 1. Sample adequacy for total plant cover and woody plant density for the pinyon-juniper reference area at Waste Rock Storage Site, Wilberg Coal Mine.

Reference Site	Parameter	N_{min}	$\bar{X}$	S.D.	$N_{obs.}$
Pinyon-juniper	Plant cover	133	3.7	3.33	49
	Woody plant density	17	2.7	0.87	25

Table 2. Vegetation type, acres disturbed, and percent of vegetation type at the Waste Rock Storage Site, Wilberg Coal Mine.

Vegetation Type	Area Disturbed	% of Vegetation Type
Pinyon-juniper	7.5	15.4

Table 3. Common plant species that were inferred to have grown within the disturbed portion of the pinyon-juniper vegetation type at the Waste Rock Storage Site, Wilberg Coal Mine.

Scientific Name	Common Name
Trees	
Juniperus osteosperma	Utah juniper
Pinus edulis	Pinyon pine
Shrubs	
Artemisia nova	Black sagebrush
Cercocarpus ledifolius	Curlleaf mountain mahogany
Eriogonum microthecum	Slenderbush eriogonum
Ephedra cutleri	Cutler ephedra
Opuntia polyacantha	Plains pricklypear
Xanthocephalum sarothrae	Broome snakeweed
Yucca harrimaniae	Harriman yucca
Forbs	
Bahia dissecta	Ragleaf bahia
Cryptantha flava	Yellow cryptantha
C. flavoculata	Roughseed cryptantha
Descurainia pinnata	Pinnate tansymustard
Erigeron sp.	Fleabane
Euphobia fendleri	Fendler euphobia
Ipomopsis aggregata	Sky rocket gilia
Lepidium montanum	Mountain pepperweed
Penstemon osterhoutii	Osterhout penstemon
Physaria australis	Twinpod
Senecio multilobatus	Lobeleaf groundsel
Streptanthus cordatus	Twistflower
Townsendia incana	Hoary townsendia
Grasses	
Oryzopsis hymenoides	Indian ricegrass
Sitanion hystrix	Bottlebrush squirreltail

Table 4. Similarity between the pinyon-juniper reference area and the disturbed site at the Waste Rock Storage Site, Wilberg Coal Mine.

Parameter	Reference	Disturbed
Cover, %[1]	3.3	3.0-5.0
Woody plant density, No/acre	1,495	-
Species composition, s[2]	26	24
Aspect	Southern	Southern
Slope, %	6	6
Elevation, ft.	6,810	6,780
Soil	Xerollic Calciorthid	Xerollic Calciorthid
Geology	Alluvium	Alluvium
Index of Similarity, %	78.6	

[1]Ground cover of plants less than one-meter tall.
[2]s=total plant species.

Table 5. Common plant species occurring within the pinyon-juniper reference area of the Waste Rock Storage Site, Wilberg Coal Mine.

Scientific Name	Common Name
Trees	
Juniperus osteosperma	Utah juniper
Pinus edulis	Pinyon pine
Shrubs	
Artemisia nova	Black sagebrush
Cercocarpus ledifolius	Curlleaf mountain mahogany
Eriogonum microthecum	Slenderbush eriogonum
Ephedra cutleri	Cutler ephedra
Opuntia polyacantha	Plains pricklypear
Xanthocephalum sarothrae	Broome snakeweed
Yucca harrimaniae	Harriman yucca
Forbs	
Arabis selbyi	Rockcress
Bahia dissecta	Ragleaf bahia
Cryptantha flava	Yellow cryptantha
C. flavoculta	Roughseed cryptantha
Descurainia pinnata	Pinnate tansymustard
Erigeron sp.	Fleabane
Eriogonum sp.	Buckwheat
Euphobia fendleri	Fendler euphorbia
Ipomopsis aggregata	Skyrocket gilia
Lepidium latifolium	Pepperweed
L. montanum	Mountain pepperweed
Penstemon osterhoutii	Osterhout penstemon
Physaria australis	Twinpod
Senecio multilobatus	Loableaf groundsel
Streptanthus cordatus	Twistflower
Thelesperma subnudum	Navajo-tea greenthread
Townsendia incana	Hoary townsendia
Grasses	
No grasses were found within the reference area.	

Table 6. Ground cover for the pinyon-juniper reference area at the Waste Rock Storage Site, Wilberg Coal Mine.

Parameter	Percent Cover	
Total plant cover[1]	3.3	
Woody plant		1.6
Forb		1.7
Litter	18.0	
Rock	9.2	
Bare ground	69.5	
	100	

[1]Ground cover of plants less than one-meter tall.

Table 7. Woody plant density and composition for the pinyon-juniper reference area for the Waste Rock Storage Area, Wilberg Coal Mine.

Species	Composition, %	Density, No/acre
Pinyon pine	46	687
Cutler ephedra	24	359
Utah juniper	16	239
Curlleaf mountain mahogany	8	120
Harriman yucca	5	75
Black sagebrush	1	15
	100	1495

Appendix

Letters from Governmental Agencies

United States Department of Agriculture

Soil Conservation Service

August 2, 1982

Mr. Jerry Barker
C/O Bio Resources
P. O. Box 3447
Logan, Utah 84321

Dear Mr. Barker:

You have requested site, condition and production on 48.62 acres in Sections 34 and 35 of T 17S and R 7E North and West of Orangeville, Utah. The site is an Upland Stony Loam (Pinyon Juniper) D-34. The ecological condition is fair and the site is producing about 700 pounds of herbage per acre.

George S. Cook

George S. Cook
Range Conservationist

United States Department of the Interior

IN REPLY REFER TO
4190/3400
(U-067)

BUREAU OF LAND MANAGEMENT
Moab District
San Rafael Resource Area
P. O. Drawer AB
Price, Utah 84501

June 24, 1982

Mr. Jerry Barker
c/o Bio Resources
P. O. Box 3447
Logan, Utah 84321

Dear Mr. Barker:

You have requested information concerning Sections 34 and 35 of T. 17 S., R. 7 E.

The two sections are made up of three range sites:

1. Waste - Comprised mainly of cliff and rock outcrop areas.

2. Pinyon-Juniper - Made up of varying amounts of pinyon-juniper, saltbush, bitterbrush, Morman tea, blacksage, mahogany and several grass species. Plant density is between 5-18% and plant vigor is considered weak for most forage species.

3. Desert saltbush - Made up of shadscale, mat saltbush, castle valley clover, Morman tea, blacksage, and seven grass species including curlygrass, sandsage, Indian ricegrass, bull grass, and blue gramma. Plant density is between 0 and 20%.

Range condition could be estimated between fair and good. Vegetative production is low due to range site characteristics. Presently we have no current production or condition figures. There has not been any significant livestock use in the area for the last few years, due to the lack of water.

Our range survey, which was prior to 1966 indicates that Section 34 comprises 640 acres and has a carrying capacity of 9.7 AUM's. Section 35 comprises 640 acres and has a carrying capacity of 18.2 AUM's.

We hope this is the information you need.

Sincerely yours,

Neil A. Simmons

Acting Area Manager

state of utah

DIVISION OF WILDLIFE RESOURCES

DOUGLAS F. DAY
Director

EQUAL OPPORTUNITY EMPLOYER

1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

July 19, 1982

Reply To SOUTHEASTERN REGIONAL OFFICE
455 West Railroad Avenue, Box 840, Price, Utah 84501
(801) 637-3310

Mr. Jerry Barker
Bio-Resources, Inc.
P.O. Box 3447
Logan, Utah 84321

RE: UP & L Wilberg Mine--Waste Rock Disposal Area

Dear Jerry:

In response to your request for wildlife information concerning the waste rock disposal area for Utah Power and Light Company near the Wilberg Mine, the site represents high-priority valued winter range for mule deer. The assessment of wildlife and recommended mitigation planning provided by the Division to Chris Shingleton (UPandL) on March 2, 1981 should be considered satisfactory for this site. It is anticipated that UPandL will develop an acceptable mitigation plan for their activities as they relate to the rock disposal area.

If the Division can be of further service, please coordinate with Larry Dalton (telephone 637-3310) as appropriate.

Sincerely,

John Livesay

John Livesay, Supervisor
Southeastern Region

JL:LBD:gp

cc: Darrell Nish
Chris Shingleton
Utah Division of Oil, Gas and Mining

Revegetation

Environment Conditions

The surrounding vegetation is a pinyon-juniper community. Important perennial understory species include curlleaf mountain mahogany, Cutler ephedra, black sagebrush, Harriman yucca, Indian ricegrass and bottlebrush squirreltail. Grasses are rare within this pinyon-juniper community.

The soil is a loamy-skeletal, mixed, mesic Xeralic Calciothid and belongs to the Kenilworth series. These soils have a pH of around 7.7 and an exchangeable sodium of 4 percent. Erosion potential is moderate.

The range site is a Semi-Desert Stony Loam (Pinyon-Juniper). Slopes vary from 3 to 5 percent. Annual precipitation is 8 to 10 inches with the majority being received during late summer. The frost-free season is 110 to 130 days. Elevation varies around 6800 ft. Present use of the area is rangeland. The post-mining use will also be rangeland.

A native plant mixture has been selected that is adapted to the site (Table 1). These species are perennial, drought resistant and fairly salinity resistant.

A fall planting will occur after September 1 when soil water and weather conditions are favorable. A grass and forb mixture will be direct seeded at a rate of 12 pounds of pure live seed per acre (Table 2). Container-grown shrubs will be transplanted immediately after seeding occurs at a density of 1700 seedlings per acre (Table 3).

Forbs and grasses will be direct seeded using a rangeland drill. Two passes over the area will be necessary to accomplish the seeding. On the first pass, only Indian ricegrass will be planted at a depth of one to two inches. The other grass and forb seed will be planted as a mixture on the second pass at a depth of about one-half inch.

Immediately after seeding straw will be used to mulch the area at a rate of two tons per acre. The straw will then be crimped into the soil.

The container-grown shrub seedlings will be transplanted after mulching. Standard transplanting procedures will be followed. Care will be taken to minimize root damage to the seedlings. If possible, seedlings will be irrigated immediately after transplanting. At the time of transplanting a slow release fertilizer such as Agriform Planting Tablets will be placed with each seedling.

Proper management is important following the revegetation process. Livestock and wildlife grazing will be prevented for at least two years. Also, all vehicle and foot traffic will be restricted from the area. Fencing the revegetated area will prevent livestock grazing and keep unwanted traffic away. If rodent, rabbit and deer damage is anticipated, Vexar plastic netting can be placed around individual shrub seedlings to minimize animal depredation.

Sources of seeds, container-grown shrubs:

Kroh Nurseries, Inc.
P.O. Box 536
Loveland, CO 80537
(303) 667-5466

Mountain West Environments, Inc.
P.O. Box 2107
Steamboat Springs, CO 80477
(303) 879-2313

Native Plants, Inc.
360 Wakara Way
Salt Lake City, UT 84108
(801) 582-0144

Wm. Roger Stewart & Sons
Box 724
Ephraim, UT 84627
(801) 283-4423

Source for the Vexar plastic netting and Agriform Planting Tablets:

International Reforestation Supplier
P.O. Box 5547
Eugene, OR 97405
(503) 345-0597

Table 1. Recommended native plant species for revegetating the Waste Rock Storage Site.

	Scientific Name	Common Name
Grasses	Agropyron riparium	Streambank wheatgrass
	A. smithii	Western wheatgrass
	Elymus cinereus	Great Basin wildrye
	Oryzopsis hymenoides	Indian ricegrass
	Stipa comata	Needle-and-Thread grass
Forbs	Aster chilensis	Pacific aster
	Hedysarum boreala[a]	Northern sweetvetch
	Penstemon palmeri	Palmer pensteman
	Sphaeralcea coccinea	Scarlet globemallow
Shrubs	Artemisia nova	Black sagebrush
	Atriplex canescens	Fourwing saltbush
	Cerocarpus ledifolius	Curlleaf mountain mahogany
	Ephedra cutleri	Cutler ephedra

[a]native legume

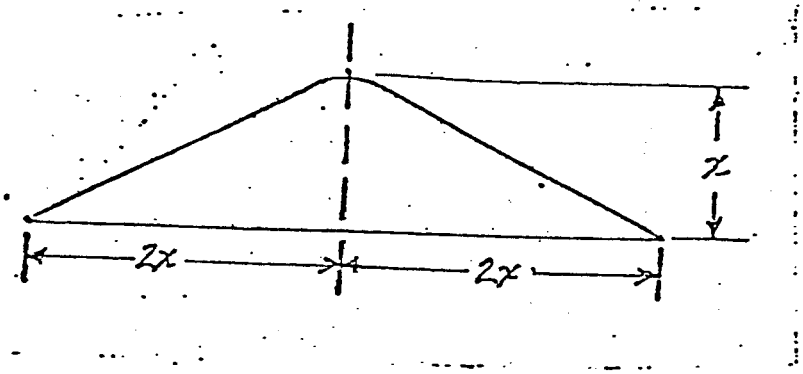
Table 2. Planting rate (pounds of pure live seed per acre) of grass and forb seeds.

	Species	Planting Rate
Grasses	Streambank wheatgrass	1.5
	Western wheatgrass	2.2
	Indian ricegrass	2.0
	Needle-and-Thread grass	2.3
	Great Basin wildrye	2.0
		10.0
Forbs	Pacific aster	0.1
	Northern sweetvetch	1.0
	Palmer pensteman	0.4
	Scarlet globemallow	0.5
		2.0

Table 3. Planting density of shrubs (number/acre).

Species	Planting Rate
Black Sagebrush	425
Fourwing Saltbush	425
Curlleaf Mountain Mahogany	425
Cutler Ephedra	425

Waste Dump Berm Design

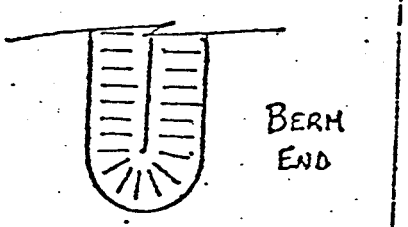


Excavate 200' x 300' x 1'

Volume Material = 60,000 Ft.^{3}

Assume: Negligible Swell

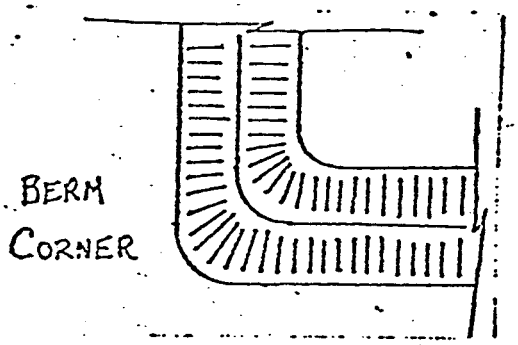
Berm Length = 160' + 375' + 375' + Ends + Corners



Volume Ends = 7 cone

$= 1/3\ \pi r^2 h$; h = x v = 2x

$= 4/3\ \pi x^3$



Equivalent Length

$2x^2\ L = 4/3\ \pi x^3$

$L = 2/3\ \pi x$; Assume x = 6

L = 12.6'

Equ. Length Corners = 2x + 2x + 2x + 2x

= 8x

= 42'

Total Berm Length = 970.6 use 970'

Volume of 2h : 1v berm per foot of length = $2x^2$

Waste Dump Berm Design (Continued)

Find Berm Height (x):

$$\text{Volume Req. Per Foot of Berm} = \frac{60{,}000 \text{ Ft.}^3}{970 \text{ Ft.}}$$

$$= 62 \text{ Ft.}^3$$

Therefore: $2x^2 = 62 \text{ Ft.}^2$

$$x^2 = \frac{62 \text{ Ft.}^2}{2}$$

$$= 31 \text{ Ft.}^2$$

$$x = \underline{5.6'}$$

(Assumption of x = 6' close enough)

Use 5.5' Berm Height

22' Base Width

WILBERG WASTE ROCK DUMP SITE

SOIL DESCRIPTION

JOSEPH M. JARVIS

WILBERG WASTE ROCK DUMP SITE

SITE: Portions of E½SE¼ S. 34 and W½ SW¼ S. 35 T. 17 S. R. 17 E. SLBM. 48.62 acres

PARENT MATERIAL: Alluvial outwash of Cretaceous sandstone and siltstone beds.

ASPECT: Southeast

SLOPE: 3%

ANNUAL PRECIPITATION: 12 inches

VEGETATION: Pinyon-Juniper Woodland

An open stunted type with a sparse shrub understory of Ephedra nevadensis, Cercocarpus montanus and Cowania mexicana.

LAND USE: Curently the site has a coal hauling road and is partially cleared of trees on about ten acres. Some deer winter use occurs here but the alluvial fan produces less browse than adjacent higher slopes.

PRODUCTIVITY: Low, 1,000 lbs/acre

SOIL: A young shallow alluvial derived soil, calcerous with a definite hardpan. Impervious layer influences plant growth so large rooted species predominate in the vegetation composition.

SOIL DESCRIPTION:

A_1	0-3"	Brown (10YR 5/3,moist) silt loam; gravelly with scattered rocks; granular, soft, loose, slightly sticky, slightly plastic; moderately calcerous, PH 8.2; few small and medium roots; boundary gradual.
A_2	3-18"	Pale brown (10YR 6/3,moist) loam, gravelly with scattered rocks; small angular blocky, friable, slightly sticky, slightly plastic; moderately calcerous; common small and medium roots, some large relic roots; some clay buildup at 14", cobble bed at 18-20".
C_{ca}	20"-	Light brownish gray (10YR 6/2,moist) caliche,rocky; massive, very hard, strongly calcerous; few medium roots; a cemented caliche layer.
C		Depth varies but consists mainly of bedded cobbles and rocks.

UTAH POWER & LIGHT COMPANY
1407 WEST NORTH TEMPLE STREET
P. O. BOX 899
SALT LAKE CITY, UTAH 84110

December 19, 1980

To Whom It May Concern:

Please be advised that I have visited the site proposed for waste rock storage by Utah Power & Light Company. My findings are that the site is gently sloping (7%), nearly level. In my professional opinion, the site is stable enough to accommodate the proposed structure without altering its sound condition.

Please be further advised that the writer, Willie J. Whitney, Jr., is registered as a Professional Engineer in the State of Utah (No. 4904).

Very truly yours,

Willie J. Whitney

Willie J. Whitney, Jr.
Project Engineer
Mining and Exploration

REGISTERED PROFESSIONAL ENGINEER
No. 4904
Willie J. Whitney, Jr.
State of Utah

WJW:JBW:lw
GEN:2577:DAD:WW:BW

cc: J. B. Webster

EXHIBIT IX

CERTIFICATION

STATE OF UTAH)
: ss.
County of Salt Lake)

Except as otherwise indicated thereon, all maps, plans, and cross sections submitted with this application have been prepared under the supervision of Don A. Dewey, a registered Professional Engineer of the State of Colorado, who hereby certifies to the correctness thereof.

Don A. Dewey, P.E.
(Professional Engineer #6522)