

2. This unit occurs near the upper edge of the escarpment. Soils are shallow and stoney. Sandstone rock outcrops and eroded shale exposures are included. Vegetation consists of pinyon-juniper, mountain mahogany, and limber pine. No treatment is planned.
3. This is a steeply sloping escarpment. Soils are shallow to moderately deep and stoney. Slopes are 40 to 65 percent. Vegetation includes pinyon-juniper and mountain brush. The site is droughty due to the steep, southfacing slopes and rapid runoff. Runoff from this soil unit contributes to soil erosion downslope, especially in M.U. 4. No treatment is planned.
4. These soils have formed on alluvial and colluvial deposits below the escarpment (M.U.3). They receive moisture from runoff upslope as well as on-site precipitation. The soils typically have a dark brown loam surface layer that is 8 to 18 inches thick. This is underlain by a clay loam subsoil, which typically has a calcium carbonate accumulation starting at a depth of about 18 inches. Rock fragments, mostly gravel and cobble, make up 10 to 40 percent at the soil profile. Vegetation is dominantly serviceberry, pinyon-juniper, sagebrush, and grasses. Slopes are 10 to 20 percent. This soil unit has some of the best soils for treatment in the Battlegrounds area. Erosion is primarily in the form of gullies ranging from 2 to 5 feet in depth. This unit is proposed for treatment.
 

The Hydrologic Soil Group is C and B; the Runoff Curve Number is estimated at 87; the runoff from the 6 hour 50 year recurrence interval storm is estimated to be 0.92 inches.
5. These soils have a thin brown surface over a highly carbonaceous subsoil.
 

The soils commonly have a high gravel content at the surface. Textures range from sandy loam to clay loam. Vegetation includes black sagebrush with relatively sparse forbs and grasses. Slopes are 10 to 25 percent. Sheet erosion is prevalent on these soils. Contour furrowing would be a good measure to control surface runoff, however the production of vegetation is expected to be low.

The Hydrologic Soil Group is C and D; the Runoff Curve Number is estimated at 93; the runoff from the 6 hour 50 year recurrence interval storm is estimated to be 1.3 inches.
6. This unit has shallow to moderately deep (12 to 40 inches) soils on slopes of 15 to 40 percent. Steep slope pitches and benches are present. Soils on the steeper portions are shallow over shale and quite stoney. On the gentler slopes, the soils are deeper, darker colored, and support more vegetation. Soil

textures are silt loam to clay in the subsoils. Topsoil thickness varies from about 3 to 12 inches. Vegetation includes pinyon-juniper, sagebrush and grasses. Sheet, rill, and gully erosion is occurring within this soil unit. The sheet and rill erosion dominates a shallow soil on steep slopes, and the gullies are typical where soils are deeper and slopes are in the 15-20 percent range. This unit is proposed for treatment.

The Hydrologic Soil Group is B; the Runoff Curve Number is estimated at 78; the runoff from the 6 hour 50 year recurrence interval storm is estimated to be 0.5 inches.

7. This map unit consists of shallow to moderately deep soils supporting dominantly pinyon-juniper stands on 15 to 35 percent slopes. Topsoil layers are thin and have loam to sandy loam textures. Subsoils are clay loam or sandy loam.

The Hydrologic Soil Group is C; the Runoff Curve Number is estimated at 90; the runoff from the 6 hour 50 year recurrence interval storm is estimated at 1.0 inches.

8. This map unit lies below some steeper slopes where erosion is active. Overall, it is a zone of soil accumulation as sediments are deposited. However, one major gully has cut through the unit where runoff is concentrated. The soils have a thick dark colored loam surface, often 15 to 24 inches thick. Subsoils range from a gravelly loam to a clay loam and typically have accumulation of calcium carbonate. These soils support dominantly sagebrush and grass. Slopes are 8 to 15 percent. There is a good potential for revegetation. This unit is proposed for treatment.

The Hydrologic Soil Group is B; the Runoff Curve Number is estimated at 78; the runoff from the 6 hour 50 year recurrence interval storm is estimated to be 0.5 inches.

9. These soils are shallow to moderately deep over sandstone and shale on slopes of about 5 to 20 percent. They support mostly sagebrush (including some black sagebrush) and grasses with some scattered pinyon and juniper. The soils typically have a loam to sandy loam surface soil over a finer texture subsoil which is clay loam or clay. The soils are quite variable within the unit, differing primarily in texture, depth, and rock fragment content. Shallow clayey soils are common on black sagebrush sites, and shallow stoney soils are common where pinyon-juniper is present. A portion of this unit is planned for treatment.

The Hydrologic Soil Group is C; the Runoff Curve Number is estimated at 87; the runoff from the 6 hour 50 year recurrence interval storm is estimated to be 0.92 inches.

10. This unit consists of steeply sloping lands with shallow, stoney soils supporting pinyon and juniper. Slopes are 30 to 70 percent. Rock outcrops are common. This unit is not proposed for treatment.

There are no identified wet lands or flood plains in the treatment area.

#### H. Watershed Condition Improvements

There is a total of 606 acres proposed for various forms of treatment within the project area. The amount of treatment is shown below and on the project map.

Table I Amount of Treatment

Contour furrow	566 acres
Contour trench	40 acres
Protection fence	1 mile
Gully swaling	6,000 feet
Gully plugs	17 double fence dams

The trench and furrow spacing is determined from the equation in: Sediment Reduction Through Watershed Rehabilitation, by Edward E. Noble, USDA - Forest Service, Intermountain Region, 1963. Page 16.

$$\frac{\text{Runoff (in.)} \times \text{furrow interval (ft.)}}{12 \frac{\text{inches}}{\text{ft.}}} = \text{furrow capacity} \frac{(\text{ft.}^3)}{\text{ft.}}$$

From the map unit descriptions the greatest runoff from the 6 hour 50 year storm event is 1.3 inches. The furrow construction method produces a capacity of 5.4 ft.<sup>3</sup>/ft. (How to Treat a Watershed, by Darell Stewart, Manti-LaSal National Forest, Price, Utah, 1982, Page 59). Using the previous equation:

$$\frac{1.3 \text{ inches}}{12 \frac{\text{inches}}{\text{ft.}}} \times 50 \text{ ft.} = 5.4 \frac{\text{ft.}^3}{\text{ft.}}$$

Therefore, a spacing of 50 feet between furrows will provide sufficient storage for the 6 hour 50 year storms. A reduced spacing of 40 feet which is planned will provide some freeboard.

Spacing of the furrows will vary from area to area because of slope, soil conditions and ground cover. They will be constructed with a D-7 crawler tractor with a hydraulic blade. If available, a Vari-dozer would be preferable.

SOIL CLASSIFICATION - BATTLEGROUND

Map Unit

*Argic Pachic Cryoborolls, fine, montmorillonitic*

1. Argic Cryoborolls, fine, montmorillonitic
2. Lithic Ustortherts, loamy-skeletal, mixed  
Typic Argiborolls, loamy-skeletal, mixed  
Rock outcrop: Sandstone and shale
3. Typic Ustorthents, loamy-skeletal, mixed  
Typic Ustochrepts, loamy-skeletal, mixed
4. Typic Argiborolls, fine-loamy, mixed  
Typic Argiborolls, loamy-skeletal, mixed  
Pachic Argiborolls, fine-loamy, mixed
5. Typic Ustochrepts, fine-loamy, mixed
6. Typic Ustorthents fine-loamy, shallow, mixed  
Typic Ustorthents, loamy-skeletal, mixed  
Typic Argiborolls, loamy-skeletal, shallow mixed
7. Lithic Eutroboralfs, loamy-skeletal, mixed  
Lithic Argiborolls, loamy-skeletal, mixed  
Typic Ustorthents, fine-loamy, shallow, mixed
8. Cumulic Haploborolls, fine-loamy, mixed
9. Typic Argiborolls, fine-loamy, mixed  
Lithic Argiborolls, loamy-skeletal, mixed  
Cumulic Haploborolls, fine-loamy, mixed
10. Lithic Ustorthents, loamy-skeletal, mixed  
Typic Ustorthents, fine-loamy, shallow

Rock outcrop

*Ry - Steep rocky slopes with shallow soils.*

BATTLEGROUND WATERSHED IMPROVEMENT PLAN

FERRON RANGER DISTRICT  
MANTI-LASAL NATIONAL FOREST

Prepared by: John Niebergall, District Ranger  
Bill Dye, Forester  
Dan Larsen, Soil Scientist  
Dennis Kelly, Hydrologist

Recommended by:

John Niebergall  
District Ranger

6-26-85  
Date

[Signature]  
Watershed Staff

8/10/85  
Date

Approved by:

[Signature]  
Forest Supervisor

8/19/85  
Date

## Estimated Effects of Treatment on Soil Erosion Rates

Soil Map Unit No.	Acres Treated	Erosion Rate Before Treatment (Tons/Acre/Yr.)*	Erosion Rate After Treatment (Tons/Acre/Yr.)	Reduction in Erosion Rate (Tons/Acre/Yr.)
1	131	2.7	0.9	1.8
3	20	11.4	4.6	6.8
4	165	4.1	2.0	2.1
5	40	5.1	2.3	2.8
6	125	8.6	3.6	5.0
7	30	6.6	3.5	3.1
8	10	2.9	0.9	2.0
9	50	3.4	1.2	2.2
Average		(5.7)	(2.4)	(3.2)

\*One ton of sediment at a bulk density of 1.3 is about 0.9 cubic yards. Values for cubic yard measurements would be slightly less than four tons. These erosion rates are for sheet and rill erosion and represent estimated long term averages.

Total reduction of onsite erosion is estimated at 1,680 to 2,000 tons per year over the treated area. Control of sediment delivery to Straight Canyon is estimated at 3,000 to 4,000 tons per year.

Reducing sediment load in Straight Canyon by this amount will have a large dollar benefit for the various organizations which utilizes this water for culinary, industrial, irrigation and fishery purposes.

Implementing this project will reduce the amount of maintenance and cleanup which the State will need to do on State Highway 29. It is anticipated it will save the State at least two trips per summer to remove mud and debris from the road and would also reduce the cost of ditch maintenance. The State's maintenance costs could be reduced an estimated \$6,000 per year.

Increased vegetation can be obtained by allowing the water to enter the soil rather than running off the area and by reseeding the disturbed areas.

After revegetation is accomplished, it is estimated we could obtain an additional 50 AUM's valued at \$12.78 or \$639 per year. It is estimated the project would provide an additional 790 wildlife user days, valued at \$25.20 WFUD or \$19,908.

The above estimates are based on the results which have been obtained on the South Trail Watershed Project which is located adjacent to the proposed project.

RECEIVED

APR 12 1993

DIVISION OF OIL GAS & MINING

# TRAIL MOUNTAIN PROPERTY

EMERY COUNTY, UTAH

1993 SURFACE DRILLING HOLES TMTN-9 THROUGH TMTN-15  
PACIFICORP

March 31, 1993  
SCALE 1" = 1000'

Mahogany Point, Utah  
Quadrangle

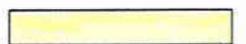
## LEGEND



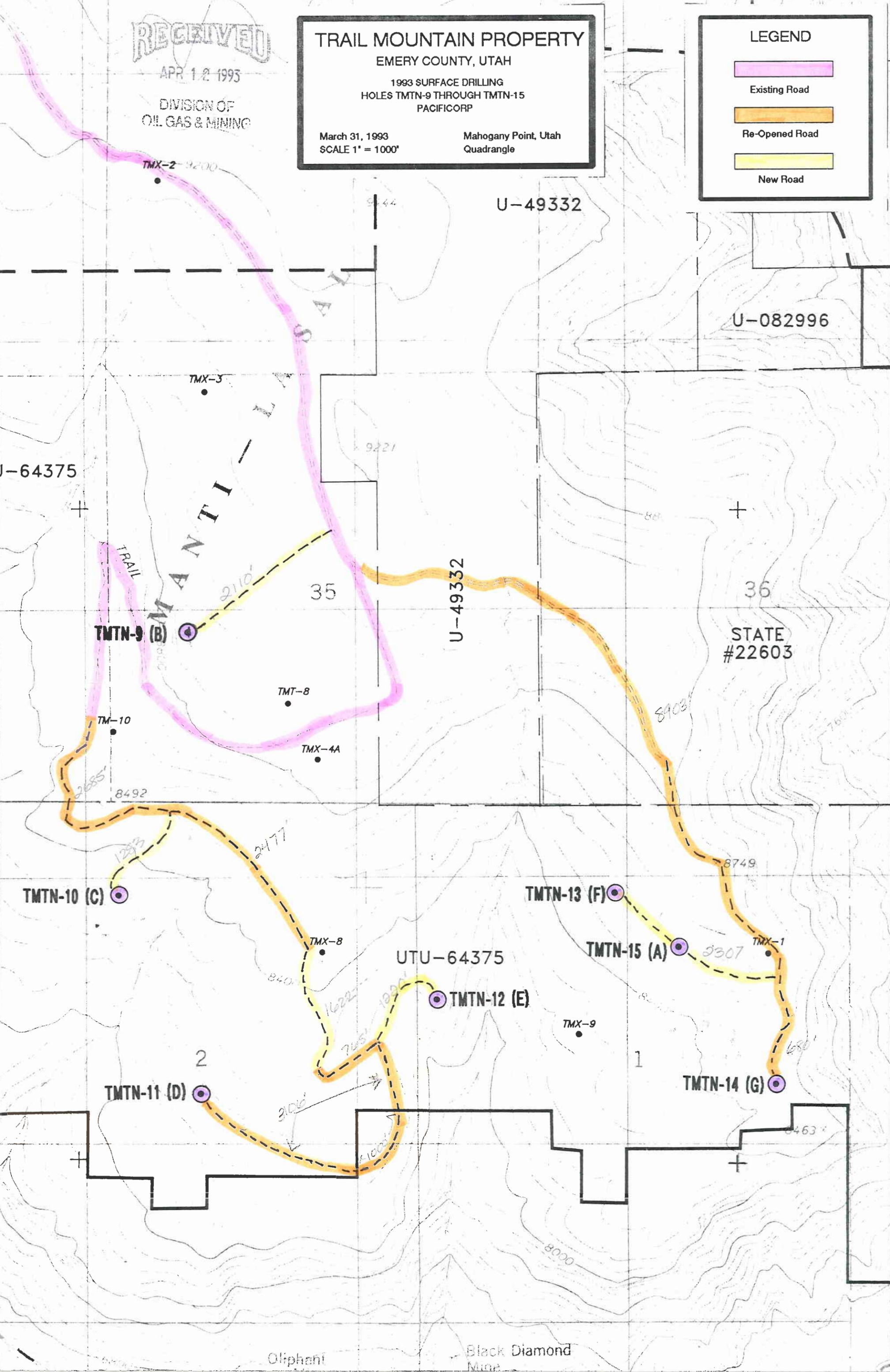
Existing Road



Re-Opened Road



New Road



TMX-2 9200

U-49332

U-082996

TMX-3

U-64375

TRAIL

TMTN-9 (B)

2110'

35

U-49332

36

STATE #22603

TMT-8

TMX-4A

TM-10

TMTN-10 (C)

2477'

TMTN-13 (F)

8749

TMTN-15 (A)

TMX-1

UTU-64375

TMTN-12 (E)

TMX-9

2

1

TMTN-11 (D)

2100'

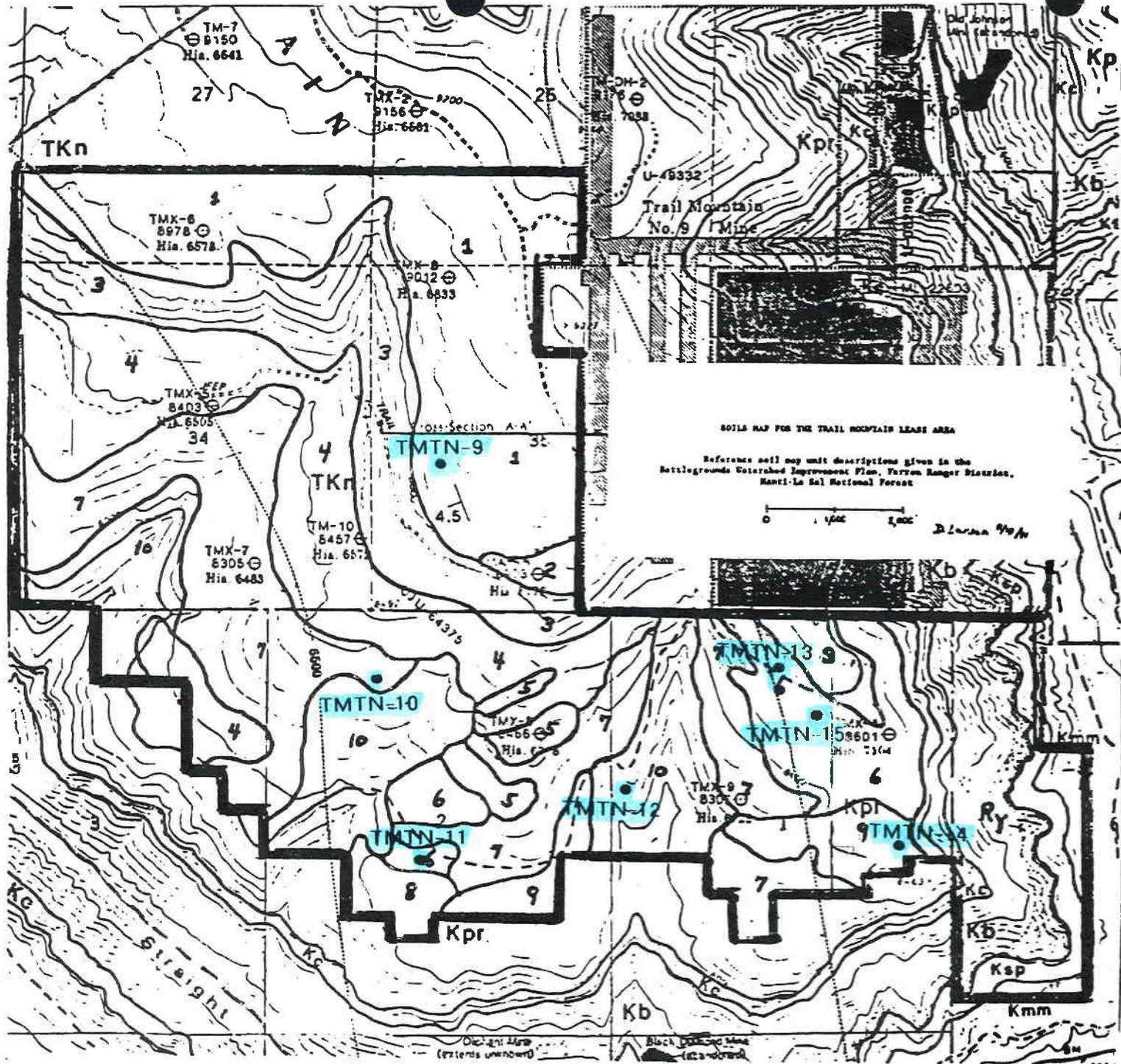
1000'

TMTN-14 (G)

8463'

Oliphant

Black Diamond





August 12, 1993

Pamela Grubaugh-Littig  
Division of Oil, Gas and Mining  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

*Please review  
by 9/10.*

RECEIVED

AUG 25 1993

DIVISION OF  
OIL, GAS & MINING

*Copy MM, Susan, Henry,  
Hugh, Jess*

RE: **1993 TRAIL MOUNTAIN EXPLORATION DRILLING AMENDMENT  
DEFICIENCIES, PACIFICORP, TRAIL MOUNTAIN MINE, ACT/015/009,  
EMERY COUNTY, UTAH**

#2

Dear Ms. Grubaugh-Littig:

PacificCorp has responded to the deficiency list that was faxed from your office on July 16, 1993 as follows:

- 1) ***The area disturbed by the exploration must be shown on all relevant maps as part of the disturbed area (see R645-301-521.163).***

A review of the pertinent maps of the Trail Mountain MRP revealed that the only relevant map was the Surface Facilities Map, 3-1. This map, due to its size and scale, does not encompass the whole permit area; therefore, a new map was generated that shows the exploration disturbance relative to the permit area, per discussion with Jess Kelley and Hugh Klein of the Division. Please find enclosed seven (7) copies of Drawing TMS1474B, Trail Mountain Exploration Disturbance Map 1993 Surface Drilling Holes TMTN-9 Through TMTN-15, to be included in the 1993 Drilling Application.

- 2) ***The permittee has calculated the cost of reclaiming the additional disturbed area, but still must either bond for that cost separately or else increase the existing bond to cover it (see R645-301-820.120).***

The existing bond in the Trail Mountain MRP has been increased sufficiently to cover the increase from exploration disturbance. Seven (7) copies of the Bonding Information will be submitted at a later date to be included in the 1993 Drilling Application as Attachment 7.

Please also find enclosed seven (7) copies of the List of Attachments revised 8/10/93 to show Attachment 7.

- 3) *The plan describes reclamation of the roads, pads and other facilities, but contains no provision for reclamation of the abandoned drill holes themselves. Upon completion of down-hole procedures, all drill holes must be completely filled with cement, in accordance with the circular "Bureau of Land Management Coal Exploration Drilling Stipulations Inside the Permit Area" (see May 28, 1993 letter from US Bureau of Land Management to the Division). The cost of reclaiming the drill holes must also be included in the reclamation cost estimate and in the reclamation bond.*

The cost associated with sealing the holes has been calculated and is enclosed for replacement of Attachment 5 in the 1993 Trail Mountain Drilling Plan. Please find enclosed seven (7) copies of Attachment 5.

- 4) *The plan must contain detailed information regarding treatment of disturbed area runoff from the drill pads, erosional control off the access roads, reclamation hydrology and updated hydrology maps showing this information.*

Treatment of the drill pads will be by use of a berm located at the perimeter of the pad to contain runoff as needed.

Erosion control off the access roads will be by use of silt fence for the areas that indicate erosion is occurring.

Reclamation hydrologic protection will be accomplished by the surrounding vegetation serving as a vegetative filter. As a secondary backup, the areas have several contour furrows that are used for water and sediment retention. These contour furrows were constructed in the 1980's in a watershed project on Trail Mountain by the USFS.

A map that shows the areas of disturbance has been generated and is referenced in Item #1, per discussion with Jess Kelley and Hugh Klein of the Division. Please find enclosed seven (7) copies of Pages 3, 5, 9 and 9.1 of the 1993 Drilling Application.

- 5) *The plan states that the exploration drilling will require approximately 0.75 acre-feet of water and that this water will be obtained from springs belonging to the Cottonwood Creek Consolidation Irrigation Company. There is however, no indication that the operator has reached an actual agreement with the irrigation company to obtain this water from it's springs.*

The confirmation of the approved use of the spring has been obtained from the Division of Water Rights and is to be enclosed as part of Attachment 6 in the 1993 Trail Mountain Drilling Plan. Please find enclosed seven (7) copies of the approval letter (Attachment 6).

- 6) ***The plan must include vegetation data both on the reference area and on the area to be disturbed.***

A survey is being conducted by Mt. Nebo Scientific and will be submitted upon completion.

- 7) ***The plan must set forth the vegetation success standards to be reached in reclamation.***

Standards will be determined and set from the survey from Mt. Nebo Scientific.

- 8) ***The plan must address interim vegetation in the event that exploration is not completed before winter.***

Interim vegetation is not planned. Once exploration drilling is completed at a drill site, it is put into final reclamation. Care will be taken to coordinate drill holes and reclamation activities to limit the amount of disturbed area before final reclamation. Even if the onset of winter occurs before final reclamation is completed, no growth would from interim reclamation occur before spring when final reclamation would be resumed. This information is included on page 9.1 and addressed under item #4 above.

- 9) ***The plan must address wildlife concerns raised by various agencies (see April 29, 1993 letter from Timothy H. Provan of the Utah Division of Wildlife Resources to Pamela Grubaugh-Littig of the Division; the May 7, 1993 letter from Kenneth W. Phippen of the Utah Division of Wildlife Resources to Dale L. Harber of the Manti LaSal National Forest; and the May 17, 1993 letter from Robert D. Williams of the US Fish and Wildlife Service to Pamela Grubaugh-Littig of the Division).***

The April 29, 1993 letter does not pertain to this amendment but was in reference to an Incidental Boundary Change at the Deer Creek Mine.

Concerns listed in the May 7, 1993 letter are being addressed by the USFS.

Concerns listed in the May 17, 1993 letter have already been addressed in the July 8, 1993 letter to Pamela Grubaugh-Littig where Table 1 was revised on June 28, 1993, Pages 18 and 19 of the drilling application.

- 10) ***The plan must include an Order I Soil Survey, as specified under R645-301-222 et. seq., R645-301-223 and the Division's Guidelines for the Management of Topsoil and Overburden. The soil survey must also meet the standards of the National Cooperative Soil Survey, as referenced in R645-302-314.100. The survey must encompass the proposed disturbance associated with the exploration proposal (i.e. roads and drill pads).***

Information will be submitted at a later date.

- 11) ***The Operator must commit to removing and segregating as a separate layer, all topsoil (as defined by the soil survey) from the area to be disturbed (see R645-301-232.100). The Operator must describe the methods and equipment which will be used to insure that the proper depth of topsoil is removed (see R645-301-231.100).***

Will be coordinated with Item #10 and handled at a later date.

- 12) ***The Operator's proposal to store and protect topsoil is not adequate and must be revised. Topsoil which is salvaged must be stockpiled and protected using a containment berm and/or silt fence around the perimeter of each stockpile. The topsoil stockpiles must be stabilized using a sterile nurse crop, surface mulch and/or other acceptable methods.***

This concern will be addressed as part of the response to Item 10.

- 13) ***The Operator must commit to notifying the Division prior to the commencement of reclamation activities.***

Page 9 of the 1993 Drilling Application was revised August 10, 1993 and seven (7) copies are enclosed under item #4.

- 14) ***Henry Sauer of the Division requests an onsite review of the results of the reclamation activities conducted on exploration drill holes EM149 through EM152 and the associated drill hole access roads. Reclamation methods and topsoil handling procedures are similar to those currently proposed for the reclamation of drill holes TMTN-9 through TMTN-15 and their associated access roads.***

Henry Sauer accompanied by Susan White, both of the Division, were on site on August 3, 1993. East Mountain drill holes and Trail Mountain proposed holes were examined.

Additionally seven (7) copies of the archeological report prepared by AERC are provided for placement in Attachment 4 of the 1993 Drilling Application.

If you have any questions please feel free to contact Karl R. Houskeeper or myself at 653-2312.

Sincerely,  
  
Val Payne

Sr. Environmental Engineer

KRH/dw  
Enclosures

cc: Steve Kochevar  
Larry LaFrentz  
J. Blake Webster  
Scott Child

PACIFIC CORP 1994 DRILL PLAN

ATTACHMENTS 1-3

# ***PACIFICORP***

***1994 TRAIL MOUNTAIN DRILLING PLAN  
DRILL HOLES TMTN-16 THROUGH TMTN-28***

***APPLICANT:***

***PACIFICORP  
ONE UTAH CENTER  
201 SOUTH MAIN, SUITE 2100  
SALT LAKE CITY, UTAH 84140-0021  
(801) 220-2000***

*ATTACHMENTS 1-3*

December 13, 1993

RECEIVED

DEC 16 1993

DIVISION OF  
OIL, GAS & MINING

Pamela Grubaugh-Littig  
Division of Oil, Gas and Mining  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

**RE: 1994 TRAIL MOUNTAIN EXPLORATION DRILLING APPLICATION  
AMENDMENT FOR REMOVAL OF LESS THAN 250 TONS OF COAL,  
PACIFICORP, TRAIL MOUNTAIN MINE, ACT/015/009, EMERY COUNTY,  
UTAH**

Dear Ms. Grubaugh-Littig:

Please find enclosed ten (10) copies of PacifiCorp's proposal to drill thirteen (13) surface exploration drill holes on Trail Mountain. The thirteen (13) holes are to be located within the Trail Mountain Mine Permit area ACT/015/009 as follows:

<u>DRILL HOLE NUMBER</u>	<u>LOCATION</u>	<u>NORTHING</u>	<u>EASTING</u>	<u>DEPTH</u>	<u>SURFACE OWNER</u>	<u>OBJECTIVE</u>
TMTN-16	SW1/4 SEC 27 T17S, R6E	356,450	2,075,662	2,520'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-17	NW1/4 SEC 34 T17S, R6E	355,231	2,077,324	2,440'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

TMTN-18	NW1/4 SEC 34 T17S, R6E	353,274	2,076,241	2,040'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-19	SW1/4 SEC 34 T17S, R6E	352,436	2,076,282	1,980'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-20	NW1/4 SEC 2 T18S, R6E	349,545	2,079,324	1,895'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-21*	NW1/4 SEC 2 T18S, R6E	348,653	2,079,759	1,760'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-22	NE1/4 SEC 2 T18S, R6E	348,109	2,081,468	1,740'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-23	NE1/4 SEC 2 T18S, R6E	349,665	2,082,129	1,940'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-24	NE1/4 SEC 34 T17S R6E	354,352	2,080,227	2,080'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-25	SE1/4 SEC 34 T17S R6E	352,638	2,079,211	1,940'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-26	SE1/4 SEC 2 T18S R6E	346,733	2,083,276	1,490'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

\* TMTN-21 was moved 150' North and 30' East as a result of the archeological study.

TMTN-27	NW1/4 SEC 1 T18S R6E	350,109	2,084,319	1,790'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-28	SW1/4 SEC 35 T17S R6E	351,138	2,081,663	2,265'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

Drill holes TMTN-16 through TMTN-28 have become necessary for long term mine planning. At present the Trail Mountain Mine is undergoing rehabilitation.

The following information is submitted for your review:

**TEXT:**

1994 Trail Mountain Drilling Plan TMTN-16 through TMTN-28.

**DRAWING:**

Trail Mountain Property  
1994 Surface Drilling  
TMTN-16 through TMTN-28

(This drawing is an 11" x 17" portion of 7.5 minute quadrangle map of Mahogany Point that has been enlarged to a 1" = 1000' scale map.)

**ATTACHMENTS:**

1. **Revegetation seed mix for Trail Mountain Reclamation.**  
Reclamation success.  
Vegetation sampling of the proposed drill sites on Trail Mountain 1994.
2. **BLM Coal Exploration Stipulations - PacifiCorp - 1993 Trail Mountain Drilling.**
3. **USFS 1994 Road Use Permit.**
4. **Archeological clearance for 1994 Coal Exploration.**
5. **PacifiCorp Reclamation Cost Estimate for Drill Holes TMTN-16 through TMTN-28.**

6. **Water Usage Estimate and Water Rights Information.**
7. **Bonding information.**
8. **Affidavit of newspaper publication.**
9. **Soil Survey information.**

**Soil Stripping and Stockpiling plan.**

**The surface rights for Drill Holes TMTN-16 through TMTN-28 belong to the Forest Service and subsurface rights are on Federal Lease UTU64375.**

**General access is via the existing Cottonwood Canyon and Trail Mountain road system. Access to the drill holes will be as follows:**

**DRILL HOLE NO.                      ACCESS**

**Open main access to TMTN-16 and TMTN-17 as follows: Reopen Approximately 2000' of road from TM-7, all of which is off the permitted area.**

<b>TMTN-16</b>	<b>Open approximately 1190' of new road off main access listed above, all of which is off the permitted area. Open approximately 1550' of new road, all of which is on the permitted area.</b>
<b>TMTN-17</b>	<b>Reopen approximately 400' of road off main access listed above, all of which is off the permitted area. Reopen approximately 1450' of road, all of which is on the permitted area. Open approximately 1630' of new road, all of which is on the permitted area.</b>
<b>TMTN-18</b>	<b>Open approximately 47' of new road off of an existing road, all of which is on the permitted area.</b>
<b>TMTN-19</b>	<b>Open approximately 1660' of new road off an existing road, all of which is on the permitted area.</b>
<b>TMTN-20</b>	<b>Open approximately 760' of new road off the 1993 drill access road, all of which is on the permitted area.</b>

- TMTN-21** Open approximately 1020' of new road off the 1993 TMTN-10 drill access road, all of which is on the permitted area.
- TMTN-22** Two routes have been discussed by State and Federal agencies as being acceptable: The first route takes off the 1993 drill access road above TMTN-23 and requires opening 1530' of new road, all of which is on the permitted area. The second route takes off the 1993 drill access road below TMX-8 and requires opening 1200' of new road, all of which is on the permitted area.
- TMTN-23** Open approximately 50' of new road off the 1993 drill road, all of which is on the permitted area.
- TMTN-24** Open approximately 725' of new road off an existing road, all of which is on the permitted area.
- TMTN-25** Open approximately 1380' of new road off an existing road, all of which is on the permitted area.
- TMTN-26** Open approximately 550' of new road off the 1993 drill road, all of which is on the permitted area.
- TMTN-27** Open approximately 2060' of new road off of TMTN-23, all of which is on the permitted area.
- TMTN-28** Open approximately 570' of new road off of an existing road, all of which is on the permitted area.

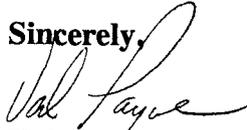
**A Location Map showing the drill sites and accesses is enclosed in the drilling application.**

**The drill pads will be located immediately adjacent to the access roads, thereby reducing surface disturbance.**

**PacifiCorp desires to initiate drilling and reclamation of TMTN-16 through TMTN-28 as soon as possible in 1994.**

Your assistance in facilitating this project is greatly appreciated. If you require additional copies of this submittal or other information please contact Karl Houskeeper or myself at 653-2312.

Sincerely,



Val Payne

Sr. Environmental Engineer

KH/kh

Enclosure

cc: George Morris - Forest Service (2 copies)  
Penelope Smalley - BLM  
Miles Moretti - Division of Wildlife Resources  
Rodger Fry  
Blake Webster  
Morgan Moon  
Chuck Semborski  
Scott Child

**PACIFICORP**  
**1994 TRAIL MOUNTAIN DRILLING PLAN**  
**DRILL HOLES TMTN-16 THROUGH TMTN-28**

**APPLICANT:**  
**PACIFICORP**  
**ONE UTAH CENTER**  
**201 SOUTH MAIN, SUITE 2100**  
**SALT LAKE CITY, UTAH 84140-0021**  
**(801) 220-2000**

## **LIST OF ATTACHMENTS**

1. **REVEGETATION SEED MIX FOR TRAIL MOUNTAIN RECLAMATION.  
RECLAMATION SUCCESS.  
VEGETATION SAMPLING OF THE PROPOSED DRILL SITES ON TRAIL  
MOUNTAIN 1994.**
2. **BLM COAL EXPLORATION STIPULATIONS - PACIFICORP - 1993 TRAIL  
MOUNTAIN DRILLING.**
3. **USFS 1994 ROAD USE PERMIT.**
4. **ARCHEOLOGICAL CLEARANCE FOR 1994 COAL EXPLORATION.**
5. **PACIFICORP RECLAMATION COST ESTIMATE FOR DRILL HOLES TMTN-  
16 THROUGH TMTN-28.**
6. **WATER USAGE ESTIMATE AND WATER RIGHTS INFORMATION.**
7. **BONDING INFORMATION.**
8. **AFFIDAVIT OF NEWSPAPER PUBLICATION.**
9. **SOIL SURVEY INFORMATION.  
SOIL STRIPPING AND STOCKPILING PLAN.**

# PACIFICORP

## 1993 TRAIL MOUNTAIN DRILLING PLAN

### DRILL HOLES TMTN-16 THROUGH TMTN-28

It is planned to conduct surface drilling above the Trail Mountain Mine located near Orangeville, Utah. Less than 250 tons of coal will be removed. DOGM will be notified prior to drilling activities.

Proposed are thirteen (13) holes TMTN-16 through TMTN-28, as shown on the enclosed map. Access to drill holes TMTN-16 through TMTN-28 will need to be constructed as discussed later. The location depth and elevation of the holes are as follows:

<u>DRILL HOLE NUMBER</u>	<u>LOCATION</u>	<u>NORTHING</u>	<u>EASTING</u>	<u>DEPTH</u>	<u>SURFACE OWNER</u>	<u>OBJECTIVE</u>
TMTN-16	SW1/4 SEC 27 T17S, R6E	356,450	2,075,662	2,520'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-17	NW1/4 SEC 34 T17S, R6E	355,231	2,077,324	2,440'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

TMTN-18	NW1/4 SEC 34 T17S, R6E	353,274	2,076,241	2,040'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-19	SW1/4 SEC 34 T17S, R6E	352,436	2,076,282	1,980'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-20	NW1/4 SEC 2 T18S, R6E	349,545	2,079,324	1,895'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-21*	NW1/4 SEC 2 T18S, R6E	348,653	2,079,759	1,760'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-22	NE1/4 SEC 2 T18S, R6E	348,109	2,081,468	1,740'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-23	NE1/4 SEC 2 T18S, R6E	349,665	2,082,129	1,940'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

\* TMTN-21 was moved 150' North and 30' East as a result of the archeological study.

TMTN-24	NE1/4 SEC 34 T17S R6E	354,352	2,080,227	2,080'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-25	SE1/4 SEC 34 T17S R6E	352,638	2,079,211	1,940'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-26	SE1/4 SEC 2 T18S R6E	346,733	2,083,276	1,490'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-27	NW1/4 SEC 1 T18S R6E	350,109	2,084,319	1,790'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA
TMTN-28	SW1/4 SEC 35 T17S R6E	351,138	2,081,663	2,265'	FOREST SERVICE	EVALUATE COAL ELEVATION, THICKNESS, QUALITY AND IDENTIFY SURROUNDING STRATA

After drilling is completed the holes will be geophysically logged to the full depth and the holes will be plugged in accordance with BLM requirements.

In accordance with Federal Regulations 30 CFR 211 and the Utah Permanent Coal Mining Regulations, the following is submitted:  
**NAME AND ADDRESS OF RESPONSIBLE PERSON:**

Mr. Dale Wilson  
Energy West  
Huntington Field Office  
PO Box 1005  
Huntington, Utah 84521  
(801) 653-2312

**SURFACE OWNERSHIP OTHER THAN UNITED STATES:**

United States Forest Service

**SUBSURFACE OWNERSHIP OTHER THAN UNITED STATES:**

Bureau of Land Management

**METHOD OF DRILLING**

It is proposed to drill holes TMTN-16 through TMTN-28 to the depths specified.  
Drilling will be accomplished by means of surface drilling utilizing a rotary drill rig.

**DRILLING EQUIPMENT**

**Drill Rig:**

1 1500 Rotary Drill Rig

The drilling rig will require support vehicles as follows:

1 Water truck, 80 to 100 barrel capacity  
1 Flat-bed truck for carrying drill pipe and casing  
1 D8H Crawler Tractor  
1 Landscape Tractor/Trailer  
1 Semi-Truck/Flat-bed Trailer  
1 Logging Truck (Geophysical Probe Truck)  
4 Pickup Trucks (Crew Transportation)  
1 700 CFM Compressor and Booster

The drilling pad and mud pits will be constructed using a crawler tractor and backhoe. On relatively flat areas blade work will be minimal, only the low growing brush will be removed by back-blading the surface.

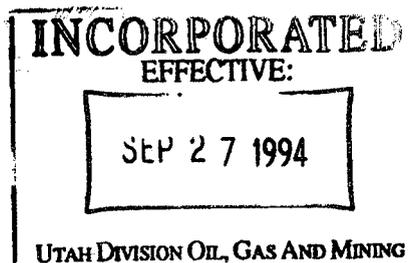
Preservation of topsoil is managed by stripping the drill pad and stockpiling the topsoil adjacent to the drilling site.

**Drilling sequence is as follows:**

A crawler tractor constructs a minimum width road from the existing road system to the proposed site. This rough construction road is built balancing the cuts and fills. The drill pad, usually 100' x 150' is laid out to fit the slope of ground allowing for the least amount of cut.

The site is cleared of brush and topsoil is stripped using a crawler tractor (dozer). Topsoil will be stripped and stockpiled according to the soil stripping plan found in Attachment 9 awaiting reclamation work. Silt fence material will be made available for protection of the topsoil stockpile if needed. Mud pits are then excavated. Treatment of the drill pads will be by use of a berm located at the perimeter of the pad to contain runoff as needed. Upon completion of the drill pad site the drill rig is driven to the site and set up to begin drilling. Ancillary equipment such as compressors, booster, water truck and flat-bed (drill pipe) trucks are positioned on the pad.

Once drilling has begun it continues until the exploration hole is completed or in the case of a planned core hole, casing is set at the prescribed depth. During the drilling period, drilling materials and cement are delivered to the site awaiting plugging of the hole.



After reaching the planned depth the drill string is removed from the hole and the geophysical logging truck is positioned to probe the hole. Upon recording the necessary data (geophysical logs) the hole is plugged, as specified by the BLM, using a two to one cement/water slurry plugging the entire length of the hole drilled. The drilling rig and support equipment are then moved from the site. The drilling site is cleaned of waste and trash and reclamation of the site will begin as soon as the mud pits have lost their fluids.

### POLLUTION CONTROL MEASURES

#### Fire Prevention:

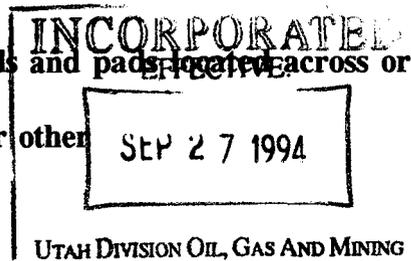
In the past, fire hazard has not been a major problem. The clearing of drill sites reduces the chance of machine related ignitions and the storing of combustible fuels in a safe area further lessens any fire hazards associated with drilling. Each drilling rig is attended both day and night and if needed, a 3,000 gallon water truck is available for fire suppression.

#### Soil Erosion:

Short-term soil erosion protection is accomplished by road design, that is, during road construction the roads are located at the minimum grade possible and out-sloped for drainage. Erosion control off the access roads will be by use of silt fence for the areas that indicate erosion is occurring. Per USFS request reclamation work requires all roads not obliterated, but left for future exploration activities that utilize these same roads, to have water bars installed and all disturbed areas will be seeded.

#### Water Pollution Control Measures:

What little surface water exists on Trail Mountain is found in the form of springs, seeps and small ponds. These waters are used primarily for stock and wildlife and some are developed with tanks and troughs. All access roads and pads ~~across~~ adjacent to live or intermittent streams will require culverts or other



protective measures to safeguard water quality. Ground water encountered during drilling will be evaluated for monitoring purposes and reported as stipulated by the BLM.

Present DOGM regulations are specific in monitoring ground water (hydrologic balance) for determining future impacts associated with mining. Measures to protect the migration of ground water will be to cement the hole completely.

**Air Pollution:**

We anticipate no significant impact to the air quality due to the drilling and other than watering roads for dust suppression when necessary no specific measures are planned.

**Damage to Fish and Wildlife:**

The area of drilling is abundant with wildlife and is known primarily for its deer and elk harvest each Fall. Past experience has proven the wildlife disturbance is minimal.

**Fisheries:**

There are no major fisheries within the drilling influence zone.

**OTHER NATURAL RESOURCES**

Drill holes TMTN-16 and TMTN-17 will require reopening approximately 2000' of road from TM-7 all of which is off the permitted area. It is estimated that a total of .69 acres of disturbance will occur off the permit area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetative seeding.

Drill hole TMTN-16 will require; opening approximately 1190' of new road off the main access road listed above all of which is off the permitted area, opening approximately 1550' of new road and drill pad all of which is on the permitted area. It is estimated that .41 acres of disturbance will occur off the permitted area and .87 acres of disturbance will occur on the permitted area for a total disturbance of 1.28 acres. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-17 will require; reopening approximately 400' of road off the main access listed above all of which is off the permitted area, reopening approximately 1450' of road all of which is on the permitted area, opening approximately 1630' of new road and drill pad all of which is on the permitted area. It is estimated that .13 acres of disturbance will occur off the permitted area and 1.40 acres of disturbance will occur on the permitted area for a total disturbance of 1.53 acres. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-18 will require pad construction and opening 47' of new road off an existing road all of which is on the permitted area. It is estimated that .36 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

INCORPORATED  
EFFECTIVE  
SEP 27 1994  
UTAH DIVISION OIL, GAS AND MINING

Drill hole TMTN-19 will require pad construction and opening 1660' of new road off an existing road all of which is on the permitted area. It is estimated that .91 acres of disturbance will occur on the permitted area. For the most part this disturbance

will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-20 will require pad construction and opening 760' of new road off the 1993 drill access road all of which is on the permitted area. It is estimated that .60 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-21 will require pad construction and opening 1020' of new road off the 1993 TMTN-10 drill pad all of which is on the permitted area. It is estimated that .69 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Two routes have been discussed by State and Federal agencies for accessing TMTN-22. Both routes are described as follows; The first route would require pad construction and opening approximately 1530' of new road off the 1993 drill access road above TMTN-23 proposed location all of which is on the permitted area. It is estimated that .87 acres of disturbance will occur on the permitted area in association with the first route. The second route would require pad construction and opening approximately 1200' of new road off the 1993 drill access road below TMX-8 all of which is on the permitted area. It is estimated that .75 acres of disturbance will occur on the permitted area in association with the second route. For the most part, the disturbance from either route will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-23 will require pad construction and opening approximately 50' of new road off the 1993 drill access road all of which is on the permitted area. It is estimated that .36 acres will be disturbed. For the most part, this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-24 will require pad construction and opening 725' of new road off an existing road all of which is on the permitted area. It is estimated that .59 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-25 will require pad construction and opening 1380' of new road off an existing road all of which is on the permitted area. It is estimated that .81 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-26 will require pad construction and opening approximately 550' of new road off the 1993 drill access road all of which is on the permitted area. It is estimated that .53 acres will be disturbed. For the most part, this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-27 will require pad construction and opening 2060' of new road off of TMTN-23 drill pad all of which is on the permitted area. It is estimated that 1.05 acres of disturbance will occur on the permitted area. For the most part this

disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

Drill hole TMTN-28 will require pad construction and opening 570' of new road off an existing road all of which is on the permitted area. It is estimated that .54 acres of disturbance will occur on the permitted area. For the most part this disturbance will occur on open grass covered range land. Specific action to reduce this impact will be revegetive seeding.

### **PUBLIC HEALTH AND SAFETY**

Due to the remoteness of the drilling area, public safety involvement is small. PacifiCorp requires by contract that the drilling contractor is knowledgeable and complies with all state and local laws related to his drilling operations and that all equipment used in conjunction with this project meet the safety standards of the federal, state and local governing agencies.

#### **Method of Plugging Drill Holes:**

After the hole is drilled and geophysically logged, a proper cement slurry shall be placed in the hole through the open-ended drill pipe using 200 foot segmented lifts for inducing a pressure grout for plugging the drill hole. A hole location marker shall be placed on the surface of the hole to witness its location. This procedure will achieve compliance with the BLM hole plugging requirements as prescribed in Attachment 2.

**SURFACE RECLAMATION**

**Reclamation Schedule:**

It is planned to reclaim the drill site as soon as possible after completion of drilling unless directed otherwise by USFS personnel. Reclamation costs found in Attachment 9 are derived from historic exploration costs on east and trail mountain. DOGM will be notified immediately before and after reclamation. We have found from prior drilling in this area that the mud pits require at least two weeks or more to dissipate their fluids. After the reclamation sequence has started it will continue until complete.

The average time to drill a 2,000 foot hole in this area is about four days, reclamation work per drill site will average two days. We are planning to complete the reclamation work during 1994. Reclamation success is discussed in Attachment 1. Reclamation hydrologic protection will be accomplished by the surrounding vegetation serving as a vegetative filter. As a secondary backup, the areas have several contour furrows that are used for water and sediment retention. These contour furrows were constructed in the 1980's in a water shed project on Trail Mountain by the USFS.

**Grading and Backfilling:**

Pad removals are scheduled to be completed in 1994, in accordance with the surface management agency's stipulations.

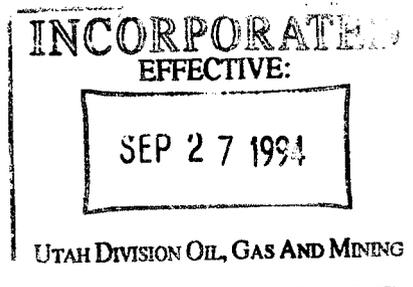
**INCORPORATED**  
EFFECTIVE:  
**SEP 27 1994**

Using a crawler tractor, mud pits will be filled in the drill pad bladed, contoured to its original shape and the previously stockpiled topsoil spread evenly over the disturbed area.

**Method of Soil Preparation and Fertilizer Application:**

There is no special soil preparation planned excepting harrowing the disturbed areas after seeding. No fertilizer is planned unless stipulated by the surface owner.

Interim vegetation is not planned. Once exploration drilling is completed at a drill site, it is put into final reclamation. Care will be taken to coordinate drill holes and reclamation activities to limit the amount of disturbed area before final reclamation. Even if the onset of winter occurs before final reclamation is completed, no growth from interim reclamation would occur before spring when final reclamation would be resumed.



**Type and Mixture of Seeds (see Attachment 1):**

<b><u>COMMON NAME</u></b>	<b><u>SCIENTIFIC NAME</u></b>	<b><u>LBS/ACRE PLS</u></b>
Intermediate Wheatgrass	Agropyron intermedium	3
Slender Wheatgrass	Agropyron trachycaulus	3
Crested Wheatgrass	Agropyron cristatum var. high crest or Ephraim	3
Smooth Brome	Bromus inermis	3
Yellow Sweet Clover	Melilotus officinalis	1
Ladak Alfalfa	Medicago sativa ladak	1
Small Burnett	Sanguisorba minor	1
Mountain Mahogany	Cercocarpus moutanus	1
Utah Serviceberry	Amelanchier alnifolia	1
Mountain Big Sagebrush	Artemisia tridentata vaseyana	1

This seed mixture must be 99 percent pure live seed, certified weed-free, and applied at the rate of 18 pounds per acre.

All seeds are broadcast by a hand-held rotary broadcaster. Areas seeded are cultivated and raked with a tractor-drawn tooth harrow. The rate of application is approximately 18 pounds PLS per acre.

**Estimated Timetable and Completion Date for Reclamation Work:**

Once reclamation of a drill site begins all phases are continuous, that is, cat work, spreading topsoil, ditching, seeding and harrowing.

Included in this submittal is an 11" x 17" portion of the 7.5 minute map of Mahogany Point showing existing roads, major drainages, surface ownership and the proposed drilling sites.

# 1994 PROPOSED DRILLING

## TRAIL MOUNTAIN

### DRILL HOLES TMTN-16 THROUGH TMTN-28

DRILL HOLE NUMBER	LOCATION	NORTHING	EASTING	TOTAL DEPTH FEET	LEASE NUMBER	SURFACE OWNER
TMTN-16	SW1/4 SEC 27 T17S, R6E	356,450	2,075,682	2,520'	UTU-64375	FOREST SERVICE
TMTN-17	NW1/4 SEC 34 T17S, R6E	355,231	2,077,324	2,440'	UTU-64375	FOREST SERVICE
TMTN-18	NW1/4 SEC 34 T17S, R6E	353,274	2,076,241	2,040'	UTU-64375	FOREST SERVICE
TMTN-19	SW1/4 SEC 34 T17, R6E	352,436	2,076,282	1,980'	UTU-64375	FOREST SERVICE
TMTN-20	NW1/4 SEC 2 T18S, R6E	349,545	2,079,324	1,895'	UTU-64375	FOREST SERVICE
TMTN-21 *	NW1/4 SEC 2 T18S, R6E	348,653	2,079,759	1,760'	UTU-64375	FOREST SERVICE
TMTN-22	NE1/4 SEC 2 T18S, R6E	348,109	2,081,468	1,740'	UTU-64375	FOREST SERVICE
TMTN-23	NE1/4 SEC 2 T18S, R6E	349,665	2,082,129	1,940'	UTU-64375	FOREST SERVICE
TMTN-24	NE1/4 SEC 34 T17S, R6E	354,352	2,080,227	2,080'	UTU-64375	FOREST SERVICE
TMTN-25	SE1/4 SEC 34 T17S, R6E	352,638	2,079,211	1,940'	UTU-64375	FOREST SERVICE
TMTN-26	SE1/4 SEC 2 T18S, R6E	346,733	2,083,276	1,490'	UTU-64375	FOREST SERVICE
TMTN-27	NW1/4 SEC 1 T18S, R6E	350,109	2,084,319	1,790'	UTU-64375	FOREST SERVICE
TMTN-28	SW1/4 SEC 35 T17S, R6E	351,138	2,081,663	2,265'	UTU-64375	FOREST SERVICE

\* TMTN-21 was moved 150' North and 30' East as a result of the archeological study.

### ENVIRONMENT

The area of exploration is located on Trail Mountain in the Wasatch plateau area of eastern Utah near Orangeville.

### Soils

The dry, desert soils of the valley east and south of the mines are used mainly for range and pasture. Irrigated cropland occurs in small areas where water is available. These valley soils receive 8 to 14 inches of precipitation annually and have a low to moderate erosion potential (Wilson, et al, 1975).

The soil types of the mountainous areas surrounding the exploration area are characteristic of canyon slopes, geologic folds and faults. Bare rock and shallow soils over sandstone bedrock occur over most of the area. These soils support valuable watersheds, recreational areas and wildlife habitat. Runoff in these areas is high and contributes to heavy sedimentation and erosion problems. These erosion characteristics indicate that the revegetation potential is poor (Wilson, et al, 1975).

### Vegetation

The dominant vegetation types are characteristic of central Utah (Foster, 1968).

Pinyon-juniper woodland is on the dry, south slopes and intergrades with sagebrush and grassland types at higher elevations on Trail Mountain. Spruce-fir Douglas fir forest occupies the ravines, ridge top, and the more mesic north slopes at elevations above 8,000 feet (Holmgren, 1972). In mesic areas surrounding springs and seeps on the mountain tops, small meadows are present.

Pinyon pine (Pinus edulis), juniper (Juniperus osterosperma), mountain mahogany (Cercocarpus spp.) and serviceberry (Amelanchier utahensis) are the common woody plant species. These forms provide an open canopy. The understory of pinyon-juniper habitat is sparse and consists of scattered clumps of Indian ricegrass (Oryzopsis hymenoides) and forbs.

White fir (Abies concolor), Douglas fir (Pseudotsuga menziesii), and Engelmann spruce (Picea engelmannii) are the characteristic overstory species in the spruce-fir Douglas fir vegetation type. Stands of aspen (Populus tremuloides) are scattered throughout the conifer vegetation. The understory associated with the conifers includes snowberry (Symphoricarpos oreophilus), buffaloberry (Shepherdia canadensis), twinflower

(Linnaea borealis), blueberry (Vaccinium caespitosum), and miterwort (Mitella stenopetala). Annuals make up a very minor part of the cover.

### Fish and Wildlife

The southern area is in pinyon-juniper habitat. A number of important vertebrate species are typical of this habitat within the region. (The sparse vegetation and steep, dry conditions present at the portal areas are less suitable for wildlife than are densely vegetated portions of pinyon-juniper habitat on gently sloping terrain south and west of the mine property.

The mule deer is the most conspicuous large mammal in pinyon-juniper habitat in the mine vicinity. Other mammal species found in this habitat include black-tailed jackrabbit, mountain cottontail, coyote, badger, striped skunk, deer mouse, pinion mouse, least chipmunk, hoary bat, and western big-eared bat (Brown, et al, 1958).

Typical birds in pinyon-juniper habitat include the mourning dove, pinion jay, western bluebird, western kingbird, American kestrel and chipping sparrow (Brown, et al, 1958).

Dry surface conditions and the absence of standing water virtually preclude the presence of amphibians from pinyon-juniper habitat in the immediate vicinity, but several reptile species are common. The side-blotched lizard, eastern fence lizard, sagebrush lizard, racer, gopher snake, and western rattlesnake are representative species in this habitat type throughout the region (Stebbins, 1966).

Spruce fir Douglas fir and pinyon juniper habitats intermingle in canyon bottoms and at intermediate elevations to form a transition zone between the two vegetation types. Aspen groves in the spruce-fir Douglas fir communities offer excellent calving areas for

elk (US Forest Service, 1976). Mule deer, snowshoe hare, and blue grouse are important game species in forested areas. Non-game mammals which inhabit forest areas include bobcat, beaver, porcupine, red fox, coyote, mountain vole, deer mouse, hoary bat, and silver-haired bat.

Many bird species frequent the forested portions of Trail Mountain. Conspicuous breeding birds include band-tailed pigeon, plain titmouse, Clark's nutcracker, raven, turkey vulture, great horned owl, red-tailed hawk and golden eagle.

Amphibian species such as the chorus frog and western toad inhabit mesic areas of the site. Reptiles are probably not abundant, but the short-horned lizard, sagebrush lizard, gopher snake, and western terrestrial garter snake inhabit sagebrush and forest-sagebrush ecotones in the site region.

Sagebrush and grassland habitat, and some mesic vegetation types occur on the relatively flat upper benches of Trail Mountain. Meadow habitat is limited to small drainage areas and a few springs. These habitats, combined with the forest edge ecotonal areas, are suitable for elk, mule deer, sage grouse, ruffed grouse, blue grouse and snowshoe hare.

The additional moisture, increased vegetation, and structural diversity of the vegetation in the forest-sagebrush and forest-grassland ecotones provide habitat for more vertebrate species than is provided by pinyon-juniper woodland.

The stream habitat is considered of critical value to the areas wildlife even though fish do not actually occupy the area of concern. It is a feeder stream to a class 3 fishery in lower Cottonwood Creek.

## **Important Species**

**Important wildlife species are defined as those which are of recreational or economic value, are essential to the structure and function of the ecosystems in which they occur, or which have special status (e.g. endangered, declining, protected, etc.) within the region.**

**Several important species occur on and near East Mountain. The status, known distribution in the region and general habitat preference of each are discussed below.**

- o Mule Deer (*Odocoileus hemionus*) - Mule deer range throughout all habitats on East Mountain. Pinion-juniper on the lower slopes of East Mountain are used as winter range. During other seasons deer concentrations are greater at high elevations. They occupy winter range from 12-1 to 4-15. South facing slopes are critical for winter food availability (Dalton, Price, Romin, 1990).**
- o Elk (*Cervus elaphus*) - Elk inhabit all elevations. Forest edges and aspen are critical for calving from 5-15 to 7-15. Altitudinal migration is displayed by this game animal and they occupy winter range from 12-1 to 4-15 (Dalton, Price, Romin, 1990).**
- o Mountain Lion (*Felis concolor*) - This species inhabits rugged mountains and forest areas in the region and may be found at all elevations on the Wasatch Plateau. It is common in relative abundance. Deer make up 75% of their winter diet (Dalton, Price, Romin, 1990).**
- o Snowshoe Hare (*Lepus americanus*) - This species is common in submontane and montane areas of the Wasatch Plateau. Nests are shallow**

depressions in dead leaves under trees. Young are born from April to August. It inhabits higher elevations on East Mountain (Dalton, Price, Romin, 1990).

- o **Mountain Cottontail (Sylvilagus nuttalli)** - Mountain cottontails inhabit brushy areas and forests, particularly on rocky slopes throughout the region. They are common in the submontane and montane elevations of the Wasatch Plateau. Their population trend is stable. (USDI Bureau of Land Management, 1976; Dalton, Price, Romin, 1990).
- o **Blue Grouse (Dendragapus obscurus)** - Open conifer stands with brushy understory in the submontane and montane zones provide suitable habitat for this species. Blue grouse occur on the Wasatch Plateau. Their population trend is stable (Dalton, Price, Romin, 1990).
- o **Ruffed Grouse (Bonasa umbellus)** - Brushy woodlands (aspens, willows and conifers) near streams and springs are suitable habitat. This species occurs at submontane and montane elevations of the Wasatch Plateau. Breeding occurs from March through May and is centered around a drumming log (Dalton, Price, Romin, 1990).
- o **Chukar Partridge (Alectoris chukar)** - This species prefers steep, rocky, grassy or brushy slopes in arid mountains and canyons of desert and submontane zones. This species was introduced in Utah from 1951 to 1968. During this period 185,911 individuals were released at 191 different locations. The species is now widely distributed throughout Utah and other western states. Their population trend is stable (Rawley and Bailey, 1972; Dalton, Price, Romin, 1990).

- o **Mourning Dove (Zenaidura macroura)** - This is an important game bird in many parts of North America. Mourning doves prefer open field and forest edge habitat, but occur over a broad range of vegetation types throughout the 48 conterminous United States. The species occurs in pinion-juniper and forest edge habitat on East Mountain.

**Special Status Species**

Table I is a current listing of Threatened, Endangered and Sensitive species occurring within the Price and Ferron District of the Manti-La Sal National Forest. None are known to inhabit the areas of the proposed 1994 drilling; however, prior to initiating drilling activities the area will be surveyed as necessary in cooperation with the appropriate agencies.

TABLE 1  
 THREATENED, ENDANGERED AND SENSITIVE SPECIES  
 OCCURRING IN THE PRICE AND FERRON DISTRICTS  
 OF THE MANTI-LA SAL NATIONAL FOREST<sup>a</sup>

	COMMON NAME	SPECIES	STATUS <sup>b</sup>		LOCATION AND HABITAT
			USFWS <sup>c</sup>	USFS <sup>d</sup>	
MAMMALS	Spotted bat	<i>Eudarma maculatum</i>	C2	S	Ponderosa pine, desert scrub, pinyon-juniper, open pasture state-wide. Roost in crevices on cliff faces.
	Western big-eared bat	<i>Plecotus townsendii</i>	None	S	Pinyon-juniper forests, shrub/steep grasslands, deciduous and mixed-conifer forests from sea level to 10,000 ft. elevation. Winter roosting in caves, mine shafts, rocky outcrops and buildings.
BIRDS	Bald Eagle	<i>Haliaeetus leucocephalus</i>	E	E	Winter visitor, open water and upland areas.
	Flammulated owl	<i>Otus flammeolus</i>	None	S	Mature ponderosa pine-Douglas fir forests with open canopies and large diameter dead trees.
	Three-toed woodpecker	<i>Picoides tridactylus</i>	None	S	Coniferous and mixed forests to 9,000 ft. elevation.
REPTILES/ AMPHIBIANS	Spotted frog	<i>Rana pretiosa</i>	C1	S	Marshy edges of permanent ponds and lakes, algae-grown overflow pools of streams, near springs with emergent vegetation.
PLANTS	Heliotrope milkvetch	<i>Astragalus montii</i>	T	T	Flagstaff limestone formation in the subalpine mixed grass-forb community above 10,500 feet elevation. Presently known to occur only on 3 sites on South end of the Wasatch Plateau in Sevier and Sanpete counties.
	Canyonlands sedge	<i>Carex curatorum</i>	C3	S	Scad Valley and South side of Ferron Mtn. in Current Creek area.
	Creutzfeldt flower	<i>Cryptantha creutzfeldtii</i>	C2	S	Open, dry Mancos shale; open pinyon-juniper and salt desert shrub plant communities between 5,500 to 6,500 feet elevation.
	Carrington daisy	<i>Erigeron carringtonae</i>	C2	S	Meadows and escarpment margins on Flagstaff limestone between 10,000 and 11,000 feet elevation.
	Sedge fescue	<i>Festuca dasyclada</i>	3c	S	Open slopes and ridges in sagebrush, mountain brush, and juniper communities on Green River Shale formation and limestone gravels between 6,990 and 10,000 feet elevation.
	Canyon Sweetvetch	<i>Hedysarum occidentale</i> var. <i>canone</i>	C2	S	Alluvium or outwash deposited material; pinyon-juniper, sagebrush communities between 5,000 and 8,000 feet elevation.
	Low hymenoxys	<i>Hymenoxys depressa</i>	C2	S	Ephedra, sagebrush, shadscale and pinyon-juniper communities on very rocky, shallow fine silty clay to clay loam soils between 4,400 and 8,000 feet elevation.
	Halenium hymenoxys	<i>Hymenoxys halenioides</i>	3b	S	Mountain brush, sagebrush, aspen, and dry meadow communities on clay loam soils between 8,000 to 10,700 feet elevation.

Maguire  
campion

*Silene*  
*petersonii*

C2

S

Ponderosa pine, Rocky Mountain juniper, bristlecone pine, spruce-fir and aspen-sagebrush communities on open calcareous and igneous gravels between 6,955 to 11,200 feet elevation.

Ute ladies'-  
tresses

*Spiranthes*  
*diluvialis*

T

T

Low, wet or mesic riparian meadows or in understory meadows of riparian woodlands in the Colorado River drainage of Eastern Utah. "No known population or habitat has been found on the forest to date, 3/92". (Dr. Bob Thompson, USFS Price)

<sup>1</sup> Spahr, et al. 1991  
Atwood, et al. 1991

<sup>2</sup> S-Sensitive, T-Threatened, E-Endangered, see page 21

<sup>3</sup> Endangered Species Act Listing

<sup>4</sup> Forest Service Region 4 Status

## **DEFINITIONS**

### **FEDERAL STATUS**

**Species listed as endangered or threatened or as candidates for endangered or threatened status under the Endangered Species Act are defined as follows:**

#### **Listed Species (from Endangered Species Act, Section 3)**

**Endangered - Taxa in danger of extinction throughout all or a significant portion of its range.**

**Threatened - Taxa likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.**

#### **Candidate Species (from Federal Register 54(4):554-579)**

**Category 1(C1) - Taxa for which the US Fish and Wildlife Service currently has substantial information on hand to support the biological appropriateness of proposing to list as endangered or threatened. Proposed rules have not yet been issued, but development and publication of proposed rules are anticipated.**

**Category 2(C2) - Taxa for which information now in possession of the US Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. Further biological research and field study may be needed to ascertain the status of taxa in this category.**

**Possibly Extinct Category 2(C2\*) - Taxa possibly extinct.**

**Category 3(C3) - Taxa that were once being considered for listing as endangered or threatened, but are not currently receiving such consideration.**

**3a - Taxa for which the US Fish and Wildlife Service has persuasive evidence of extinction.**

**3b - Taxa that do not meet the legal definition of a species under the Endangered Species Act.**

**3c - Taxa that are now considered to be more abundant and/or widespread than previously thought.**

**Proposed (P) - Taxa which are proposed for a specified status (listed or candidate).**

## **FOREST SERVICE REGION 4 STATUS**

**Endangered - See Federal Status**

**Threatened - See Federal Status**

**Sensitive Species (from Forest Service Manual 2670.5) - Those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:**

- a. Significant current or predicted downward trends in population numbers or density.**
- b. Significant current or predicted downward trends in habitat capability that would reduce a species existing distribution.**

**Land Use:**

Land in the exploration area of Trail Mountain is used for range forage, wildlife habitat, timber, recreation, and mineral extraction. The timber value of spruce and fir in the area is minimal. Most of the timber is classified as non-commercial (USDI Forest Service and BLM, 1976) since inaccessibility, size class distribution and market conditions limit the economic feasibility of commercial operations.

This area includes range allotments, the Gentry Mountain Cattle and Horses Allotment on the Ferron Ranger District. Areas occurring in the Gentry Mountain Cattle and Horses Allotment are classified as non-range because of the steep terrain, inaccessibility, and scarcity of vegetation. A portion of the East Mountain Cattle and Horses Allotment is primary range (includes preferred forage-producing areas that are accessible and have available water). The range condition in this unit is fair and improving (USDI Forest Service and BLM, 1976). Some of the principal species are western yarrow, orange sneezeweed, Kentucky bluegrass, crested wheatgrass, big sagebrush, and twistleaf rabbit brush. The range allotments are managed on a rotation grazing cycle (USDI Forest Service and BLM, 1976).

The area proposed for drill holes TMTN-16 through TMTN-28 is presently classified for the following wildlife uses by UDWR.

<u>WILDLIFE SPECIES</u>	<u>AREA USE CLASSIFICATION</u>
Mule Deer	Critical Winter Range High Priority Winter Range High Priority Summer Range
Elk	Critical Winter Range High Priority Winter Range High Priority Summer Range
Moose	Substantial Yearlong Range
Mountain Cottontail	Substantial Yearlong Range
Snowshoe Hare	Substantial Yearlong Range

## **Blue Grouse**

## **Substantial Yearlong Range**

**No drill holes are located near or within buffer zones associated with raptor nest sites.**

### **GEOLOGY**

**The area of interest for exploration is on Trail Mountain, a part of the Wasatch Plateau located near Orangeville in Emery County.**

**Trail Mountain is a prominent topographical mesa rising over 3,000 feet from the flatlands of Castle Valley. The southern limits are marked by precipice sandstone cliffs intersected by narrow and steep drainages.**

**Significant geologic conditions in the project area pertain to the stratigraphy and structure of the area. The sedimentary strata in which the coal seams are enclosed generally consist of massive and bedded sandstones which are interbedded with siltstones and mudstones.**

**The lithologic logs of surface drill holes from locations drilled on the property also show the stratigraphic formations of the area. These logs indicate only one coal seam which is of minable thickness in the area and is referred to as the Hiawatha Seam. The Hiawatha Seam forms the basal unit of the Blackhawk Formation and is underlain by the massive Starpoint Sandstone.**

**The Blackhawk Formation which ranges from 700 feet to 800 feet thick in the area, consists of lenticular sandstones, siltstones, and mudstone in the lower portion and an ever-increasing amounts of sandstone in its upper portions, and is conformably overlain by the Castlegate Sandstone. The Castlegate averages about 200 feet thick in the area and consists nearly entirely of massive, medium to coarse-grained sandstone.**

The Castlegate forms a massive cliff and is conformably overlain by the lenticular sandstones of the Price River Formation. The Price River is about 600 feet thick and grades upward from predominantly sandy beds to interbedded sandstone, siltstone, and mudstone. The formation is overlain conformably by the slope-forming mudstones, siltstones, sandstones, and occasional limestone lenses of the North Horn Formation. The North Horn Formation ranges from 900 feet to 1100 feet thick in the area and is unconformably overlain by the lowermost remnants of the Flagstaff Limestone.

The weathering of strata in the area has resulted in the exposure of the coal seams along lower canyon walls and mesa cliffs. The sediments which enclose the coal seams form steep slopes which are capped by the cliff-forming Castlegate Sandstone. The earth materials just above the Castlegate form steep slopes that gradually lessen in intensity higher in the stratigraphic section, particularly in the North Horn Formation. The Flagstaff Formation caps the highest points of the Trail Mountain Mesa.

Structurally, the area is fairly simple. The gentle down-folded strata crossing the area from the southwest to northeast form the Straight Canyon Syncline. Dips into the syncline range from 2 to 4 degrees. The Flat Canyon Anticline is located just to the north of the subject area. No faults are known to exist within the exploration area.

### WATER

Trail Mountain is a narrow plateau with steep slopes and extends for about nine miles in a north to south direction. The northern and eastern slopes drain into Cottonwood Canyon Creek while the western and southern slopes drain into Indian Creek and into Cottonwood Creek. Cottonwood Creek drain to the southeast into the Castle Valley System. Surface waters within the exploration area are mostly mountain

**springs and seeps which have improvements of small ponds and troughs for stock watering.**

**The peaks on the Trail Mountain range in elevation between 10,084 feet in the north to 9,600 feet in the southeast. The plateau varies in topography from flat to steeply sloping, and ranges from a quarter of a mile to a mile in width. The southern slope of the mountain drops 2,700 feet in 0.5 miles while the northern slopes are more gentle and decrease from the 10,100 foot to the 8,800 foot elevations in a horizontal distance of about 1.5 miles.**

**The primary year-round water resources on the mountain result from scattered seeps along the upper slopes draining the mountain's sandstone aquifers which are supplied by seasonal patterns of precipitation.**

### **ARCHEOLOGY**

**Because of the mountain's steep slopes, access to its upper meadows and terraces is most easily accomplished on foot by climbing its long, narrow eastern ridges above Cottonwood Creek, or by climbing the western slopes in the vicinity of Upper Joes Valley and Flat Canyon. Prehistoric access to the plateau was probably predominantly accomplished on those slopes since the steepness and the frequent sandstone cliffs along the southwestern, southern, and southeastern slopes probably discouraged easy movement between and higher meadows and Castle Valley.**

**As an aid to determining the extent and location of presently known prehistoric sites distributed in the area, a records search was carried out involving files of the Antiquities Section of the Division of State History and files of the Environmental Research Section of Utah Power & Light Company. As a result of these file checks, known prehistoric sites within the Trail Mountain area can be categorized into three**

sets, i.e., lower elevation sites located between 5,800 and 7,200 feet, middle elevation sites located between 7,200 and 9,000 feet, and higher elevation sites located above 9,000 feet.

Existing records and current research have demonstrated that prehistoric human activity in the area has diminished as elevation is increased. Newly discovered sites along Grimes Creek, the sites found adjacent to the new Huntington Power Plant and site 42Em176 near the mouth of Huntington Canyon can all be considered as falling in the lower elevation category and are predominantly within the pinion-juniper ecosystem. In 1971, Raymond Matheny's field crews identified a number of archeological sites in Huntington Canyon which have since been covered by the Huntington Reservoir. Those sites and site 42Em722 in Crandall Canyon can all qualify as falling within the second and middle elevation category which consists primarily of the montane ecosystem.

The higher elevation category which involves the upper montane and sub-alpine ecosystems includes only one known site, 42Em721, which is located on Trail Mountain. This site and the majority of sites situated in the middle elevations consist of lithic fragment scatters having low to marginal significance in National Register terms. In contrast, the sites found in the lower elevation zone are not only more abundant, but often are of greater significance, having been the foci of year-round habitation related activities.

During past years archeological sweeps (surveys) were limited to planned exploration disturbances.

In 1977, public law 95-87 was enacted. Regulations promulgated under this act expanded environmental requirements for permitting coal mines.

**One such requirement was to broaden cultural resource information above underground mining activities.**

**Additionally, archeological studies have been conducted on Trail Mountain in correlation with exploration activities. An archeological clearance has been completed for all 1994 drill sites and newly constructed access roads prior to any surface disturbing activities. The archeological information is enclosed as Attachment 4.**

## **GENERAL REFERENCES**

**Atwood, D., et al. 1991. Utah Threatened, Endangered, And Sensitive Plant Field Guide. US Dept. Agricul. For. Serv., Intermountain Region, Ogden, Ut., Nat. Park Serv., Utah, Bur. of Land Manage., Salt Lake City, Ut., Utah Nat. Heritage Prog., Salt Lake City, Ut., US Fish and Wildlife Serv., Salt Lake City, Ut., US Env. Prot. Agency, Reg. 8 Denver, Colo., Navajo Nation, Navajo Natural Heritage Program, Window Rock, Az., Skull Valley Goshute Tribe, Salt Lake City, Ut.**

**Dalton, L.B., et al. 1978. Species List of Vertebrate Wildlife That Inhabit Southeastern Utah. Utah Division of Wildlife Resources Publication #78-16, Salt Lake City, Utah.**

**Dalton, L.B., et al. 1990. Fauna of Southeastern Utah and Life Requisites Regarding Their Ecosystems. Utah Div. of Wildlife Res. Pub. No. 90-11. Utah Dept. of Nat. Res., Salt Lake City, Ut. 326 pp.**

**Scott, R.W., Boner T.C. and Smith, R., 1977, Ranking of Wildlife Value on Federal Coal Lands, Utah Division of Wildlife Resources, Salt Lake City, Utah.**

**Spahr, R., et al. 1991. Threatened, Endangered and Sensitive Species of the Intermountain Region. US Dept. Agricul. For. Serv., Intermountain Region, Ogden, Ut.**

**UDWR, 1979, Status of Selected Animal and Plant Species in Utah (revised) Salt Lake City, Utah.**

# TRAIL MOUNTAIN PROPERTY

EMERY COUNTY, UTAH  
1994 SURFACE DRILLING  
HOLES TMTN-16 THROUGH TMTN-28  
PACIFICORP

August 24, 1993  
SCALE 1" = 1000'

Mahogany Point, Utah  
Quadrangle

x 9849

DEC 16 1993

DIVISION OF  
OIL, GAS & MINING

## LEGEND



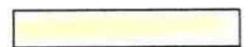
Existing Road



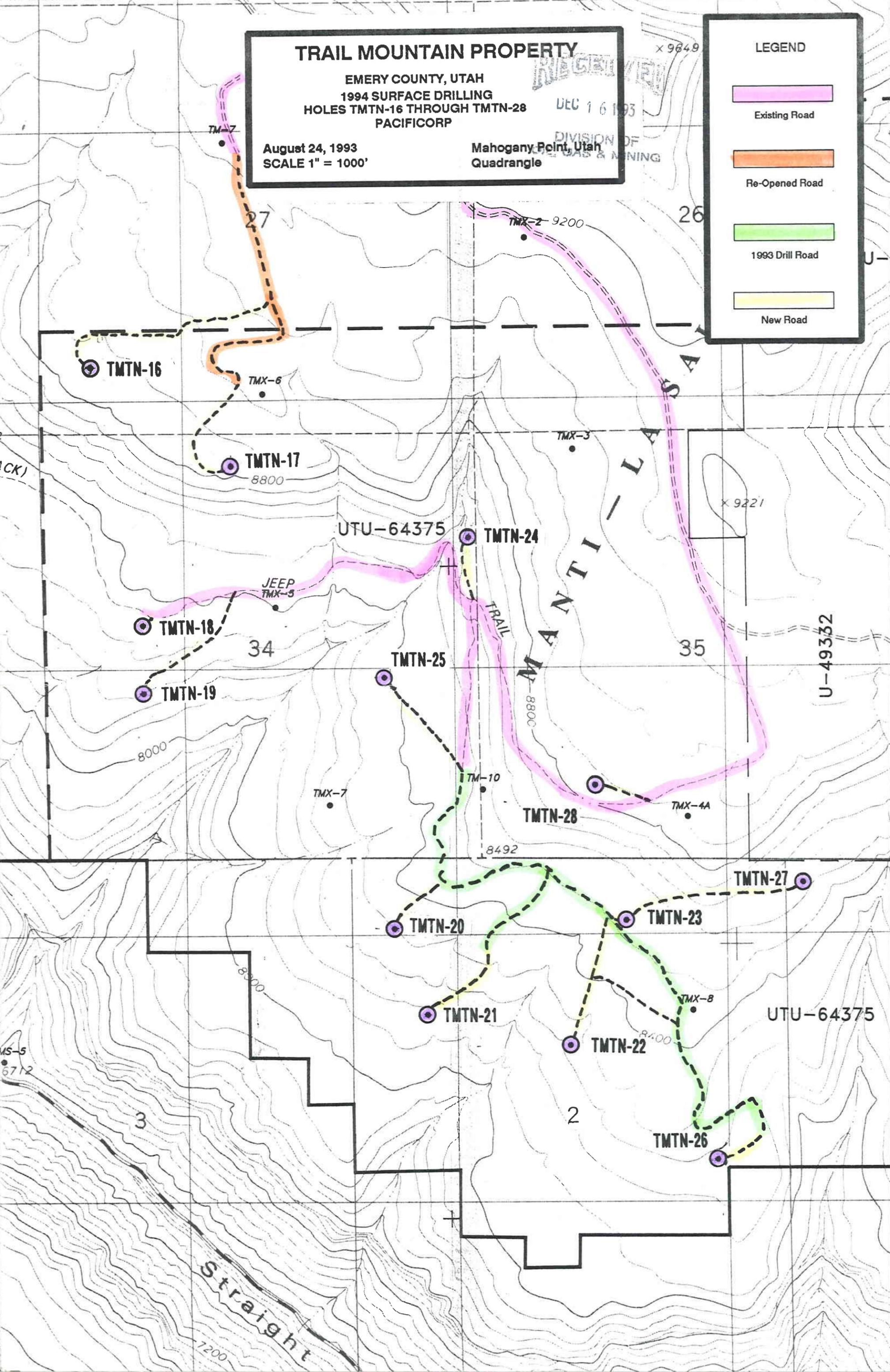
Re-Opened Road

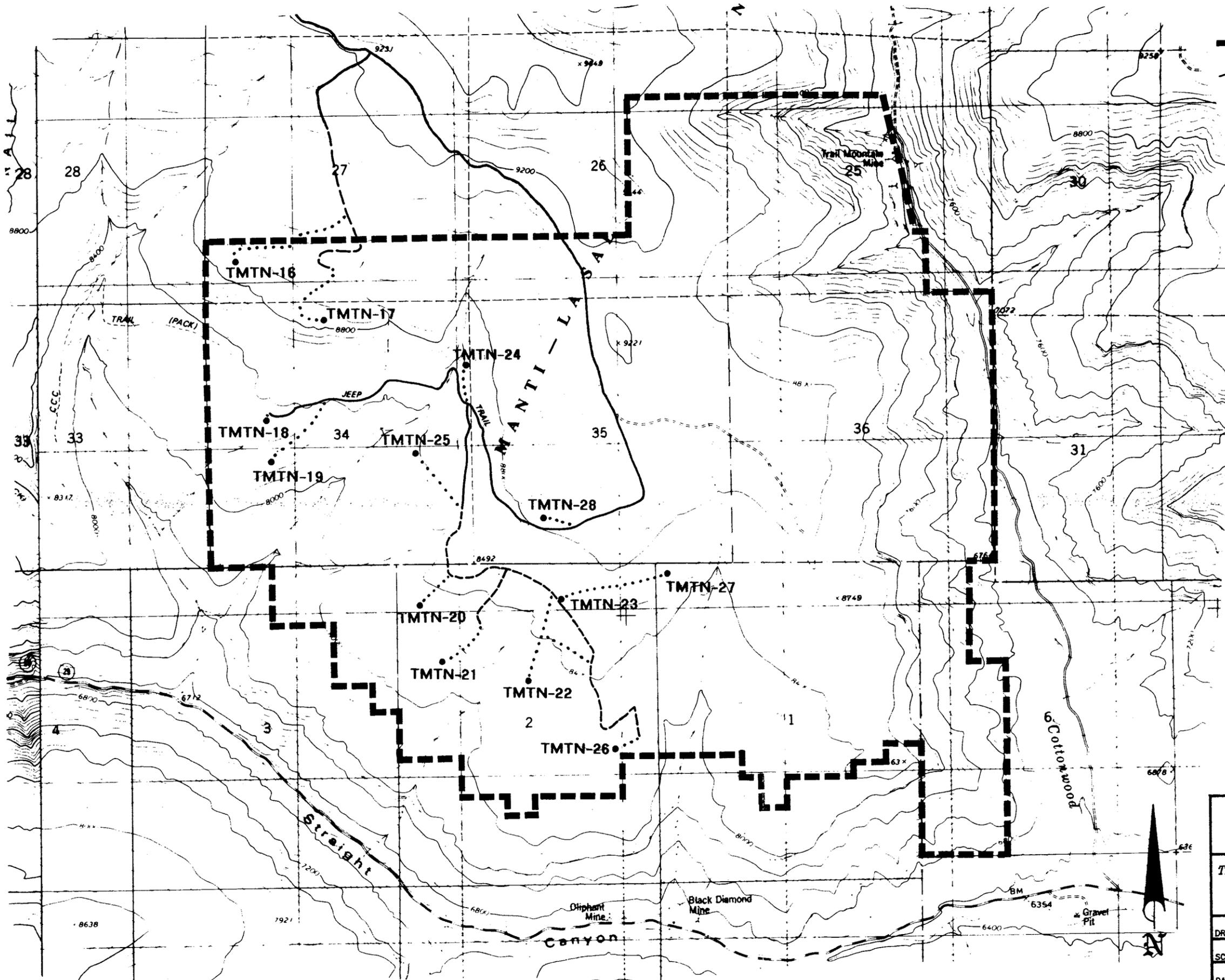


1993 Drill Road



New Road





- LEGEND:**
- PERMIT BOUNDARY
  - EXISTING ROAD
  - EXPLORATION DISTURBANCE
  - RE-OPENED ROAD
  - 1993 DRILL ROAD
  - ..... NEW ROAD
  - TMTN-20 • DRILL HOLE

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CAD FILE NAME/DISK#: 94DRILL

**ENERGY WEST  
 MINING COMPANY**  
 HUNTINGTON, UTAH 84528

**TRAIL MOUNTAIN EXPLORATION DISTURBANCE MAP  
 1994 SURFACE DRILLING  
 HOLES TMTN-16 THROUGH TMTN-28**

DRAWN BY:	K. LARSEN	TMS1477B
SCALE:	1" = 2000'	DRAWING #:
DATE:	NOV. 2, 1993	SHEET 1 OF 1 REV. _____

**1994 TRAIL MOUNTAIN DRILLING  
REVEGETATION SEED MIX**

<b><u>COMMON NAME</u></b>	<b><u>SCIENTIFIC NAME</u></b>	<b><u>LBS/ACRE PLS</u></b>
Intermediate Wheatgrass	Agropyron intermedium	3
Slender Wheatgrass	Agropyron trachycaulus	3
Crested Wheatgrass	Agropyron cristatum var. high crest or Ephraim	3
Smooth Brome	Bromus inermis	3
Yellow Sweet Clover	Melilotus officinalis	1
Ladak Alfalfa	Medicago sativa ladak	1
Small Burnett	Sanguisorba minor	1
Mountain Mahogany	Cercocarpus montanus	1
Utah Serviceberry	Amelanchier alnifolia	1
Mountain Big Sagebrush	Artemisia tridentata vaseyana	1

## **RECLAMATION SUCCESS**

**Reclamation success will be determined as follows:**

- 1. Prior to disturbance, the areas proposed to be disturbed by drilling activities will be surveyed according to vegetation type to determine cover, species composition and woody species density.**

**The areas surveyed will include road routes and pad sites in previously undisturbed areas. In addition, reclaimed roads to be reopened for drilling access and roads and pad sites in areas previously disturbed by watershed improvement projects will be surveyed.**

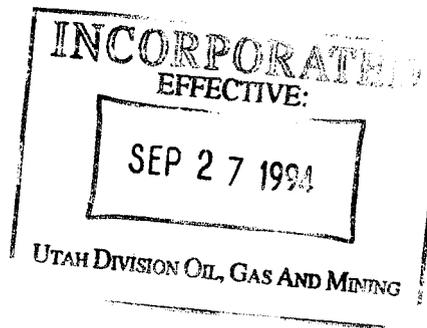
- 2. During the initial survey, areas adjacent to the proposed disturbed sites will be identified and sampled to serve as comparison areas to assess reclamation success. The comparison areas will represent range conditions and vegetation types similar to those of the associated disturbed sites.**
- 3. Reclamation success sampling will be conducted in such manner as to ensure that environmental conditions (moisture conditions, season, plant phenology, etc.) are comparable at the reclaimed sites and the comparison areas. The ultimate determination regarding reclamation success will be made by the responsible surface management agency.**

**Pacificorp has had a vegetation sampling done. A report will be prepared and submitted upon receipt of the vegetation sampling information.**

**VEGETATION SAMPLING**

**TRAIL MOUNTAIN  
DRILL SITES: TMTN 16-28**

**1994**



Prepared by

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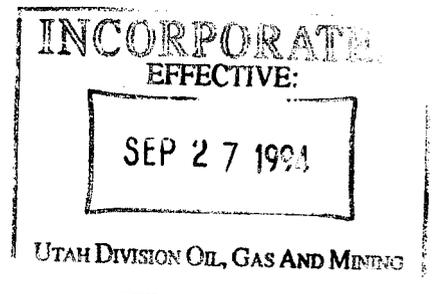
for

*PACIFICORP/ENERGY WEST*  
P.O. Box 1005  
Huntington, Utah 84528

by

Patrick D. Collins, Ph.D.

Field work: September 1993  
Report: March 31, 1994



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**VEGETATION SAMPLING**

**TRAIL MOUNTAIN  
DRILL SITES: TMTN 16-28**

1994

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SEP 27 1994

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**SCOPE**

The purpose of this document is to provide baseline information of the existing vegetation of an area that is proposed for disturbance by exploratory drilling. Reference or comparison areas were chosen and proposed to be used as a standard for revegetation success.

**INTRODUCTION**

A earlier report was submitted containing information about the vegetation proposed for disturbance on another phase of the drilling program on Trail Mountain. This report was called "Vegetation Sampling, Trail Mountain Drill Sites: TMTN 9-15" (Nov. 30, 1993). In that report seven (7) reference (comparison) areas were chosen to represent standards of revegetation success.

Data from these reference areas were examined to also be used as a standard of success for proposed new drill sites outlined in this report.

General Site Description

Continuation of an exploratory drilling program is proposed on Trail Mountain in Emery County. Trail Mountain is on the Wasatch Plateau of central Utah. Elevation of the study areas were between 8,000 ft and 9,000 ft above sea level. The dominant plant communities studied were Sagebrush/Grass and Pinyon/Juniper. Other plant communities of the area included: Spruce/Fir, Mountain Brush, Aspen and Mountain Herb/Grasslands.

As described in the earlier report (Nov. 30, 1993), many of the plant communities have been historically disturbed or at least "altered" by large contour furrows. Apparently this was done by the CCC's, or more recently by the USDA Forest Service. It is assumed that this practice was employed as an attempt to retain available soil moisture, reduce erosion, and increase forage for big game and livestock. (The study area is heavily grazed by cattle in the summer months).

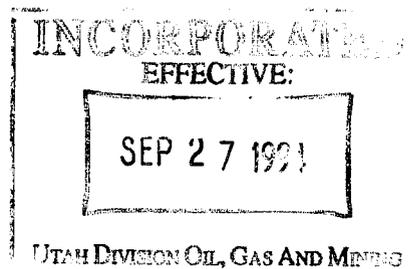
Some of the areas also seemed to have been "chained", chemically sprayed, or otherwise treated by techniques to remove large woody species. These may also have been used as techniques

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to increase understory production for livestock and big game.

### METHODS

#### Proposed Disturbances



The areas proposed for drilling and the access roads to them were the focus of this study. Aerial photographs and contour maps were used to locate each site. Quantitative and qualitative data were taken on the sample sites. Sampling was accomplished from September 28 - October 1, 1993.

#### Reference (Comparison) Areas

As mentioned above, reference areas have been proposed for another phase of the drilling program in a slightly earlier (same growing season & year) study on Trail Mountain [*Vegetation Sampling, Trail Mountain Drill Sites: 9-15 (Nov. 30, 1993)*]. Some of these same reference areas could also be used as reference areas for the next phase of exploratory drilling. Some of these data have also been presented in this report including summaries from reference areas for drill sites TMTN-9, TMTN-10 and TMTN-11. To avoid confusion with other drill site data these reference areas have been called REF-9, REF-10 and REF-11, respectively.

The reference areas that were used for comparisons will

remain undisturbed in the future until the reclaimed areas are considered equal to or better quality by statistical comparisons.

#### Transect and Quadrat Placement

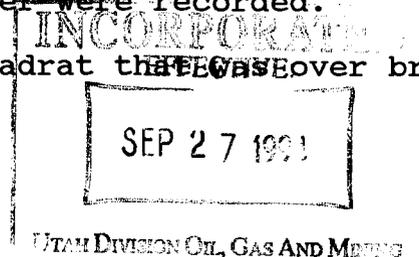
Transect lines were placed along each proposed drill pad and access road. If the vegetative types were the same for the drill site and access road, the transect lines dissected both and the data were combined.

Numbers were chosen at regular intervals on the transect lines. At each regular number, a random number dictated the direction and sample location for quadrat placement.

#### Cover and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on data sheets were: estimated precipitation, erosion, slope, exposure, grazing use, animal disturbance and other appropriate notes.

Both understory and overstory cover were recorded. Overstory was that cover above each quadrat that covers over breast-height (bh).



Woody Species Density

Density of woody plant species were recorded using the point quarter distance method and also by belt transects. In the point quarter method, the aforementioned regular points were placed on the sample sites and delineated into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

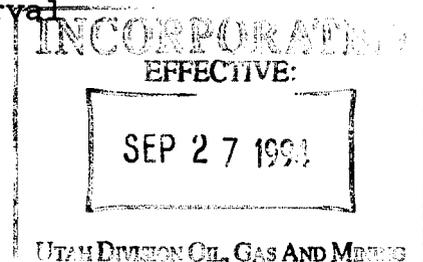
Sample Adequacy

Sampling adequacy for woody species density and cover was achieved using formulas from "Statistical Methods" (Snedocor and Cochran 1980), with the goal that at least 80% of the samples were within 10% of the true mean for the plant communities of the area. The formula used is given below.

$$n_{min} = \left[ \frac{1.28 (s)}{x (.1)} \right]^2$$

where,

- nmin = minimum adequate sample
- s = standard deviation
- x = sample mean
- .1 = confidence interval



## Photographs

Color photographs of the sample area were taken at the time of sampling and were submitted with this report.

## Raw Data

The raw data were also submitted with this report which would facilitate future scrutiny of the data and further statistical testing if desired.

## **RESULTS**

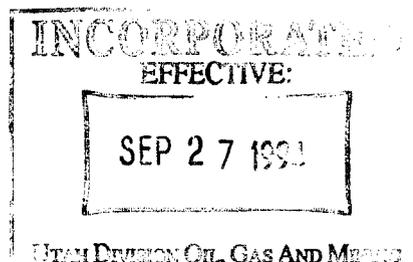
### *Comparison Figures*

Figures 1-6 provide a quick comparison of each area including cover, composition and woody species density.

### *Tables*

Summaries of the sampling and analyses for all the proposed disturbance and reference sites are shown on Tables 1-48.

### *Color Photographs*



Color photographs have been included in this report in "Appendix A".

#### Raw Data

Raw data have also been included in this report as "Appendix B".

Listed below are each of the proposed disturbed drill sites and reference areas. Listed with each are the locations in the report for summary tables, photographs and raw data. Statistical comparisons of the proposed disturbed drill sites versus the reference areas are shown on Table 49.

#### Drill Site TMTN-16

Cover & Composition: See Table 1

Cover by Species: See Table 2

Woody Species Density: See Table 3

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-10 (Tables 43-45)

Notes: There was deer and cattle use in the area.

The access road was primarily a sagebrush/grass community. The same reference area can be used for both the drill pad and access road.

Sampling was done with a 400' transect line that ran across the drill pad and up the access road (see "Methods" for more details).

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The area was mostly unaltered by previous disturbance or range enhancement techniques.

No signs of extreme erosion was evident.

Drill Site TMTN-17:

Cover & Composition: See Table 4

Cover by Species: See Table 5

Woody Species Density: See Table 6

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-9 (Tables 40-42)

Notes: There was heavy deer, elk and cattle use in the area.

Much of the access road to the drill site appeared to be an old reclaimed road. It was also a sagebrush/grass community, with taller individuals near the bottom of the hill (suggesting deeper soils). The same reference area can be used for both the drill pad and access road.

Sampling was done with a 200' transect line that ran across the drill pad and up the access road (see "Methods" for more details).

Although the random sampling did not encounter serviceberry (*Amalanchier utahensis*), it was fairly common.

The drill site was unaltered by previous disturbance or range enhancement techniques.

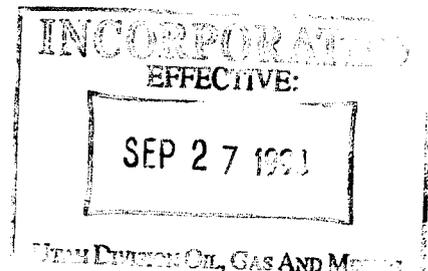
Erosion was only slightly evident.

Drill Site TMTN-18:

Cover & Composition: See Table 7

Cover by Species: See Table 8

Woody Species Density: See Table 9



Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-10 (Tables 43-45)

Notes: There was heavy elk and cattle use in the area.

There would be very little access road disturbance due to the drill site's close proximity to the existing road.

Sampling was done with two 100' transects that ran across the drill pad (see "Methods" for more details).

The lath marker had been pushed over by cattle or wildlife. We found the marker and set it into place.

The drill site had been altered previously "chaining" or other range enhancement techniques (see "Introduction" for more details).

Erosion was negligible.

Drill Site TMTN-19:

Cover & Composition: See Table 10

Cover by Species: See Table 11

Woody Species Density: See Table 12

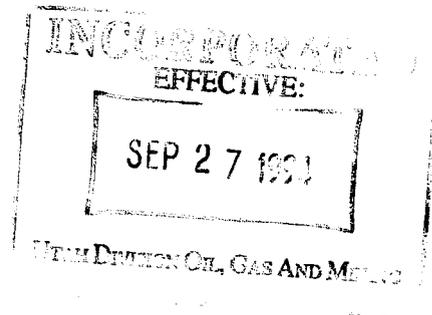
Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-11 (Tables 46-48)

Notes: There was heavy deer use in the area.

The access road to the drill site appeared to be more of a herb/grassland community at first glance. However, upon closer inspection one will note the existence of smaller woody species i.e. broom snakeweed (*Gutierrezia sarothrae*) and winterfat (*Ceratoides lanata*). Because cover and woody species density were similar, the same reference area could be used for both the drill pad and access road.



Sampling was done by two-200' transects that ran across the drill pad and up the access road. Random samples were taken every 20' along the transect line (see "Methods" for more details). Ten samples were taken on the drill pad area and ten in the area with slightly different species composition mentioned above. The data were combined, but could easily be separated.

The drill site was unaltered by previous disturbance or range enhancement techniques.

Erosion was only slightly evident.

Drill Site TMTN-20:

Cover & Composition: See Table 13

Cover by Species: See Table 14

Woody Species Density: See Table 15

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-10 (Tables 43-45)

Notes: There was heavy deer, elk and cattle use in the area.

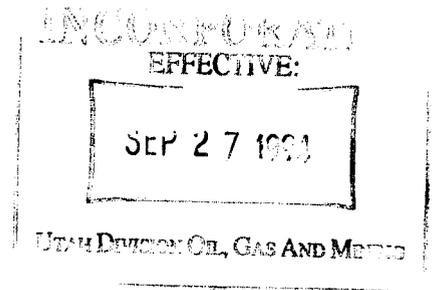
The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

Sampling was done by a 200' transect line that ran across the drill pad and another 200' one placed up the proposed access road (see "Methods" for more details).

The drill site had been altered previously "chaining", furrowing, and other range enhancement techniques (see "Introduction" for more details).

There was quite a bit of black sagebrush (*Artemisia nova*) in the gravels of this community.

Erosion was negligible.



Drill Site TMTN-21:

Cover & Composition: See Table 16

Cover by Species: See Table 17

Woody Species Density: See Table 18

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-11 Pad (Tables 46-48)  
REF-10 Access Road (Tables 43-45)

Notes: There was heavy elk use in the area.

The drill pad and about 150' up the access road could have the same reference area. However, the remainder of the access road would have the same reference area as drill site TMTN-10 (REF-10).

Sampling was done by transects that ran across the drill pad and about 150' up the proposed access road (see "Methods" for more detail).

This area has been left undisturbed by chaining or other rangeland improvement techniques. It is a good example of a mature, native, pinyon-juniper community.

Erosion was negligible.

Drill Site TMTN-22:

Cover & Composition: See Table 19

Cover by Species: See Table 20

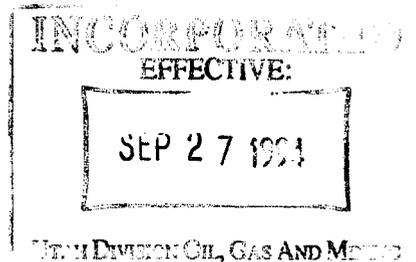
Woody Species Density: See Table 21

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-11 (Tables 46-48)  
REF-10 Access Road (Tables 43-45)

Notes: There was heavy deer, elk and cattle use in the area.



The south half of the length of the access road (approx. 1000') was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road on this area. The north half of the access road could use the TMTN-10 reference area (REF-10) to more closely approximate the existing vegetation.

Sampling was done on the pad and south section of the road by two 200' transects (see "Methods" for more details).

The south end of the access road was primarily an undisturbed pinyon-juniper community. The north end of the access road had been altered previously "chaining", furrowing, and other range enhancement techniques (see "Introduction" for more details).

Erosion was negligible.

Drill Site TMTN-23:

Cover & Composition: See Table 22

Cover by Species: See Table 23

Woody Species Density: See Table 24

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-10 (Tables 43-45)

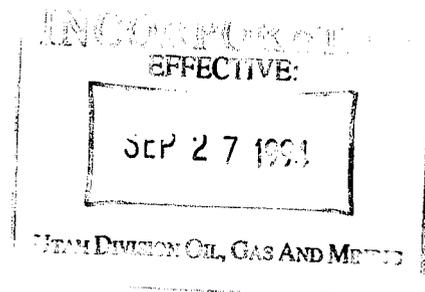
Notes: There was heavy cattle use in this area.

The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

Sampling was done by a 200' transect that ran across the drill pad and up the proposed access road (see "Methods" for more detail).

The drill site had been altered previously "chaining", furrowing, and other range enhancement techniques (see "Introduction" for more details).

Erosion was negligible.



Drill Site TMTN-24:

Cover & Composition: See Table 25

Cover by Species: See Table 26

Woody Species Density: See Table 27

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-9 (Tables 40-42)

Notes: There was heavy deer and cattle use in the area.

The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

Sampling was done by a 200' transect that ran across the drill pad. We sample undisturbed areas, not the furrows here.

The drill site had been altered previously "chaining", furrowing, and other range enhancement techniques (see "Introduction" for more details). The access road looks as though it will follow one of the furrows exactly.

Erosion was negligible.

Drill Site TMTN-25:

Cover & Composition: See Table 28

Cover by Species: See Table 29

Woody Species Density: See Table 30

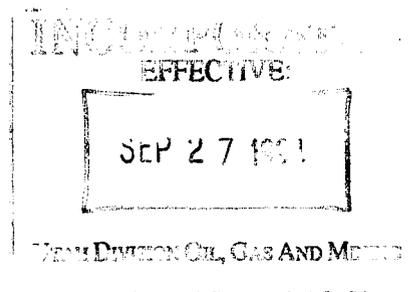
Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-9 (Tables 40-42)

Notes: There was heavy deer and cattle use in the area.

The access road was primarily the same community



as the proposed drill pad. This area had mature patches of rubber rabbitbrush (*Chrysothamnus nauseosus*) and big sagebrush (*Artemisia tridentata*) where the topography was more level. Where an incline began more serviceberry (*Amalanchier utahensis*) and grasses existed. We sampled all areas and combined the data. The same reference area can be used for both the drill pad and access road.

Sampling was done by a 200' transect that ran across the drill pad and another 200' one up the proposed access road. The entire length of the proposed access road was sampled.

The area was primarily undisturbed by range enhancement techniques (except one large furrow). It is an area where cattle seemed to congregate.

Erosion was negligible.

Drill Site TMTN-26:

Cover & Composition: See Table 31

Cover by Species: See Table 32

Woody Species Density: See Table 33

Photograph: See Appendix A

Raw Data: See Appendix B

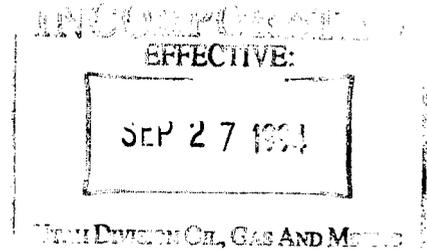
Reference Area: REF-9 (Tables 40-42)

Notes: There was heavy deer use in the area.

The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

Sampling was done by a 200' transect that ran across the drill pad and another 200' one up the proposed access road (see "Methods" for more detail).

The drill site had been altered previously "chaining", furrowing, and other range enhancement techniques. The entire area has also been disturbed previously by an old, reclaimed road.



Erosion was negligible.

Drill Site TMTN-27:

Cover & Composition: See Table 34

Cover by Species: See Table 35

Woody Species Density: See Table 36

Photograph: See Appendix A

Raw Data: See Appendix B

Reference Area: REF-9 (Tables 40-42)

Notes: There was heavy elk use in the area.

The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

The area had good cover and well represented by native plant species.

Sampling was done by a 200' transect that ran across the drill pad and another 200' one up the proposed access road (see "Methods" for more detail).

The drill site had been altered previously by contour furrowing.

There was quite a bit of black sagebrush (*Artemisia nova*) in the gravels of this community.

Erosion was negligible.

Drill Site TMTN-28:

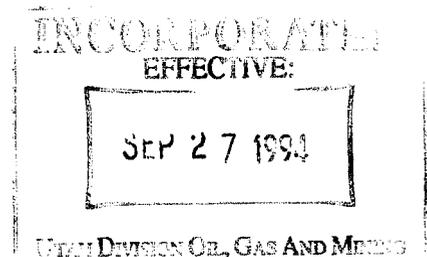
Cover & Composition: See Table 37

Cover by Species: See Table 38

Woody Species Density: See Table 39

Photograph: See Appendix A

Raw Data: See Appendix B



Reference Area: REF-10 (Tables 43-45)

Notes: There was heavy deer use in the area.

The access road was primarily the same community as the proposed drill pad. Therefore, the same reference area can be used for both the drill pad and access road.

Black sagebrush (*Artemisia nova*) was well established in the more gravelly soils.

Sampling was done by 200' transects that ran across the drill pad and up the proposed access road (see "Methods" for more detail).

The drill site had been altered previously by "chaining", chemical spraying, and other range enhancement techniques (see "Introduction" for more detail).

Erosion was negligible.

Reference Area REF-9:

Cover & Composition: See Table 40

Cover by Species: See Table 41

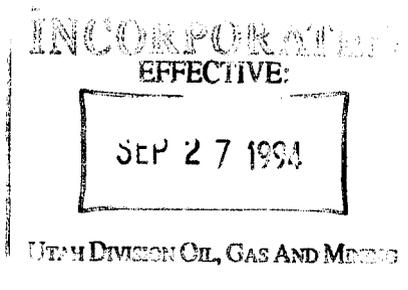
Woody Species Density: See Table 42

Photograph: See Appendix A

Raw Data: See Appendix B

Notes: This area was sampled previously and used for a reference area of other drill sites. Summaries of the data were reported earlier by *MT. NEBO SCIENTIFIC, INC.* in "Vegetation Sampling, Trail Mountain Sites: TMTN-9-15" (Nov. 30, 1993).

To facilitate comparisons between the reference area and the areas proposed for disturbance, the data summaries are also presented in this report.



Reference Area REF-10:

Cover & Composition: See Table 43

Cover by Species: See Table 44

Woody Species Density: See Table 45

Photograph: See Appendix A

Raw Data: See Appendix B

Notes: This area was sampled previously and used for a reference area of other drill sites. Summaries of the data were reported earlier by *MT. NEBO SCIENTIFIC, INC.* in "Vegetation Sampling, Trail Mountain Sites: TMTN-9-15" (Nov. 30, 1993).

To facilitate comparisons between the reference area and the areas proposed for disturbance, the data summaries are also presented in this report.

Reference Area REF-11:

Cover & Composition: See Table 46

Cover by Species: See Table 47

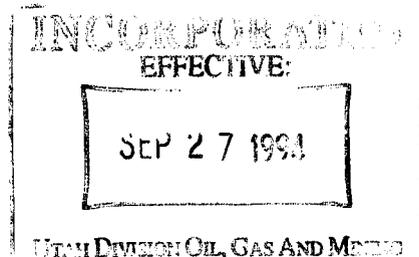
Woody Species Density: See Table 48

Photograph: See Appendix A

Raw Data: See Appendix B

Notes: This area was sampled previously and used for a reference area of other drill sites. Summaries of the data were reported earlier by *MT. NEBO SCIENTIFIC, INC.* in "Vegetation Sampling, Trail Mountain Sites: TMTN-9-15" (Nov. 30, 1993).

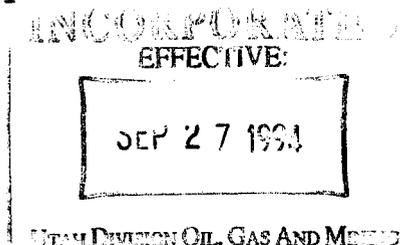
To facilitate comparisons between the reference area and the areas proposed for disturbance, the data summaries are also presented in this report.



## DISCUSSION

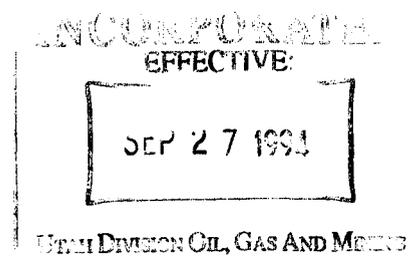
Reference areas were chosen with basic physiognomic and habitat characteristics similar to those areas proposed for disturbance. Two parameters - living cover and woody species density - are important when identifying appropriate reference areas for the proposed disturbances. Table 49 is a summary sheet for the statistical analyses performed comparing the proposed disturbed areas with the reference areas.

As one can note from Table 49, the t-values were sometimes statistically different when cover and woody species densities were analyzed. For this study, other parameters were also considered for reference area selections including prevalent plant species and species composition. These attributes were compared by more qualitative or nonparametric methods. There were several reference areas from the aforementioned previous study to choose from. Although some of the reference areas appeared identical to a given proposed disturbed area by cover and/or density, species presence and composition greatly contrasted. In other words, some of the previously sampled reference areas may have been closer by percent cover and density, but when one compares the plant species and relative proportions of them, a different community seemed to be a more appropriate standard.



The above statements provide some justification for the selection of the reference areas. Upon review of this document and/or field investigations by the operator and DOGM, there may be other opinions about the reference areas chosen. If that is the case, there are data from several other reference areas compiled from field sampling for the earlier study (Nov. 30, 1993). Other selections that would statistically "fit" the cover and densities more closely may be made.

It is, however, recommended in the scope of this report to use the reference areas reported here for cover standards of their respective proposed disturbed areas. Woody species numbers were not a limiting factor on any of the sites on Trail Mountain. In fact, many of the rangeland techniques were designed to decrease the density and cover of woody plant species. For these reasons (and to simplify future revegetation standards), 1,000 individuals per acre are recommended as the density standard for each reclaimed site. This of course is subject to review and approval by the operator and DOGM.



**TABLE 1:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-16.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Understory	48.75	10.71	20
Litter	6.25	2.17	20
Bareground	14.00	7.18	20
Rock	31.00	13.10	20
<b>COMPOSITION</b>			
Shrubs	47.87	22.49	20
Forbs	18.75	18.64	20
Grasses	33.39	12.57	20

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EFFECTIVE:

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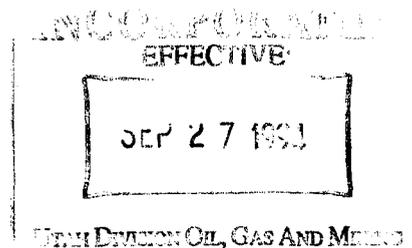
**TABLE 2: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-16.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Artemisia nova</i>	1.75	6.57	20	10.00
<i>Artemisia tridentata</i>	16.00	12.71	20	75.00
<i>Chrysothamnus depressus</i>	2.75	3.70	20	40.00
<i>Chrysothamnus nauseosus</i>	0.25	1.09	20	5.00
<i>Chrysothamnus viscidiflorus</i>	.50	1.50	20	10.00
<i>Gutierrezia sarothrae</i>	0.25	1.09	20	5.00
<i>Symphoricarpos oreophilus</i>	2.50	5.59	20	20.00
<b><u>FORBS</u></b>				
<i>Astragalus tenellus</i>	0.75	2.38	20	10.00
<i>Chaenactis douglasii</i>	0.25	1.09	20	5.00
<i>Leptodactylon pungens</i>	2.00	3.67	20	20.00
<i>Lupinus argenteus</i>	0.75	2.28	20	10.00
<i>Machaeranthera grindelioides</i>	0.25	1.09	20	5.00
<i>Penstemon caespitosa</i>	3.25	4.26	20	45.00
<i>Penstemon pachyphyllus</i>	1.00	2.55	20	15.00
<b><u>GRASSES</u></b>				
<i>Elymus salinus</i>	16.00	7.68	20	95.00
<i>Poa secunda</i>	0.25	1.09	20	5.00
<i>Stipa hymenoides</i>	0.25	1.09	20	5.00

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TABLE 3: Woody species densities of Trail Mountain Drill Site:  
TMTN-16.

	<b>NUMBER/ACRE</b>
<i>Artemisia nova</i>	771.10
<i>Artemisia tridentata</i>	2906.46
<i>Chrysothamnus viscidiflorus</i>	118.63
<i>Gutierrezia sarothrae</i>	177.95
<i>Rosa woodsii</i>	59.32
<i>Symphoricarpos oreophilus</i>	<u>711.79</u>
<b>TOTAL</b>	<b><u>4745.25</u></b>



**TABLE 4:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-17.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	0.50	2.18	20
Understory	57.25	12.09	20
Litter	19.10	5.86	20
Bareground	18.25	12.93	20
Rock	4.90	3.05	20
<b>COMPOSITION</b>			
Shrubs	42.68	21.75	20
Forbs	4.49	5.84	20
Grasses	52.11	22.64	20

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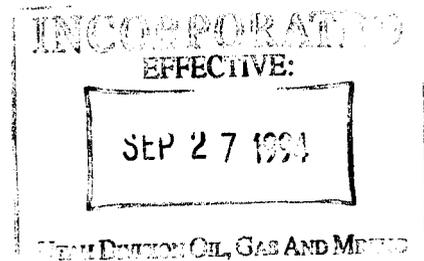
**TABLE 5: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-17.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Artemisia tridentata</i>	13.75	9.07	20	85.00
<i>Chrysothamnus viscidiflorus</i>	1.00	2.00	20	20.00
<i>Juniperus ostersperma</i>	0.75	3.27	20	5.00
<i>Symphoricarpos oreophilus</i>	9.75	10.30	20	60.00
<b><u>FORBS</u></b>				
<i>Leptodactylon pungens</i>	1.00	2.00	20	20.00
<i>Lupinus argenteus</i>	0.50	2.18	20	5.00
<i>Penstemon pachyphyllus</i>	1.00	2.55	20	15.00
<b><u>GRASSES</u></b>				
<i>Bromus carinatus</i>	2.25	4.87	20	20.00
<i>Elymus salinus</i>	25.50	12.03	20	100.00
<i>Poa secunda</i>	1.25	2.68	20	20.00
<i>Stipa hymenoides</i>	0.50	1.50	20	10.00

INCORPORATE  
EFFECTIVE:  
SEP 27 1994  
WELLS DIVISION OIL, GAS AND MINERAL

TABLE 6: Woody species densities of Trail Mountain Drill Site:  
TMTN-17.

	NUMBER/ACRE
<i>Artemisia tridentata</i>	3968.43
<i>Chrysothamnus viscidiflorus</i>	948.97
<i>Juniperus osteosperma</i>	172.54
<i>Symphoricarpos oreophilus</i>	<u>1811.67</u>
TOTAL	<u>6901.61</u>



**TABLE 7: Total cover and composition summary for Trail Mountain Drill Site: TMTN-18.**

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory Cover	--	--	20
Understory Cover	47.75	8.44	20
Litter	9.00	5.15	20
Bareground	33.25	10.28	20
Rock	10.00	9.87	20
<b>COMPOSITION</b>			
Shrubs	32.41	20.47	20
Forbs	9.02	12.72	20
Grasses	58.57	27.15	20

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NEW DIVISION OIL, GAS AND MINES

**TABLE 8: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-18.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	4.50	8.05	20	25.00
<i>Artemisia tridentata</i>	7.25	6.42	20	70.00
<i>Chrysothamnus viscidiflorus</i>	2.75	3.70	20	35.00
<i>Gutierrezia sarothrae</i>	0.50	1.50	20	10.00
<b><u>FORBS</u></b>				
<i>Castilleja linariifolia</i>	.25	1.09	20	5.00
<i>Machaeranthera grindelioides</i>	1.00	2.00	20	20.00
<i>Penstemon caespitosus</i>	2.75	5.12	20	20.00
<b><u>GRASSES</u></b>				
<i>Elymus salinus</i>	25.75	16.38	20	95.00
<i>Stipa hymenoides</i>	3.00	5.79	20	25.00

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EFFECTIVE:  
SEP 27 1993  
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
DIVISION OF OIL, GAS AND METALS

TABLE 9: Woody species densities of Trail Mountain Drill Site:  
TMTN-18.

	NUMBER/ACRE
<i>Amalanchier utahensis</i>	371.63
<i>Artemisia tridentata</i>	2006.82
<i>Ceratoides lanata</i>	37.16
<i>Chrysothamnus viscidiflorus</i>	966.25
<i>Gutierrezia sarothrae</i>	<u>334.47</u>
TOTAL	<u>3716.33</u>

INCORPORATED  
EFFECTIVE:  
SEP 27 199A  
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**TABLE 10:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-19.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory Cover	3.50	10.25	20
Understory Cover	39.75	10.66	20
Litter	9.00	5.15	20
Bareground	16.75	8.41	20
Rock	31.00	10.56	20
<b>COMPOSITION</b>			
Shrubs	25.96	27.42	20
Forbs	28.83	22.03	20
Grasses	46.46	26.26	20

INCORPORATED  
EFFECTIVE:  
SEP 27 1990  
HEAVY DIVISION OIL, GAS AND MINING

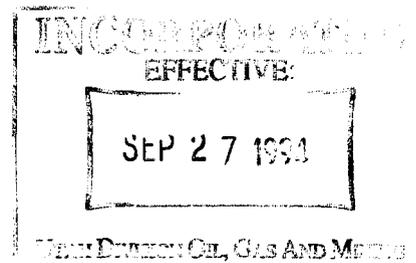
**TABLE 11:** Species cover and frequency summary for Trail Mountain Drill Site: TMTN-19.

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Artemisia tridentata</i>	1.25	4.44	20	10.00
<i>Ceratoides lanata</i>	0.50	1.50	20	10.00
<i>Cercocarpus ledifolius</i>	1.50	5.50	20	10.00
<i>Gutierrezia sarothrae</i>	2.25	3.70	20	35.00
<i>Pinus edulis</i>	4.25	11.21	20	15.00
<i>Purshia tridentata</i>	2.75	8.29	20	10.00
<b><u>FORBS</u></b>				
<i>Astragalus tenellus</i>	0.75	2.38	20	10.00
<i>Leptodactylon pungens</i>	0.25	1.09	20	5.00
<i>Machaeranthera grindelioides</i>	8.00	9.67	20	55.00
<i>Penstemon caespitosus</i>	1.00	2.55	20	15.00
<i>Penstemon pachyphyllus</i>	2.00	2.45	20	40.00
<b><u>GRASSES</u></b>				
<i>Bromus carinatus</i>	0.25	1.09	20	5.00
<i>Elymus salinus</i>	15.00	12.94	20	70.00
<i>Stipa hymenoides</i>	4.00	5.83	20	40.00

INCORPORATED  
EFFECTIVE:  
SEP 27 1994  
OIL, GAS AND MINERAL

TABLE 12: Woody species densities of Trail Mountain Drill Site:  
TMTN-19.

	NUMBER/ACRE
<i>Amalanchier utahensis</i>	46.59
<i>Artemisia nova</i>	93.18
<i>Artemisia tridentata</i>	559.09
<i>Cercocarpus ledifolius</i>	93.18
<i>Ceratoides lanata</i>	248.48
<i>Gutierrezia sarothrae</i>	372.73
<i>Pinus edulis</i>	93.18
<i>Purhia tridentata</i>	<u>46.59</u>
TOTAL	<u>1553.02</u>



**TABLE 13:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-20.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Living Cover	43.25	8.55	20
Litter	6.00	2.00	20
Bareground	29.75	15.69	20
Rock	21.00	17.44	20
<b>COMPOSITION</b>			
Shrubs	36.67	25.30	20
Forbs	20.72	18.83	20
Grasses	42.61	20.63	20

RECEIVED  
 EFFECTIVE:  
 SEP 27 1961  
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF OIL, GAS AND MINERAL RESOURCES

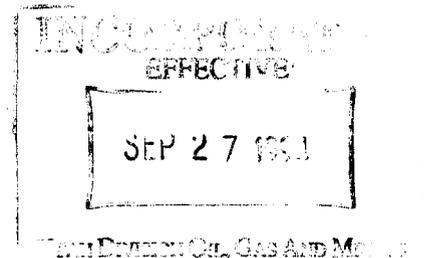
**TABLE 14: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-20.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	1.75	7.63	20	5.00
<i>Artemisia nova</i>	7.75	8.58	20	65.00
<i>Artemisia tridentata</i>	2.50	5.81	20	25.00
<i>Ceratoides lanata</i>	0.75	1.79	20	15.00
<i>Chrysothamnus depressus</i>	2.50	2.50	20	50.00
<i>Chrysothamnus viscidiflorus</i>	0.25	1.05	20	5.00
<b><u>FORBS</u></b>				
<i>Astragalus tenellus</i>	2.75	3.70	20	40.00
<i>Castilleja linariifolia</i>	0.25	1.09	20	5.00
<i>Machaeranthera grindelioides</i>	3.00	3.32	20	50.00
<i>Penstemon caespitosus</i>	2.25	4.32	20	25.00
<i>Penstemon pachyphyllus</i>	0.50	1.50	20	10.00
<b><u>GRASSES</u></b>				
<i>Agropyron cristatum</i>	1.25	5.45	20	5.00
<i>Bromus carinatus</i>	1.00	3.00	20	50.00
<i>Elymus salinus</i>	11.75	10.16	20	80.00
<i>Stipa hymenoides</i>	5.00	6.89	20	45.00

INCORPORATED  
EFFECTIVE  
SEP 27 1991  
WATER DIVISION, U.S. GEOLOGICAL SURVEY

TABLE 15: Woody species densities of Trail Mountain Drill Site:  
TMTN-20.

	NUMBER/ACRE
<i>Amalanchier utahensis</i>	50.16
<i>Artemisia nova</i>	3160.01
<i>Artemisia tridentata</i>	351.11
<i>Ceratoides lanata</i>	<u>451.43</u>
TOTAL	<u>4012.71</u>



**TABLE 16:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-21.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	17.50	21.65	20
Understory	25.75	12.17	20
Litter	22.50	14.62	20
Bareground	16.00	13.29	20
Rock	18.25	15.75	20
<b>COMPOSITION</b>			
Shrubs	64.88	28.24	20
Forbs	7.27	12.17	20
Grasses	27.96	26.45	20

4001-10-10  
 EFFECTIVE:  
 SEP 27 1961  
 THE BRADEN CO., GAS AND MEAS. CO.

**TABLE 17: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-21.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	0.25	1.09	20	5.00
<i>Artemisia nova</i>	1.00	4.36	20	5.00
<i>Artemisia tridentata</i>	3.00	7.65	20	15.00
<i>Chrysothamnus nauseosus</i>	0.25	1.09	20	5.00
<i>Chrysothamnus viscidiflorus</i>	1.50	6.54	20	5.00
<i>Cercocarpus montanus</i>	3.25	8.70	20	15.00
<i>Juniperus ostersperma</i>	7.50	15.69	20	25.00
<i>Pinus edulis</i>	11.75	12.38	20	60.00
<i>Symphoricarpos oreophilus</i>	0.75	3.27	20	5.00
<b><u>FORBS</u></b>				
<i>Astragalus tenellus</i>	0.25	1.09	20	5.00
<i>Leptodactylon pungens</i>	0.50	1.50	20	10.00
<i>Penstemon caespitosus</i>	0.75	2.38	20	10.00
<i>Penstemon pachyphyllus</i>	1.25	3.49	20	15.00
<b><u>GRASSES</u></b>				
<i>Elymus salinus</i>	9.25	9.65	20	75.00
<i>Stipa hymenoides</i>	2.00	3.67	20	25.00

INTEGRITY  
EFFECTIVE:  
SEP 27 1991  
WELL DESIGN, GAS AND MEASUREMENTS

**TABLE 18: Woody species densities of Trail Mountain Drill Site: TMTN-21.**

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	115.70
<i>Artemisia tridentata</i>	192.83
<i>Artemisia nova</i>	12.86
<i>Cercocarpus montanus</i>	154.28
<i>Chrysothamnus viscidiflorus</i>	38.57
<i>Chrysothamnus nauseosus</i>	25.71
<i>Juniperus osteosperma</i>	89.99
<i>Opuntia polyacantha</i>	12.86
<i>Pinus edulis</i>	359.96
<i>Symphoricarpos oreophilus</i>	<u>25.71</u>
<b>TOTAL</b>	<b><u>1028.47</u></b>

EFFECTIVE:  
SEP 27 1963  
 TRAIL MOUNTAIN OIL, GAS AND MINERAL

**TABLE 19:** Total cover and composition summary for Trail Mountain Drill Site: TMTN-22.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	4.25	8.26	20
Understory	37.75	9.68	20
Litter	15.00	12.85	20
Bareground	30.50	13.22	20
Rock	12.50	11.35	20
<b>COMPOSITION</b>			
Shrubs	40.11	20.71	20
Forbs	24.14	20.16	20
Grasses	36.29	17.47	20

INCORPORATED  
EFFECTIVE:  
SEP 27 1991  
TRAIL MOUNTAIN CO., GAS AND MINERAL

**TABLE 20: Species cover and frequency summary for Trail Mountain Drill Site: TMTN-22.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b>TREES &amp; SHRUBS</b>				
<i>Amalanchier utahensis</i>	0.75	2.38	20	10.00
<i>Artemisia tridentata</i>	5.60	7.06	20	55.00
<i>Artemisia nova</i>	2.55	5.89	20	25.00
<i>Chrysothamnus depressus</i>	0.50	1.50	20	10.00
<i>Chrysothamnus viscidiflorus</i>	1.60	2.94	20	5.00
<i>Pinus edulis</i>	5.00	9.49	20	25.00
<i>Pseudotsuga menziesii</i>	0.25	1.09	20	5.00
<i>Symphoricarpos oreophilus</i>	1.50	6.54	20	5.00
<b>FORBS</b>				
<i>Astragalus tenellus</i>	7.00	8.28	20	55.00
<i>Leptodactylon pungens</i>	0.35	1.15	20	10.00
<i>Machaeranthera grindelioides</i>	0.25	1.09	20	5.00
<i>Penstemon caespitosus</i>	1.90	2.84	20	35.00
<b>GRASSES</b>				
<i>Elymus salinus</i>	14.00	8.31	20	90.00
<i>Stipa hymenoides</i>	1.00	3.39	20	10.00

REVISED SPECIFICATION  
EFFECTIVE:  
SEP 27 1991  
TEMPERATURE, OIL, GAS AND METALS

TABLE 21: Woody species densities of Trail Mountain Drill Site:  
TMTN-22.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	138.42
<i>Artemisia nova</i>	415.27
<i>Artemisia tridentata</i>	1162.75
<i>Chrysothamnus viscidiflorus</i>	138.42
<i>Pinus edulis</i>	193.79
<i>Purhia tridentata</i>	55.37
<i>Pseudotsuga menziesii</i>	27.68
<i>Symphoricarpos oreophilus</i>	<u>83.05</u>
TOTAL	<u>2214.75</u>

EFFECTIVE:  
SEP 27 1991  
 UNIT: POUNDS/AC, GAS AND METERS

**TABLE 22:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-23.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	--	--	20
Understory	32.00	6.40	20
Litter	6.75	2.38	20
Bareground	42.75	14.87	20
Rock	18.50	13.43	20
<b>COMPOSITION</b>			
Shrubs	12.08	20.62	20
Forbs	16.49	16.73	20
Grasses	71.43	26.73	20

RECEIVED  
EFFECTIVE:  
SEP 27 1991  
TERRACON CO., GAS AND MFG. CO.

TABLE 23: Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-23.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQ.
<u>TREES &amp; SHRUBS</u>				
<i>Artemisia nova</i>	0.25	1.09	20	5.00
<i>Artemisia tridentata</i>	2.25	5.12	20	20.00
<i>Chrysothamnus depressus</i>	2.15	3.29	20	35.00
<i>Chrysothamnus viscidiflorus</i>	1.25	2.68	20	20.00
<i>Ceratoides lanata</i>	0.25	1.09	20	5.00
<u>FORBS</u>				
<i>Hymenoxys richardsonii</i>	2.75	5.58	20	25.00
<i>Penstemon caespitosus</i>	0.85	2.59	20	10.00
<u>GRASSES</u>				
<i>Agropyron cristatum</i>	1.00	4.36	20	5.00
<i>Elymus hispidus</i>	1.75	7.63	20	5.00
<i>Elymus salinus</i>	9.75	10.30	20	60.00
<i>Stipa hymenoides</i>	9.75	10.78	20	50.00

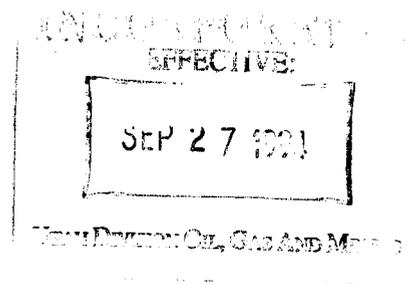


TABLE 24: Woody species densities of the reference area of Trail Mountain Drill Site: TMTN-23.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	107.80
<i>Artemisia nova</i>	125.97
<i>Artemisia tridentata</i>	574.95
<i>Ceratoides lanata</i>	341.38
<i>Chrysothamnus viscidiflorus</i>	269.51
<i>Pinus edulis</i>	<u>17.97</u>
<b>TOTAL</b>	<b><u>1437.58</u></b>

AMERICAN OIL & GAS COMPANY  
EFFECTIVE:  
SEP 27 1991  
NEW DENVER OIL, GAS AND MINERAL

**TABLE 25:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-24.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	2.00	6.20	20
Understory	51.50	10.85	20
Litter	21.50	9.63	20
Bareground	13.25	9.26	20
Rock	11.75	10.64	20
<b>COMPOSITION</b>			
Shrubs	53.23	26.71	20
Forbs	4.69	7.07	20
Grasses	43.71	21.39	20

NATIONAL PETROLEUM COUNCIL  
 EFFECTIVE:  
 SEP 27 1994  
 TECHNICAL DEPARTMENT, OIL, GAS AND MINERAL SERVICES

**TABLE 26: Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-24.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<u>TREES &amp; SHRUBS</u>				
<i>Amalanchier utahensis</i>	7.75	14.45	20	30.00
<i>Artemisia tridentata</i>	13.65	13.17	20	65.00
<i>Symphoricarpos oreophilus</i>	9.50	14.22	20	55.00
<u>FORBS</u>				
<i>Leptodactylon pungens</i>	1.75	3.27	20	25.00
<i>Machaeranthera canescens</i>	.50	1.50	20	10.00
<u>GRASSES</u>				
<i>Bromus carinatus</i>	1.50	5.50	20	10.00
<i>Elymus salinus</i>	17.75	12.50	20	80.00
<i>Stipa hymenoides</i>	3.25	5.31	20	30.00

RECEIVED  
 EFFECTIVE:  
 SEP 27 1991  
 TRAIL MOUNTAIN DRILL SITE, GAS AND METALS

TABLE 27: Woody species densities of Trail Mountain Drill Site:  
TMTN-24.

	NUMBER/ACRE
<i>Amalanchier utahensis</i>	308.54
<i>Artemisia tridentata</i>	2247.96
<i>Chrysothamnus viscidiflorus</i>	88.16
<i>Symphoricarpos oreophilus</i>	<u>881.55</u>
TOTAL	<u>3526.21</u>

IN COMPLIANCE WITH  
EFFECTIVE:  
SEP 27 1991  
UNITED STATES DEPARTMENT OF ENERGY  
BUREAU OF LAND MANAGEMENT

**TABLE 28:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-25.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory Cover	--	--	20
Understory Cover	65.75	8.26	20
Litter	13.60	7.94	20
Bareground	15.00	9.88	20
Rock	5.65	6.06	20
<b>COMPOSITION</b>			
Shrubs	50.11	22.37	20
Forbs	0.00	0.00	20
Grasses	49.89	22.37	20

INCORPORATED  
EFFECTIVE:  
SEP 27 1993  
FURTHER ON, GAS AND METALS

**TABLE 29:** Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-25.

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	2.75	7.33	20	15.00
<i>Artemisia tridentata</i>	23.00	14.00	20	100.00
<i>Chrysothamnus nauseosus</i>	6.75	11.97	20	35.00
<i>Chrysothamnus viscidiflorus</i>	0.25	1.09	20	5.00
<i>Gutierrezia sarothrae</i>	0.25	1.09	20	5.00
<i>Symphoricarpos oreophilus</i>	1.00	4.36	20	5.00
<b><u>FORBS</u></b>				
<b><u>GRASSES</u></b>				
<i>Elymus salinus</i>	25.25	13.27	20	95.00
<i>Stipa hymenoides</i>	6.50	5.94	20	60.00

INCORPORATED  
EFFECTIVE:  
SEP 27 1991  
THE DIVISION OF OIL, GAS AND MINERAL RESOURCES

**TABLE 30:** Woody species densities of the reference area of Trail Mountain Drill Site: TMTN-25.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	311.96
<i>Artemisia tridentata</i>	3119.59
<i>Chrysothamnus nauseosus</i>	1060.66
<i>Chrysothamnus viscidiflorus</i>	249.57
<i>Gutierrezia sarothrae</i>	62.39
<i>Symphoricarpos oreophilus</i>	<u>187.18</u>
<b>TOTAL</b>	<b><u>4991.35</u></b>

ENCLOSURE  
EFFECTIVE:  
SEP 27 1991  
TERRITORY DIVISION OF GAS AND MINERAL RESOURCES

**TABLE 31:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-26.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory Cover	0.50	2.18	20
Understory Cover	45.75	7.46	20
Litter	13.25	6.18	20
Bareground	34.75	8.29	20
Rock	5.75	1.79	20
<b>COMPOSITION</b>			
Shrubs	37.80	33.51	20
Forbs	11.98	12.41	20
Grasses	51.87	23.71	20

RECEIVED  
EFFECTIVE:  
SEP 27 1991  
WATER DIVISION OF CALIFORNIA DEPARTMENT OF WATER RESOURCES

**TABLE 32: Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-26.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	0.25	1.09	20	5.00
<i>Artemisia nova</i>	1.00	4.36	20	5.00
<i>Artemisia tridentata</i>	7.25	9.15	20	60.00
<i>Chrysothamnus depressus</i>	4.25	3.96	20	60.00
<i>Chrysothamnus viscidiflorus</i>	2.25	4.87	20	20.00
<i>Pinus edulis</i>	1.00	4.36	20	5.00
<b>FORBS</b>				
<i>Astragalus tenellus</i>	2.75	3.34	20	45.00
<i>Machaeranthera canescens</i>	.25	1.09	20	5.00
<i>Machaeranthera grindelioides</i>	1.25	3.11	20	15.00
<i>Melilotus officinalis</i>	0.25	1.09	20	5.00
<i>Penstemon caespitosus</i>	0.75	2.38	20	10.00
<i>Penstemon pachyphyllus</i>	0.25	1.09	20	5.00
<b><u>GRASSES</u></b>				
<i>Agropyron cristatum</i>	4.75	9.55	20	25.00
<i>Bromus carinatus</i>	1.50	3.91	20	15.00
<i>Elymus salinus</i>	10.25	9.15	20	75.00
<i>Poa secunda</i>	2.75	6.22	20	20.00
<i>Stipa comata</i>	1.50	6.54	20	5.00
<i>Stipa hymenoides</i>	3.25	6.18	20	30.00

RECEIVED BY AIR MAIL  
EFFECTIVE:  
SEP 27 1991  
MOUNTAIN OIL, GAS AND MINERAL

**TABLE 33:** Woody species densities of the reference area of Trail Mountain Drill Site: TMTN-26.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	40.03
<i>Artemisia nova</i>	200.15
<i>Artemisia tridentata</i>	2081.55
<i>Chrysothamnus nauseosus</i>	40.03
<i>Chrysothamnus viscidiflorus</i>	680.51
<i>Pinus edulis</i>	80.06
<i>Purhia tridentata</i>	<u>80.06</u>
TOTAL	<u>3202.39</u>

INCORPORATED  
EFFECTIVE:

SEP 27 1991

Fuels Division Oil, Gas And Minerals

**TABLE 34:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-27.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Living Cover	51.00	8.31	20
Litter	7.90	3.56	20
Bareground	31.50	11.41	20
Rock	9.60	9.24	20
<b>COMPOSITION</b>			
Shrubs	12.36	19.81	20
Forbs	0.00	0.00	20
Grasses	87.64	19.81	20

INCORPORATED  
 EFFECTIVE:  
 SEP 27 1991  
 TRAIL MOUNTAIN DRILL SITE, GAS AND MINERAL

**TABLE 35: Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-27.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	0.75	2.38	20	10.00
<i>Artemisia nova</i>	0.25	1.09	20	5.00
<i>Artemisia tridentata</i>	2.75	5.80	20	30.00
<i>Ceratoides lanata</i>	0.50	1.50	20	10.00
<i>Chrysothamnus viscidiflorus</i>	0.75	2.38	20	10.00
<i>Symphoricarpos oreophilus</i>	0.50	2.18	20	5.00
<b><u>FORBS</u></b>				
<b><u>GRASSES</u></b>				
<i>Agropyron cristatum</i>	1.50	6.54	20	5.00
<i>Bromus carinatus</i>	0.50	2.18	20	5.00
<i>Elymus salinus</i>	34.50	17.17	20	90.00
<i>Stipa hymenoides</i>	9.00	13.84	20	40.00

MINOR PURCHASE  
 EFFECTIVE:  
 SEP 27 1991  
 MINOR PURCHASE CO., GAS AND MEASUREMENT

**TABLE 36:** Woody species densities of the reference area of Trail Mountain Drill Site: TMTN-27.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	88.13
<i>Artemisia tridentata</i>	1277.90
<i>Ceratoides lanata</i>	66.10
<i>Chrysothamnus nauseosus</i>	22.03
<i>Chrysothamnus viscidiflorus</i>	264.39
<i>Symphoricarpos oreophilus</i>	<u>44.07</u>
<b>TOTAL</b>	<u><b>1762.62</b></u>

ENCLOSURE  
EFFECTIVE  
SEP 27 1991  
UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

**TABLE 37:** Total cover and composition summary for the reference area of Trail Mountain Drill Site: TMTN-28.

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory	--	--	20
Understory	47.50	9.01	20
Litter	8.00	2.90	20
Bareground	19.50	7.89	20
Rock	25.00	11.73	20
<b>COMPOSITION</b>			
Shrubs	34.65	21.87	20
Forbs	19.80	13.12	20
Grasses	45.23	15.67	20

RECEIVED  
EFFECTIVE:  
SEP 27 1991  
TERRY D. WILSON, Geol. Gas And Mineral

**TABLE 38: Species cover and frequency summary for the reference area of Trail Mountain Drill Site: TMTN-28.**

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Amalanchier utahensis</i>	1.00	4.36	20	5.00
<i>Artemisia nova</i>	1.25	2.68	20	20.00
<i>Artemisia tridentata</i>	8.00	9.67	20	60.00
<i>Ceratoides lanata</i>	1.50	2.78	20	25.00
<i>Chrysothamnus depressus</i>	1.50	2.78	20	5.00
<i>Chrysothamnus viscidiflorus</i>	0.75	3.27	20	5.00
<i>Gutierrezia sarothrae</i>	0.95	1.96	20	20.0
<i>Symphoricarpos oreophilus</i>	2.50	6.80	20	15.00
<b><u>FORBS</u></b>				
<i>Arenaria fendleri</i>	1.00	2.00	20	20.00
<i>Astragalus lancearius</i>	0.75	1.79	20	15.00
<i>Astragalus megacarpus</i>	0.75	2.38	20	10.00
<i>Castilleja linariifolia</i>	0.25	1.09	20	5.00
<i>Leptodactylon pungens</i>	1.25	2.68	20	20.00
<i>Machaeranthera grindelioides</i>	3.00	3.32	20	50.00
<i>Penstemon caespitosus</i>	1.75	2.38	20	35.00
<b><u>GRASSES</u></b>				
<i>Arrhenatherum elatius</i>	1.50	5.50	20	10.00
<i>Elymus salinus</i>	16.75	9.91	20	90.00
<i>Stipa hymenoides</i>	3.00	7.97	20	15.00

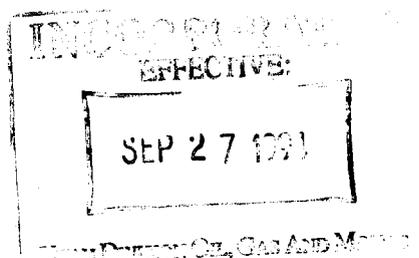
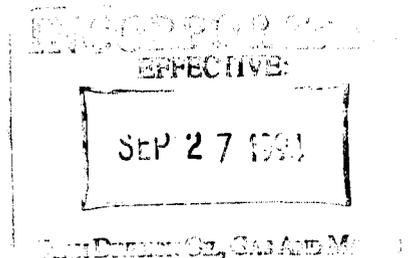


TABLE 39: Woody species densities of the reference area of Trail Mountain Drill Site: TMTN-28.

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahesis</i>	163.23
<i>Artemisia nova</i>	816.14
<i>Artemisia tridentata</i>	2013.15
<i>Ceratoides lanata</i>	435.28
<i>Chrysothamnus viscidiflorus</i>	163.23
<i>Gutierrezia sarothrae</i>	435.28
<i>Symphoricarpos oreophilus</i>	<u>326.46</u>
TOTAL	<u>4352.77</u>



**TABLE 40:** Total cover and composition summary for the reference area: REF-9. (This community is proposed as a reference area for the following drill sites: TMTN-17, TMTN-24, TMTN-25, TMTN-26 & TMTN-27).

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Living Cover	53.75	7.89	20
Litter	11.40	5.62	20
Bareground	29.75	10.89	20
Rock	5.10	2.02	20
<b>COMPOSITION</b>			
Shrubs	35.40	22.68	20
Forbs	3.20	5.95	20
Grasses	61.41	22.99	20

INCORPORATED  
 EFFECTIVE:  
 SEP 27 1991  
 THE DIRECTOR OF THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

**TABLE 41:** Species cover and frequency summary for the reference area: REF-9. (This community is proposed as a reference area for the following drill sites: TMTN-17, TMTN-24, TMTN-25, TMTN-26 & TMTN-27).

<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Artemisia tridentata</i>	13.50	9.10	20	95.00
<i>Symphoricarpos oreophilus</i>	6.50	10.01	20	40.00
<b><u>FORBS</u></b>				
<i>Arenaria fendleri</i>	0.25	1.09	20	5.0
<i>Eriogonum umbellatum</i>	0.50	2.18	20	5.00
<i>Hymenoxys richardsonii</i>	0.50	1.50	20	10.00
<i>Trifolium repens</i>	0.50	2.18	20	5.00
<b><u>GRASSES</u></b>				
<i>Bromus inermis</i>	18.25	13.06	20	80.00
<i>Elymus salinus</i>	3.25	8.70	20	10.00
<i>Elymus spicatus</i>	4.00	8.60	20	20.00
<i>Koeleria micrantha</i>	6.50	8.82	20	40.00

RECORDED AND INDEXED  
 EFFECTIVE:  
 SEP 27 1991  
 UNITED STATES GEOLOGICAL SURVEY  
 WASHINGTON, D.C. 20541

**TABLE 42:** Woody species densities of the reference area: REF-9.  
 (This community is proposed as a reference area for the following  
 drill sites: TMTN-17, TMTN-24, TMTN-25, TMTN-26 & TMTN-27).

	<b>NUMBER/ACRE</b>
<i>Artemisia tridentata</i>	2897.74
<i>Pinus edulis</i>	42.61
<i>Symphoricarpos oreophilus</i>	<u>468.75</u>
<b>TOTAL</b>	<u><b>3409.10</b></u>

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 EFFECTIVE:  
 SEP 27 1981  
 TMTN-24, TMTN-25, TMTN-26, TMTN-27

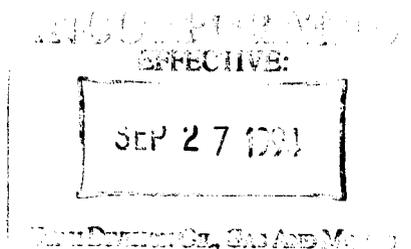
**TABLE 43:** Total cover and composition summary for the reference area: REF-10. (This community is proposed as a reference area for the following drill sites: TMTN-16 TMTN-18, TMTN-20, TMTN-23 & TMTN-28).

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Living Cover	42.00	9.41	20
Litter	15.50	8.65	20
Bareground	30.25	15.93	20
Rock	12.25	9.68	20
<b>COMPOSITION</b>			
Shrubs	23.21	17.74	20
Forbs	31.60	23.87	20
Grasses	45.19	24.20	20

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 EFFECTIVE:  
 SEP 27 1991  
 THE UNIVERSITY OF TEXAS AT AUSTIN

**TABLE 44:** Species cover and frequency summary for the reference area: REF-10. (This community is proposed as a reference area for the following drill sites: TMTN-16 TMTN-18, TMTN-20, TMTN-23 & TMTN-28).

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQ.
<u>TREES &amp; SHRUBS</u>				
<i>Amalanchier utahensis</i>	1.50	3.57	20	15.00
<i>Artemisia nova</i>	0.50	2.18	20	5.00
<i>Artemisia tridentata</i>	5.75	6.57	20	60.00
<i>Chrysothamnus depressus</i>	0.25	1.09	20	5.00
<i>Chrysothamnus viscidiflorus</i>	0.75	1.79	20	15.00
<i>Pinus edulis</i>	0.25	1.09	20	5.00
<i>Symphoricarpos oreophilus</i>	0.75	3.27	20	5.00
<u>FORBS</u>				
<i>Arenaria fendleri</i>	4.50	6.50	20	45.00
<i>Astragalus tenellus</i>	4.25	6.38	20	45.00
<i>Castilleja linariifolia</i>	3.05	3.28	20	55.00
<i>Leptodactylon pungens</i>	1.00	2.00	20	20.00
<i>Machaeranthera grindelioides</i>	0.50	1.50	20	10.00
<i>Orthocarpus tolmiei</i>	0.15	0.65	20	5.00
<i>Penstemon pachyphyllus</i>	0.25	1.09	20	5.00
<i>Stanleya pinnata</i>	0.50	2.18	20	5.00
<u>GRASSES</u>				
<i>Bromus inermis</i>	0.75	3.27	20	5.00
<i>Elymus salinus</i>	17.30	9.31	20	95.00



**TABLE 45:** Woody species densities of reference are: REF-10.  
 (This community is proposed as a reference area for the following  
 drill sites: TMTN-16 TMTN-18, TMTN-20, TMTN-23 & TMTN-28).

	<b>NUMBER/ACRE</b>
<i>Amalanchier utahensis</i>	218.07
<i>Artemisia nova</i>	100.65
<i>Artemisia tridentata</i>	1023.27
<i>Ceratoides lanata</i>	83.88
<i>Chrysothamnus viscidiflorus</i>	100.65
<i>Juniperus communis</i>	16.78
<i>Pinus edulis</i>	50.32
<i>Symphoricarpos oreophilus</i>	16.78
	<hr/>
<b>TOTAL</b>	<b><u>1610.39</u></b>

INCORPORATED  
 EFFECTIVE:  
 SEP 27 1991

**TABLE 46:** Total cover and composition summary for the reference area: REF-11. (This community is proposed as a reference area for the following drill sites: TMTN-19, TMTN-21, & TMTN-22).

<b>TOTAL COVER</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>
Overstory Cover	10.50	16.58	20
Understory Cover	31.50	13.05	20
Litter	11.75	12.38	20
Bareground	36.50	17.40	20
Rock	9.75	8.14	20
<b>COMPOSITION</b>			
Shrubs	49.33	32.32	20
Forbs	21.69	24.40	20
Grasses	28.98	24.41	20

RECEIVED  
 EXECUTIVE  
 SEP 27 1991  
 THE DIRECTOR OF THE ARIZONA DEPARTMENT OF LAND AND WATER

**TABLE 47: Species cover and frequency summary for the reference area: REF-11. (This community is proposed as a reference area for the following drill sites: TMTN-19, TMTN-21, & TMTN-22).**

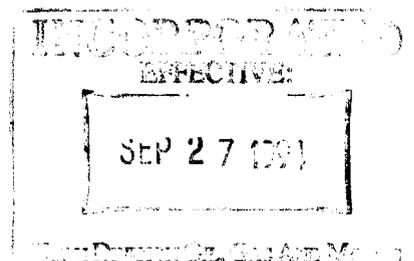
<b>SPECIES</b>	<b>% MEAN COVER</b>	<b>STANDARD DEVIATION</b>	<b>SAMPLE SIZE</b>	<b>RELATIVE FREQ.</b>
<b><u>TREES &amp; SHRUBS</u></b>				
<i>Artemisia nova</i>	2.00	4.58	20	25.00
<i>Artemisia tridentata</i>	2.25	7.66	20	15.00
<i>Chrysothamnus depressus</i>	3.25	4.82	20	40.00
<i>Chrysothamnus viscidiflorus</i>	0.50	1.50	20	10.00
<i>Ephedra viridis</i>	0.50	2.18	20	5.00
<i>Juniperus osteosperma</i>	1.25	5.45	20	5.00
<i>Pinus edulis</i>	11.50	17.54	20	40.00
<i>Purshia tridentata</i>	0.25	1.09	20	5.00
<b><u>FORBS</u></b>				
<i>Astragalus megacarpus</i>	1.25	2.68	20	20.00
<i>Astragalus tenellus</i>	4.25	6.76	20	35.00
<i>Castilleja liniaefolia</i>	0.50	1.50	20	10.00
<i>Erigeron sp.</i>	0.75	1.79	20	15.00
<i>Leptodactylon pungens</i>	0.75	3.27	20	5.00
<i>Machaeranthera grindelioides</i>	0.75	1.79	20	15.00
<b><u>GRASSES</u></b>				
<i>Elymus salinus</i>	10.50	12.24	20	75.00
<i>Elymus spicatus</i>	0.75	2.38	20	10.00
<i>Stipa hymenoides</i>	1.00	2.55	20	15.00

EFFECTIVE:  
 SEP 27 1991

THE DISTRICT OF COLUMBIA

**TABLE 48:** Woody species densities of the reference area: REF-11.  
 (This community is proposed as a reference area for the following  
 drill sites: TMTN-19, TMTN-21, & TMTN-22).

	<b>NUMBER/ACRE</b>
<i>Artemisia nova</i>	154.43
<i>Artemisia tridentata</i>	432.40
<i>Chrysothamnus viscidiflorus</i>	10.30
<i>Ephedra viridis</i>	10.30
<i>Gutierrezia sarothrae</i>	20.59
<i>Juniperus ostersperma</i>	20.59
<i>Pinus edulis</i>	319.15
<i>Purhia tridentata</i>	<u>20.59</u>
<b>TOTAL</b>	<b><u>988.33</u></b>



**TABLE 49: Statistical summary sheet for the Proposed Disturbed and Reference Areas on Trail Mountain.**

<b>DRILL SITE: TMTN-16</b>			
Living Cover**	x=48.75	s=10.71	n=20
Density	x=1321.88*	s=489.52	n=20
<b>REFERENCE AREA: REF-10</b>			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=2.117	df=38	SL=p<.05
Density	t=-3.736	df=42	SL=p<.05
<b>DRILL SITE: TMTN-17</b>			
Living Cover**	x=57.25	s=12.09	n=20
Density	x=908.87*	s=337.15	n=20
<b>REFERENCE AREA: REF-9</b>			
Understory Cover	x=53.75	s=7.89	n=20
Density	x=1838.97*	s=431.92	n=20
<b>STATISTICAL ANALYSES</b>			
Cover	t=1.084	df=38	SL=N.S.
Density	t=-7.591	df=38	SL=p<.05
<b>DRILL SITE: TMTN-18</b>			
Living Cover**	x=47.75	s=8.44	n=20
Density	x=1687.86*	s=817.78	n=20
<b>REFERENCE AREA: REF-10</b>			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=2.034	df=38	SL=p<.05
Density	t=-3.146	df=42	SL=p<.05
<b>DRILL SITE: TMTN-19</b>			
Living Cover**	x=39.75	s=10.25	n=20
Density	x=4038.98*	s=1409.24	n=20
<b>REFERENCE AREA: REF-11</b>			
Understory Cover	x=31.50	s=13.05	n=20
Density	x=6346.70*	s=2163.34	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=2.223	df=38	SL=p<.05
Density	t=-4.097	df=42	SL=p<.05

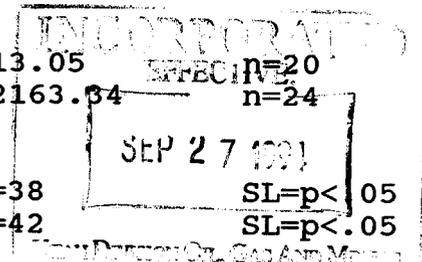


TABLE 49: (continued)

DRILL SITE: TMTN-20			
Living Cover**	x=43.25	s=8.55	n=20
Density	x=1563.19*	s=420.12	n=20
REFERENCE AREA: REF-10			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
STATISTICAL ANALYSES			
Cover	t=0.440	df=38	SL=N.S.
Density	t=-3.395	df=42	SL=p<.05
DRILL SITE: TMTN-21			
Living Cover**	x=25.75	s=12.17	n=20
Density	x=6099.11*	s=2604.20	n=20
REFERENCE AREA: REF-11			
Understory Cover	x=31.50	s=13.05	n=20
Density	x=6346.70*	s=2163.34	n=24
STATISTICAL ANALYSES			
Cover	t=-1.441	df=38	SL=N.S.
Density	t=-0.345	df=42	SL=N.S.
DRILL SITE: TMTN-22			
Living Cover**	x=37.75	s=9.68	n=20
Density	x=2832.20*	s=1106.90	n=20
REFERENCE AREA: REF-11			
Understory Cover	x=31.50	s=13.05	n=20
Density	x=6346.70*	s=2163.34	n=24
STATISTICAL ANALYSES			
Cover	t=1.720	df=38	SL=N.S.
Density	t=-6.575	df=42	SL=p<.05

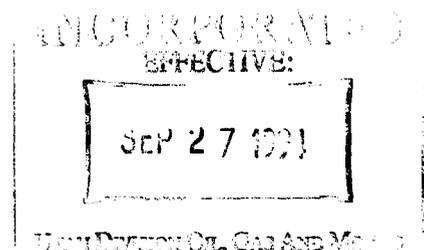


TABLE 49: (continued)

<b>DRILL SITE: TMTN-23</b>			
Living Cover**	x=32.00	s=6.40	n=20
Density	x=4363.94*	s=1718.26	n=20
<b>REFERENCE AREA: REF-10</b>			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=-3.930	df=38	SL=p<.05
Density	t=0.612	df=42	SL=N.S.
<b>DRILL SITE: TMTN-24</b>			
Living Cover**	x=51.50	s=10.85	n=20
Density	x=1778.86*	s=707.43	n=20
<b>REFERENCE AREA: REF-10</b>			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=2.958	df=38	SL=p<.05
Density	t=-3.038	df=42	SL=p<.05
<b>DRILL SITE: TMTN-25</b>			
Living Cover**	x=65.75	s=8.26	n=20
Density	x=1256.71*	s=507.32	n=20
<b>REFERENCE AREA: REF-9</b>			
Understory Cover	x=53.75	s=7.89	n=20
Density	x=1838.97*	s=431.92	n=20
<b>STATISTICAL ANALYSES</b>			
Cover	t=4.689	df=38	SL=p<.05
Density	t=-3.908	df=38	SL=p<.05
<b>DRILL SITE: TMTN-26</b>			
Living Cover**	x=45.75	s=7.46	n=20
Density	x=1958.74*	s=719.12	n=20
<b>REFERENCE AREA: REF-9</b>			
Understory Cover	x=53.75	s=7.89	n=20
Density	x=1838.97*	s=431.92	n=20
<b>STATISTICAL ANALYSES</b>			
Cover	t=-3.295	df=38	SL=p<.05
Density	t=0.639	df=38	SL=N.S.

DOCUMENTATION  
 EFFECTIVE:  
 SEP 27 1970  
 SL=p<.05  
 SL=N.S.

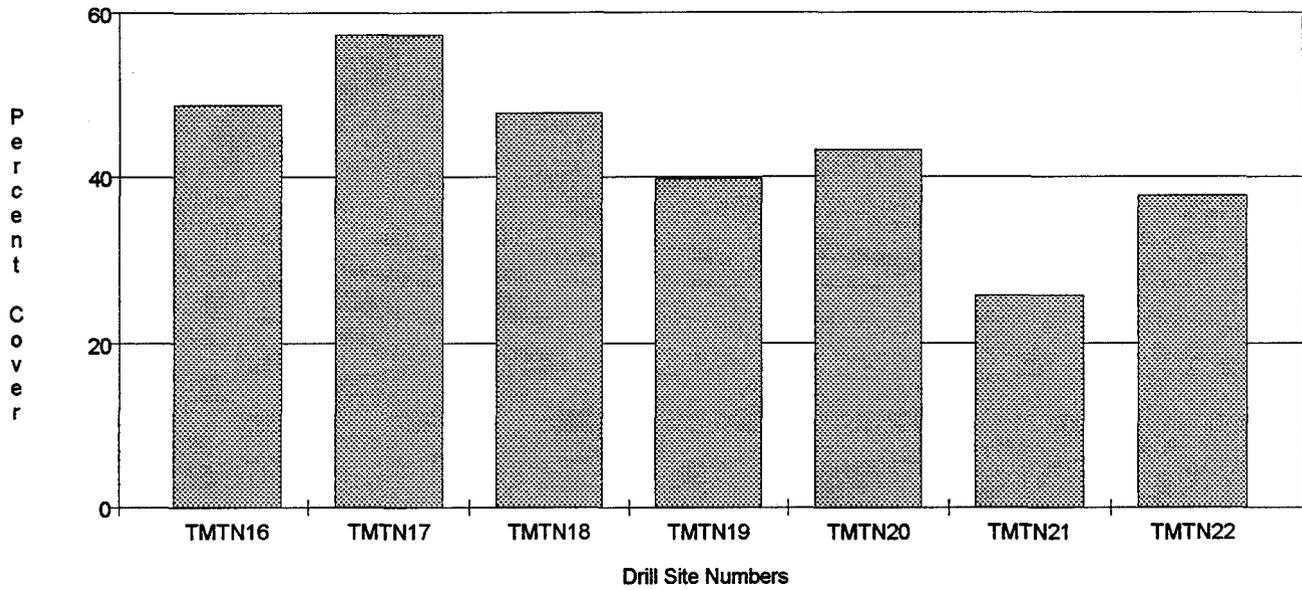
TABLE 49: (continued)

<b>DRILL SITE: TMTN-27</b>			
Living Cover**	x=51.00	s=8.31	n=20
Density	x=3558.69*	s=1243.06	n=20
<b>REFERENCE AREA: REF-9</b>			
Understory Cover	x=53.75	s=7.89	n=20
Density	x=1838.97*	s=431.92	n=20
<b>STATISTICAL ANALYSES</b>			
Cover	t=1.073	df=38	SL=N.S.
Density	t=5.844	df=38	SL=p<.05
<b>DRILL SITE: TMTN-28</b>			
Living Cover**	x=47.50	s=9.01	n=20
Density	x=1441.07*	s=583.94	n=20
<b>REFERENCE AREA: REF-10</b>			
Understory Cover	x=42.00	s=9.41	n=20
Density	x=3895.10*	s=3041.99	n=24
<b>STATISTICAL ANALYSES</b>			
Cover	t=1.888	df=38	SL=N.S.
Density	t=-3.601	df=42	SL=p<.05

x = sample mean, s = sample standard deviation,  
n = sample size, N.S. = nonsignificant,  
\* average distance squared in inches at each sample location.  
\*\* represents understory cover only.  
\*\*\* average number in belt transects.

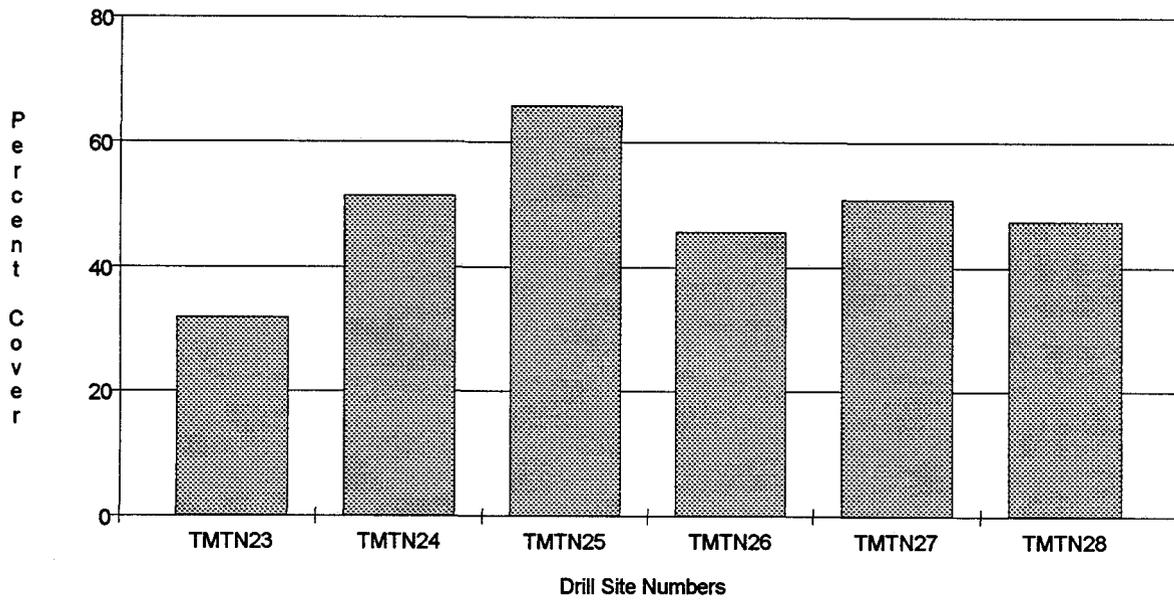
DOCUMENTATION  
EFFECTIVE:  
SEP 27 1991  
NEW BRITAIN CO., GAS AND WATER

FIG. 1: 1993 - Understory Cover for the Proposed Disturbed Areas



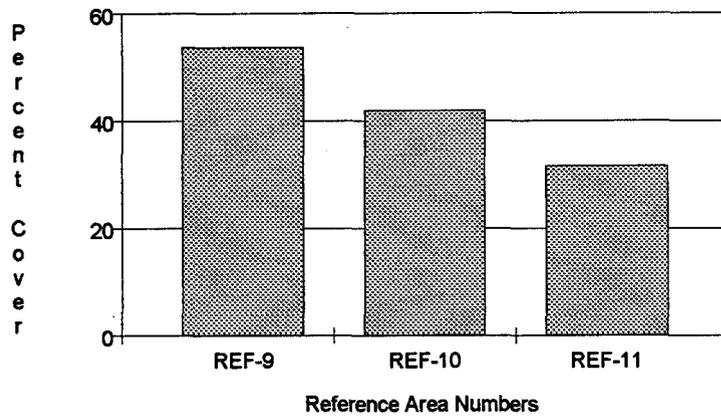
INCORPORATED  
EFFECTIVE:  
SEP 27 1991  
SOUTH DAKOTA CO., GAS AND MINERAL

FIG. 1: (continued)



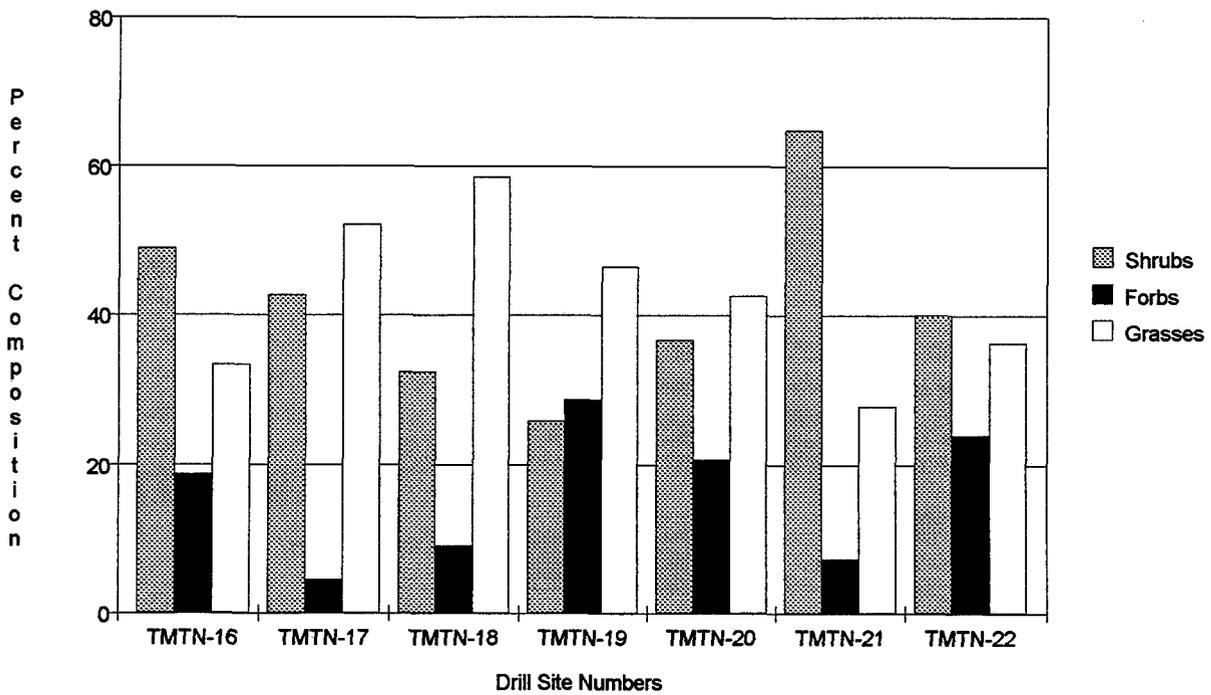
RECORDED  
EFFECTIVE:  
SEP 27 1991  
U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

FIG. 2: 1993 - Understory Cover for the Reference Areas



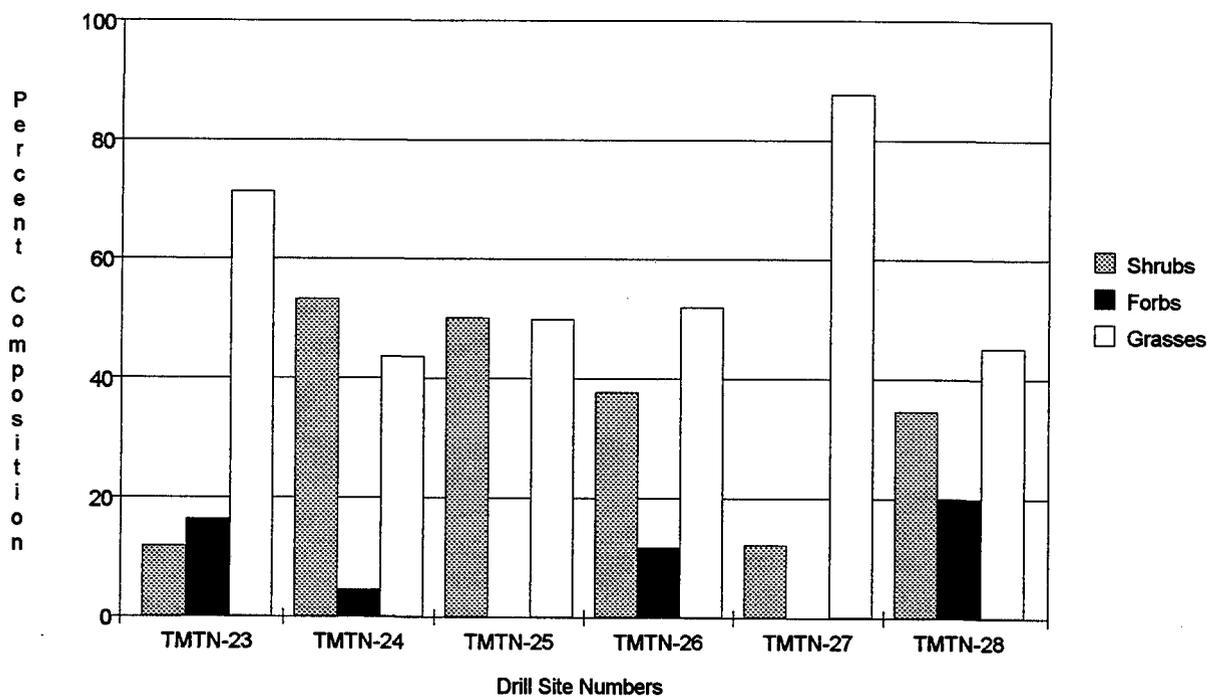
44 CORRUPT  
SPECTIVE:  
SEP 27 1993  
MAYOR OF THE CITY OF OZ, GAS AND ME...

FIG. 3: 1993 - Lifeform Composition for the Proposed Disturbed Sites



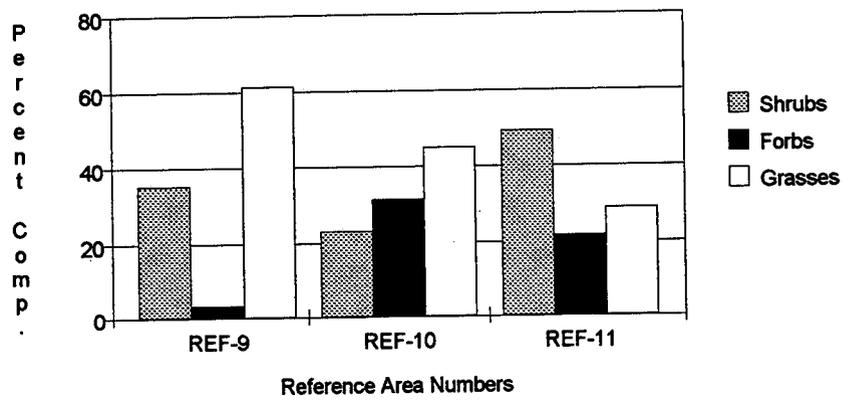
REGULATORY  
 EFFECTIVE:  
 SEP 27 1991  
 DEPARTMENT OF OIL AND MINERAL RESOURCES

FIG. 3: (continued)



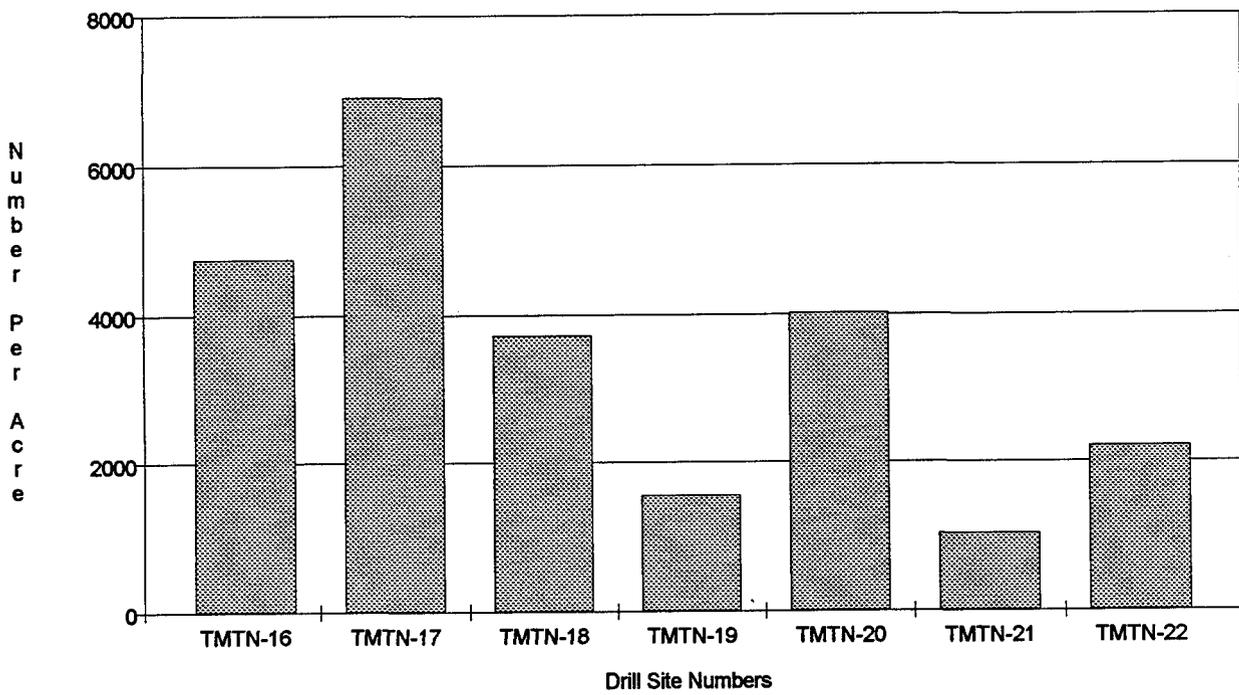
RECEIVED  
EFFECTIVE:  
SEP 27 1991

FIG. 4: 1993 - Liform Composition for the Reference Areas



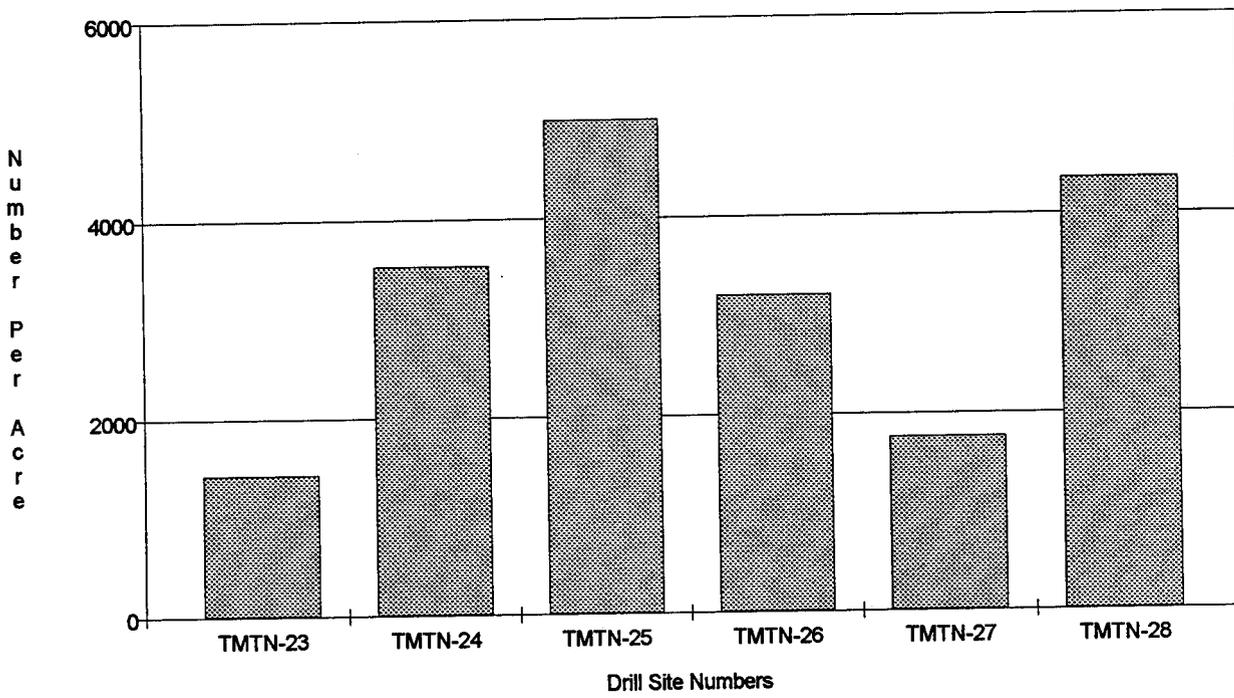
RECEIVED  
EFFECTIVE  
SEP 27 1993  
Forest Resources Dept., San Antonio, Texas

FIG. 5: 1993 - Woody Species Density for the Proposed Disturbed Areas



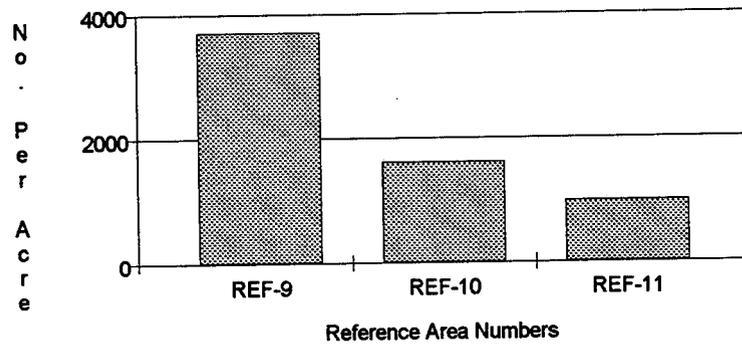
RECEIVED  
EFFECTIVE  
SEP 27 1991  
U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

FIG. 5: (continued)



RECORDED  
EFFECTIVE:  
SEP 27 1991  
Texas Department of Conservation, Fish and Wildlife Division

FIG. 6: 1993 - Woody Species Density for the Reference Area



ENCLOSURE  
EFFECTIVE  
SEP 27 1991  
The Director, U.S. Fish and Wildlife Service

**APPENDIX A:**

**COLOR PHOTOGRAPHS**

RECEIVED  
EFFECTIVE:  
SEP 27 1991  
New York, New York



TMTN-16 Proposed Drill Pad & Access Road



TMTN-17 Proposed Drill Pad & Access Road



TMTN-18 Proposed Drill Pad & Access Road



TMTN-19 Proposed Drill Pad



TMTN-19 Proposed Access Road



TMTN-20 Proposed Drill Pad & Access Road



TMTN-21 Proposed Drill Pad & Access Road



TMTN-22 Proposed Drill Pad & Access Road



TMTN-23 Proposed Drill Pad & Access Road



TMTN-24 Proposed Drill Pad & Access Road



TMTN-25 Proposed Drill Pad & Access Road



TMTN-26 Proposed Drill Pad & Access Road



TMTN-27 Proposed Drill Pad



TMTN-27 Proposed Access Road

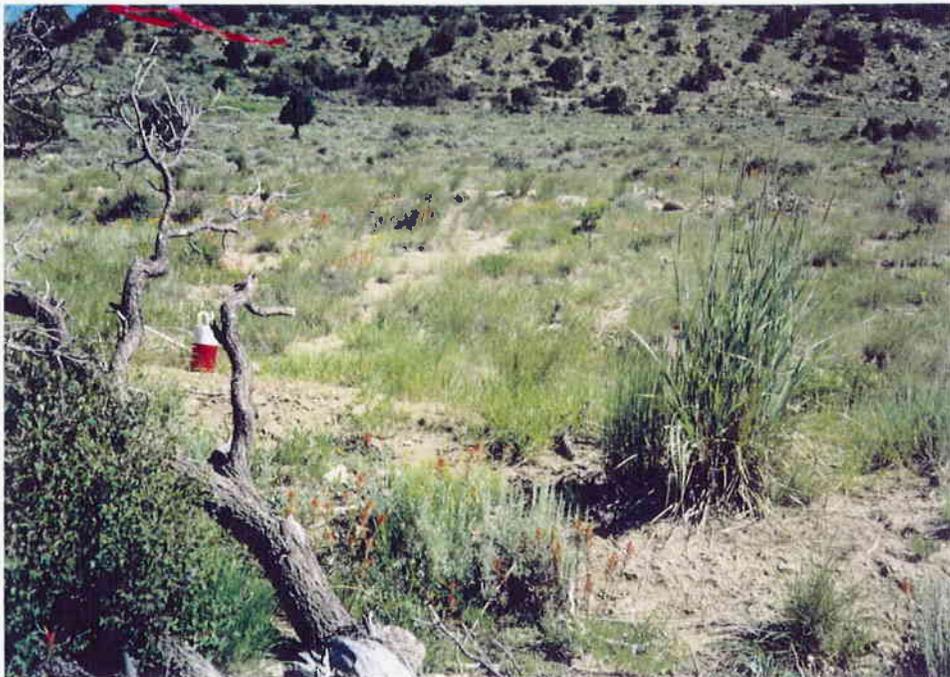


TMTN-28 Proposed Drill Pad & Access Road

INCORPORATED  
EFFECTIVE:  
SEP 27 1931  
Dillon Petroleum Oil, Gas and Minerals



REF - 9



REF - 10



REF - 11

**APPENDIX B:**

**RAW DATA**

RECEIVED  
EFFECTIVE:  
SEP 27 1991  
NEW YORK, NY, GAS AND MOBILE

UNIVERSITY OF CALIFORNIA  
 DIRECTORATE  
 SEP 27 1993  
 UNIVERSITY OF CALIFORNIA, GAS AND MINERAL

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 16

Sage/Grass/Serviceberry

Exposure: S

Slope: 5-15 deg.

Sample Date: 30 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

<i>Chrysothamnus viscidiflor</i>	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
<i>Symphoricarpos oreophilus</i>	0.00	20.00	5.00	10.00	0.00	0.00	15.00	0.00	0.00	0.00
<i>Artemisia tridentata</i>	20.00	20.00	20.00	5.00	0.00	40.00	15.00	0.00	15.00	0.00
<i>Gutierrezia sarothrae</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
<i>Artemisia nova</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
<i>Chrysothamnus nauseosus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Chrysothamnus depressus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00

FORBS

<i>Penstemon pachyphyllus</i>	0.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00
<i>Leptodactylon pungens</i>	0.00	0.00	0.00	5.00	10.00	5.00	0.00	10.00	0.00	0.00
<i>Penstemon caespitosus</i>	0.00	0.00	5.00	5.00	10.00	0.00	0.00	0.00	5.00	0.00
<i>Chaenactis douglasii</i>	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
<i>Lupinus argenteus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
<i>Chaerantha grindelioi</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
<i>Stragalus tenellus</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GRASSES

<i>Elymus salinus</i>	20.00	20.00	35.00	0.00	25.00	15.00	10.00	20.00	10.00	5.00
<i>Stipa hymenoides</i>	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
<i>Poa secunda</i>	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00

COVER

Total Living Cover	40.00	60.00	65.00	30.00	50.00	70.00	50.00	45.00	40.00	40.00
Litter	5.00	5.00	10.00	5.00	5.00	10.00	10.00	5.00	5.00	5.00
Bareground	30.00	20.00	10.00	10.00	10.00	5.00	30.00	15.00	5.00	15.00
Rock	25.00	15.00	15.00	55.00	35.00	15.00	10.00	35.00	50.00	40.00

% COMPOSITION

Shrubs	50.00	66.67	38.46	50.00	0.00	64.29	60.00	0.00	62.50	87.50
Forbs	0.00	0.00	7.69	33.33	50.00	14.29	10.00	55.56	12.50	0.00
Grasses	50.00	33.33	53.85	16.67	50.00	21.43	30.00	44.44	25.00	12.50

TELECOMMUNICATIONS  
 EFFECTIVE:  
 SEP 27 1991  
 TELECOMMUNICATIONS, GAS AND WATER

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.00	10.00	0.00	10.00	25.00	40.00	20.00	35.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
5.00	5.00	5.00	10.00	10.00	0.00	0.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
0.00	5.00	15.00	10.00	5.00	0.00	0.00	0.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00
15.00	20.00	10.00	5.00	15.00	15.00	20.00	20.00	20.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50.00	35.00	40.00	35.00	50.00	50.00	65.00	50.00	60.00	50.00
5.00	5.00	5.00	5.00	10.00	5.00	5.00	5.00	5.00	10.00
10.00	20.00	20.00	5.00	10.00	10.00	15.00	10.00	10.00	20.00
35.00	40.00	35.00	55.00	30.00	35.00	15.00	35.00	25.00	20.00
70.00	14.29	37.50	28.57	50.00	50.00	69.23	60.00	58.33	40.00
0.00	28.57	37.50	57.14	20.00	20.00	0.00	0.00	8.33	20.00
30.00	57.14	25.00	14.29	30.00	30.00	30.77	40.00	33.33	40.00

ENERGY WEST - TRAIL MOUNTAIN  
 TMN - 16  
 Sage/Grass/Serviceberry  
 Exposure: S  
 Slope: 5-15 deg.  
 Sample Date: 30 Sept 1993

TECHNICAL  
 EFFECTIVE:  
 SEP 27 1993  
 West Desert Div, Gas and M...

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
.50	1.50	10.00	Chrysothamnus viscidiflorus
2.50	5.59	20.00	Symphoricarpos oreophilus
16.00	12.71	75.00	Artemisia tridentata
0.25	1.09	5.00	Gutierrezia sarothrae
1.75	6.57	10.00	Artemisia nova
0.25	1.09	5.00	Chrysothamnus nauseosus
2.75	3.70	40.00	Chrysothamnus depressus
<b>FORBS</b>			
1.00	2.55	15.00	Penstemon pachyphyllus
2.00	3.67	20.00	Leptodactylon pungens
3.25	4.26	45.00	Penstemon caespitosus
0.25	1.09	5.00	Chaenactis douglasii
0.75	2.38	10.00	Lupinus argenteus
0.25	1.09	5.00	Machaeranthera grindelioides
0.75	2.38	10.00	Astragalus tenellus
<b>GRASSES</b>			
16.00	7.68	45.00	Elymus salinus
0.25	1.09	5.00	Stipa hymenoides
0.25	1.09	5.00	Poa secunda

<b>COVER</b>		
48.75	10.71	Total Living Cover
6.25	2.17	Litter
14.00	7.18	Bareground
31.00	13.10	Rock

<b>% COMPOSITION</b>		
47.87	22.49	Shrubs
18.75	18.64	Forbs
33.39	12.57	Grasses

PROJECTIVE

SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 17

Sage/Grass/Serviceberry/Snowberry

Exposure: S

Slope: 9 deg.

Sample Date: 30 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00	5.00	0.00
Symphoricarpos oreophilus	0.00	15.00	5.00	20.00	20.00	5.00	0.00	0.00	10.00	0.00
Artemisia tridentata	5.00	5.00	15.00	15.00	25.00	15.00	20.00	10.00	20.00	0.00
Juniperus osteosperma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Penstemon pachyphyllus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leptodactylon pungens	0.00	5.00	0.00	5.00	0.00	5.00	0.00	0.00	5.00	0.00
Lupinus argenteus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GRASSES

Elymus salinus	40.00	15.00	30.00	20.00	25.00	10.00	15.00	25.00	5.00	50.00
Bromus carinatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Poa secunda	0.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00

COVER

Overstory	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Understory	45.00	40.00	60.00	60.00	70.00	40.00	45.00	40.00	50.00	50.00
Litter	30.00	15.00	22.00	15.00	20.00	10.00	15.00	15.00	10.00	20.00
Bareground	20.00	40.00	15.00	24.00	9.00	40.00	25.00	40.00	35.00	25.00
Rock	5.00	5.00	3.00	1.00	1.00	10.00	15.00	5.00	5.00	5.00

% COMPOSITION

Shrubs	11.11	50.00	33.33	58.33	64.29	62.50	55.56	25.00	70.00	0.00
Forbs	0.00	12.50	0.00	8.33	0.00	12.50	0.00	0.00	10.00	0.00
Grasses	88.89	37.50	66.67	33.33	35.71	25.00	44.44	75.00	20.00	100.00

RECEIVED  
 EFFECTIVE  
 SEP 27 1991  
 NEW YORK STATE DEPARTMENT OF TAXATION, GAS AND MOTOR FUEL

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	30.00	25.00	0.00	10.00	0.00	10.00	0.00	30.00	15.00
10.00	20.00	10.00	35.00	25.00	0.00	0.00	20.00	10.00	15.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	10.00	5.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
25.00	20.00	25.00	25.00	30.00	45.00	40.00	5.00	35.00	25.00
0.00	0.00	0.00	10.00	5.00	15.00	0.00	15.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
40.00	70.00	70.00	70.00	70.00	70.00	60.00	60.00	75.00	60.00
25.00	20.00	15.00	20.00	20.00	15.00	20.00	20.00	20.00	35.00
30.00	5.00	10.00	5.00	5.00	10.00	15.00	5.00	4.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	2.00
25.00	71.43	57.14	50.00	50.00	0.00	15.67	50.00	53.33	50.00
0.00	0.00	0.00	0.00	0.00	14.29	15.67	7.14	0.00	8.33
75.00	28.57	42.86	50.00	50.00	85.71	65.67	28.57	45.67	41.67

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 17  
 Sage/Grass/Serviceberry/Snowberry  
 Exposure: S  
 Slope: 9 deg.  
 Sample Date: 30 Sept 1993

Mean	SDev	Freq	
1.00	2.00	20.00	TREES & SHRUBS
9.75	10.30	60.00	Chrysothamnus viscidiflorus
13.75	9.07	85.00	Symphoricarpos oreophilus
0.75	3.27	5.00	Artemisia tridentata
			Juniperus osteosperma

Mean	SDev	Freq	
1.00	2.55	15.00	FORBS
1.00	2.00	20.00	Penstemon pachyphyllus
0.50	2.18	5.00	Leptodactylon pungens
			Lupinus argenteus

Mean	SDev	Freq	
25.50	12.03	100.00	GRASSES
2.25	4.87	20.00	Elymus salinus
0.50	1.50	10.00	Bromus carinatus
1.25	2.68	20.00	Stipa hymenoides
			Poa secunda

RECEIVED  
 EFFECTIVE:  
 SEP 27 1993  
 Energy West, Gas and Minerals

Mean	SDev	Freq	
0.50	2.18		COVER
57.25	12.09		Overstory
19.10	5.86		Understory
18.25	12.93		Litter
4.90	3.05		Bareground
			Rock

Mean	SDev	Freq	
42.68	21.75		% COMPOSITION
4.49	5.84		Shrubs
52.11	22.64		Forbs
			Grasses

11.000 11.000 11.000  
 EFFECTIVE:  
 SEP 27 1993  
 11.000 11.000 11.000

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 18

Sage/Grass/Serviceberry

Exposure: SW

Slope: 4 deg.

Sample Date: 29 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Chrysothamnus viscidiflor	0.00	0.00	0.00	5.00	10.00	10.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Artemisia tridentata	15.00	0.00	5.00	10.00	5.00	10.00	0.00	10.00	10.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	25.00

FORBS

Penstemon caesitosus	0.00	0.00	0.00	0.00	0.00	10.00	15.00	0.00	5.00	0.00
Machaeranthera grindelii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Castilleja linariifolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00

GRASSES

Elymus salinus	45.00	60.00	45.00	35.00	45.00	10.00	5.00	40.00	0.00	5.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	10.00

COVER

Total Living Cover	60.00	60.00	50.00	50.00	60.00	40.00	50.00	50.00	45.00	40.00
Litter	10.00	5.00	10.00	20.00	10.00	5.00	5.00	10.00	10.00	10.00
Bareground	25.00	30.00	35.00	25.00	25.00	45.00	10.00	35.00	40.00	45.00
Rock	5.00	5.00	5.00	5.00	5.00	10.00	35.00	5.00	5.00	5.00

% COMPOSITION

Shrubs	25.00	0.00	10.00	30.00	25.00	50.00	60.00	20.00	22.22	62.50
Forbs	0.00	0.00	0.00	0.00	0.00	25.00	30.00	0.00	33.33	0.00
Grasses	75.00	100.00	90.00	70.00	75.00	25.00	10.00	80.00	44.44	37.50

EFFECTIVE  
 SEP 27 1991  
 DISTRICT CLERK, DISTRICT COURT

11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00

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5.00 0.00 0.00 10.00 5.00 0.00 5.00 0.00 0.00 5.00  
 0.00 0.00 0.00 0.00 0.00 5.00 0.00 0.00 0.00 0.00  
 5.00 5.00 0.00 5.00 10.00 0.00 0.00 15.00 20.00 20.00  
 5.00 0.00 0.00 0.00 15.00 0.00 10.00 0.00 0.00 10.00

0.00 0.00 0.00 0.00 10.00 0.00 15.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 5.00 0.00 5.00 5.00 0.00  
 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

25.00 35.00 35.00 20.00 10.00 25.00 10.00 35.00 15.00 15.00  
 5.00 0.00 15.00 0.00 0.00 0.00 0.00 10.00 0.00 0.00

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45.00 40.00 50.00 35.00 50.00 35.00 40.00 65.00 40.00 50.00  
 25.00 10.00 5.00 10.00 5.00 5.00 5.00 5.00 5.00 10.00  
 25.00 40.00 40.00 45.00 35.00 40.00 15.00 25.00 50.00 35.00  
 5.00 10.00 5.00 10.00 10.00 20.00 40.00 5.00 5.00 5.00

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33.33 12.50 0.00 42.86 60.00 14.29 37.50 23.08 50.00 70.00  
 0.00 0.00 0.00 0.00 20.00 14.29 37.50 7.69 12.50 0.00  
 66.67 87.50 100.00 57.14 20.00 71.43 25.00 69.23 37.50 30.00

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ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 18  
 Sage/Grass/Serviceberry  
 Exposure: SW  
 Slope: 4 deg.  
 Sample Date: 29 Sept 1993

Mean SDev Freq

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			TREES & SHRUBS
2.76	3.70	35.00	Chrysothamnus viscidiflorus
0.50	1.50	10.00	Gutierrezia sarothrae
7.25	6.42	70.00	Artemisia tridentata
4.50	8.05	25.00	Amalanchier utahensis

			FORBS
2.75	5.12	20.00	Penstemon caesitosus
1.00	2.00	20.00	Machaeranthera grindelioides
0.25	1.09	5.00	Castilleja linariifolia

LABORATORY  
 EFFECTIVE  
 SEP 27 1993  
 Plant Research Lab, Utah State Univ.

			GRASSES
25.75	16.38	95.00	Elymus salinus
3.00	5.79	25.00	Stipa hymenoides

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			COVER
47.75	8.44		Total Living Cover
9.00	5.15		Litter
33.25	10.28		Bareground
10.00	9.87		Rock

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			% COMPOSITION
32.41	20.47		Shrubs
9.02	12.72		Forbs
58.57	27.15		Grasses

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SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 19

PJ/Sage/Grass

Exposure: SE

Slope: 2-8 deg.

Sample Date: 29 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Artemisia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	20.00	5.00	0.00	0.00
Cercocarpus ledifolius	0.00	25.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	0.00	25.00	0.00	15.00	0.00	0.00	0.00	0.00	45.00
Purshia tridentata	0.00	0.00	0.00	0.00	30.00	25.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	5.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Penstemon pachyphyllus	0.00	0.00	0.00	5.00	0.00	5.00	5.00	0.00	0.00	5.00
Machaeranthera grindelioi	5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Leptodactylon pungens	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon caespitosus	0.00	0.00	5.00	5.00	0.00	0.00	0.00	10.00	0.00	0.00
Astragalus tenellus	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00

GRASSES

Elymus salinus	30.00	20.00	0.00	25.00	15.00	5.00	15.00	10.00	35.00	0.00
Bromus carinatus	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00

COVER

Overstory	0.00	0.00	15.00	0.00	10.00	0.00	0.00	0.00	0.00	45.00
Understory	35.00	50.00	25.00	35.00	50.00	50.00	50.00	45.00	40.00	5.00
Litter	25.00	20.00	5.00	10.00	10.00	10.00	5.00	5.00	10.00	5.00
Bareground	20.00	10.00	25.00	30.00	25.00	5.00	20.00	10.00	10.00	5.00
Rock	20.00	20.00	30.00	25.00	5.00	35.00	25.00	40.00	40.00	40.00

% COMPOSITION

Shrubs	0.00	50.00	62.50	0.00	75.00	60.00	40.00	44.44	12.50	90.00
Forbs	14.29	10.00	12.50	28.57	0.00	30.00	10.00	33.33	0.00	10.00
Grasses	85.71	40.00	25.00	71.43	25.00	10.00	50.00	22.22	87.50	0.00

RECEIVED  
 EXECUTIVE  
 SEP 27 1991  
 U.S. DEPARTMENT OF JUSTICE  
 FEDERAL BUREAU OF INVESTIGATION

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	5.00	5.00	0.00	0.00	0.00	5.00	0.00	5.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00
5.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00
0.00	35.00	10.00	20.00	15.00	20.00	15.00	10.00	20.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35.00	0.00	0.00	20.00	20.00	0.00	10.00	20.00	0.00	40.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	20.00	5.00	0.00	15.00	10.00	0.00	10.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40.00	45.00	35.00	50.00	45.00	35.00	35.00	35.00	40.00	50.00
10.00	5.00	5.00	10.00	10.00	5.00	5.00	5.00	10.00	10.00
15.00	10.00	10.00	10.00	20.00	35.00	10.00	25.00	25.00	15.00
35.00	40.00	50.00	30.00	25.00	25.00	50.00	35.00	25.00	25.00
12.50	0.00	14.29	10.00	11.11	0.00	0.00	14.29	12.50	10.00
25.00	88.89	28.57	40.00	44.44	57.14	42.86	28.57	62.50	10.00
87.50	11.11	57.14	50.00	44.44	42.86	57.14	57.14	25.00	80.00

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 19

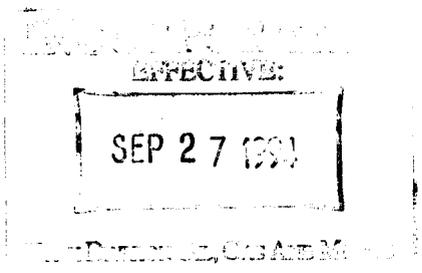
PJ/Sage/Grass

Exposure: SE

Slope: 2-8 deg.

Sample Date: 29 Sept 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
1.25	4.44	10.00	Artemisia tridentata
1.50	5.50	10.00	Cercocarpus ledifolius
4.25	11.21	15.00	Pinus edulis
2.75	8.29	10.00	Purshia tridentata
2.25	3.70	35.00	Gutierrezia sarothrae
0.50	1.50	10.00	Ceratoides lanata
<b>FORBS</b>			
2.00	2.45	40.00	Penstemon pachyphyllus
8.00	9.67	55.00	Machaeranthera grindelioides
0.25	1.09	5.00	Leptodactylon pungens
1.00	2.55	15.00	Penstemon caespitosus
0.75	2.38	10.00	Astragalus tenellus
<b>GRASSES</b>			
15.00	12.94	70.00	Elymus salinus
0.25	1.09	5.00	Bromus carinatus
4.00	5.83	40.00	Stipa hymenoides
<b>COVER</b>			
3.50	10.26		Overstory
39.75	10.66		Understory
9.00	5.15		Litter
16.75	8.41		Bareground
31.00	10.56		Rock
<b>% COMPOSITION</b>			
25.96	27.42		Shrubs
28.83	22.03		Forbs
46.46	26.26		Grasses



EFFECTIVE:  
SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 20

Sage/Grass

Exposure: SW

Slope: 5-10 deg.

Sample Date: 1 Oct 1993

1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00

TREES & SHRUBS

Artemisia tridentata	5.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Artemisia nova	0.00	30.00	15.00	5.00	0.00	10.00	10.00	10.00	0.00	5.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus depressus	0.00	0.00	5.00	5.00	0.00	5.00	0.00	5.00	5.00	5.00

FORBS

Machaeranthera grindelioi	10.00	5.00	5.00	0.00	10.00	0.00	5.00	0.00	0.00	5.00
Penstemon caespitosus	15.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Astragalus tenellus	0.00	0.00	0.00	0.00	10.00	0.00	10.00	10.00	5.00	0.00
Penstemon pachyphyllus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Castilleja linariifolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00

GRASSES

Elymus salinus	5.00	5.00	30.00	25.00	0.00	30.00	20.00	10.00	15.00	25.00
Stipa hymenoides	5.00	0.00	0.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00
Agropyron cristatum	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

COVER

Total Living Cover	40.00	40.00	55.00	50.00	45.00	55.00	45.00	55.00	40.00	40.00
Litter	5.00	5.00	5.00	5.00	5.00	10.00	5.00	5.00	5.00	5.00
Bareground	10.00	15.00	35.00	40.00	10.00	30.00	10.00	30.00	45.00	15.00
Rock	45.00	40.00	5.00	5.00	40.00	5.00	40.00	10.00	10.00	40.00

% COMPOSITION

Shrubs	12.50	75.00	36.36	30.00	0.00	45.45	22.22	27.27	25.00	25.00
Forbs	62.50	12.50	9.09	0.00	44.44	0.00	33.33	36.36	37.50	12.50
Grasses	25.00	12.50	54.55	70.00	55.56	54.55	44.44	36.36	37.50	62.50

EXHIBIT

SEP 27 1991

Department of Gas and Minerals

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
5.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	5.00	0.00
5.00	20.00	5.00	0.00	5.00	0.00	0.00	0.00	25.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	5.00	0.00	5.00	0.00	5.00	0.00
0.00	5.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00	5.00
0.00	0.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	5.00
0.00	0.00	0.00	5.00	0.00	5.00	0.00	5.00	5.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	5.00	0.00	0.00	20.00	5.00	0.00	20.00	5.00	5.00
0.00	0.00	15.00	15.00	25.00	0.00	10.00	5.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	10.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	35.00	35.00	45.00	60.00	45.00	40.00	40.00	45.00	30.00
5.00	10.00	5.00	5.00	5.00	5.00	10.00	10.00	5.00	5.00
55.00	30.00	55.00	45.00	30.00	45.00	40.00	5.00	40.00	10.00
15.00	25.00	5.00	5.00	5.00	5.00	10.00	45.00	10.00	55.00
60.00	57.14	28.57	0.00	25.00	77.78	75.00	0.00	77.78	33.33
0.00	28.57	0.00	44.44	0.00	11.11	0.00	37.50	11.11	33.33
40.00	14.29	71.43	55.56	75.00	11.11	25.00	62.50	11.11	33.33

ENERGY WEST - TRAIL MOUNTAIN  
TMTN - 20

Sage/Grass

Exposure: SW

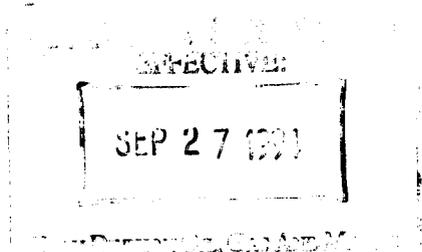
Slope: 5-10 deg.

Sample Date: 1 Oct 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
2.50	5.81	25.00	Artemisia tridentata
7.75	8.58	65.00	Artemisia nova
0.25	1.09	5.00	Chrysothamnus viscidiflorus
0.75	1.79	15.00	Ceratoides lanata
1.75	7.63	5.00	Amalanchier utahensis
2.50	2.50	50.00	Chrysothamnus depressus
<b>FORBS</b>			
3.00	3.32	50.00	Machaeranthera grindelioides
2.25	4.32	25.00	Penstemon caespitosus
2.75	3.70	40.00	Astragalus tenellus
0.50	1.50	10.00	Penstemon pachyphyllus
0.25	1.09	5.00	Castilleja linariifolia
<b>GRASSES</b>			
11.75	10.16	80.00	Elymus salinus
5.00	6.89	45.00	Stipa hymenoides
1.25	5.45	5.00	Agropyron cristatum
1.00	3.00	50.00	Bromus carinatus

<b>COVER</b>		
43.25	8.55	Total Living Cover
6.00	2.00	Litter
29.75	15.69	Bareground
21.00	17.44	Rock

<b>% COMPOSITION</b>		
36.67	25.30	Shrubs
20.72	18.83	Forbs
42.61	20.63	Grasses



OBJECTIVE

SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 21

PJ

Exposure: 5

Slope: 10 deg.

Sample Date: 1 Oct 1993

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
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TREES & SHRUBS

Artemisia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
Pinus edulis	0.00	0.00	40.00	20.00	0.00	25.00	20.00	5.00	15.00	15.00
Juniperus osteosperma	0.00	0.00	0.00	0.00	60.00	30.00	25.00	5.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dercocarpus montanus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus nauseosus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Penstemon pachyphyllus	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00	15.00	0.00
Penstemon caespitosus	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leptodactylon pungens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Stragalus tenellus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GRASSES

Elymus salinus	15.00	20.00	5.00	35.00	5.00	0.00	5.00	25.00	5.00	10.00
Stipa hymenoides	10.00	10.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00

COVER

Overstory	0.00	0.00	40.00	15.00	60.00	60.00	50.00	10.00	15.00	15.00
Understory	35.00	35.00	5.00	35.00	5.00	5.00	5.00	30.00	20.00	40.00
Litter	5.00	10.00	45.00	25.00	20.00	25.00	35.00	50.00	35.00	35.00
Bareground	35.00	40.00	5.00	20.00	5.00	5.00	5.00	5.00	15.00	5.00
Rock	25.00	15.00	5.00	5.00	10.00	5.00	5.00	5.00	15.00	5.00

% COMPOSITION

Shrubs	0.00	0.00	88.89	40.00	92.31	84.62	81.82	37.50	42.86	72.73
Forbs	28.57	14.29	0.00	0.00	0.00	7.69	0.00	0.00	42.86	9.09
Grasses	71.43	85.71	11.11	70.00	7.69	0.00	18.18	62.50	14.29	18.18

DIRECTIVE  
 SEP 27 1991  
 DIRECTOR, CIA AND M...

11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00

0.00 0.00 0.00 0.00 0.00 0.00 0.00 25.00 0.00 25.00  
 0.00 10.00 20.00 0.00 30.00 0.00 30.00 0.00 5.00 0.00  
 0.00 0.00 30.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
 30.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
 0.00 0.00 10.00 35.00 0.00 20.00 0.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 5.00 0.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 20.00 0.00

0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
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 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
 0.00 0.00 0.00 0.00 0.00 0.00 0.00 5.00 0.00 0.00

0.00 0.00 5.00 0.00 5.00 10.00 25.00 0.00 10.00 5.00  
 0.00 10.00 0.00 0.00 0.00 5.00 0.00 0.00 0.00 0.00

0.00 0.00 50.00 0.00 5.00 0.00 30.00 0.00 0.00 0.00  
 35.00 20.00 15.00 35.00 30.00 40.00 25.00 35.00 35.00 30.00  
 5.00 5.00 20.00 10.00 30.00 40.00 35.00 10.00 5.00 5.00  
 10.00 45.00 10.00 40.00 5.00 15.00 5.00 15.00 10.00 25.00  
 50.00 30.00 5.00 15.00 30.00 5.00 5.00 40.00 50.00 40.00

85.71 50.00 92.31 100.00 85.71 62.50 54.55 71.43 71.43 83.33  
 14.29 0.00 0.00 0.00 0.00 0.00 0.00 28.57 0.00 0.00  
 0.00 50.00 7.69 0.00 14.29 37.50 45.45 0.00 28.57 16.67

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 21  
 PJ  
 Exposure: S  
 Slope: 10 deg.  
 Sample Date: 1 Oct 1993

RECEIVED:  
 SEP 27 1993  
 Department of Conservation

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
3.00	7.65	15.00	Artemisia tridentata
11.75	12.38	60.00	Pinus edulis
7.50	15.69	25.00	Juniperus osteosperma
0.25	1.09	5.00	Amalanchier utahensis
0.75	3.27	5.00	Symphoricarpos oreophilus
1.50	6.54	5.00	Chrysothamnus viscidiflorus
3.25	8.70	15.00	Cercocarpus montanus
0.25	1.09	5.00	Chrysothamnus nauseosus
1.00	4.36	5.00	Artemisia nova
<b>FORBS</b>			
1.25	3.49	15.00	Penstemon pachyphyllus
0.75	2.38	10.00	Penstemon caespitosus
0.50	1.50	10.00	Leptodactylon pungens
0.25	1.09	5.00	Astragalus tenellus
<b>GRASSES</b>			
9.25	9.65	75.00	Elymus salinus
2.00	3.67	25.00	Stipa hymenoides

<b>COVER</b>		
17.50	21.65	Overstory
25.75	12.17	Understory
22.50	14.62	Litter
16.00	13.29	Bareground
18.25	15.75	Rock

<b>% COMPOSITION</b>		
64.88	28.24	Shrubs
7.27	12.17	Forbs
27.96	26.45	Grasses

## ENERGY WEST - TRAIL MOUNTAIN

TMTN - 22

PJ/Sage

Exposure: 5

Slope: 8 deg.

Sample Date: 1 Oct 1993

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
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## TREES &amp; SHRUBS

Artemisia tridentata	0.00	0.00	25.00	5.00	5.00	5.00	0.00	10.00	15.00	0.00
Pinus edulis	25.00	20.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	5.00	5.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	5.00
Pseudotsuga menziesii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus depressus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## FORBS

Astragalus tenellus	0.00	5.00	5.00	20.00	20.00	15.00	20.00	10.00	10.00	25.00
Penstemon caespitosus	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Leptodactylon pungens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Chaeranthra grindelii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## GRASSES

Elymus salinus	20.00	5.00	10.00	0.00	20.00	15.00	10.00	15.00	5.00	10.00
Stipa hymenoides	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00

## COVER

Overstory	20.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Understory	25.00	30.00	40.00	35.00	45.00	35.00	40.00	45.00	40.00	45.00
Litter	5.00	5.00	25.00	5.00	10.00	10.00	5.00	25.00	5.00	5.00
Bareground	35.00	40.00	30.00	15.00	35.00	30.00	30.00	20.00	20.00	40.00
Rock	15.00	20.00	5.00	45.00	5.00	25.00	25.00	10.00	35.00	10.00

## % COMPOSITION

Shrubs	55.56	57.14	62.50	14.29	20.00	14.29	25.00	44.44	50.00	22.22
Forbs	0.00	28.57	12.50	71.43	40.00	42.86	50.00	22.22	37.50	55.56
Grasses	44.44	14.29	25.00	14.29	40.00	42.86	25.00	33.33	12.50	22.22

EXECUTIVE  
 SEP 27 1993  
 U.S. DEPARTMENT OF ENERGY

EXECUTIVE  
 [ SEP 27 1991 ]  
 RANDOLPH COUNTY, SOUTH CAROLINA

11.00    12.00    13.00    14.00    15.00    16.00    17.00    18.00    19.00    20.00

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5.00	5.00	0.00	0.00	0.00	10.00	0.00	0.00	7.00	20.00
25.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	25.00	10.00	8.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00	0.00

5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	10.00	3.00	5.00	0.00	5.00	0.00	5.00	0.00	0.00
0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00

10.00	25.00	0.00	15.00	15.00	15.00	20.00	30.00	30.00	10.00
0.00	0.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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25.00	0.00	25.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
25.00	50.00	20.00	25.00	30.00	35.00	45.00	40.00	45.00	50.00
40.00	15.00	45.00	10.00	40.00	10.00	5.00	10.00	20.00	5.00
5.00	30.00	5.00	55.00	20.00	50.00	45.00	45.00	30.00	30.00
5.00	5.00	5.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00

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70.00	30.00	55.56	0.00	28.57	42.86	55.56	37.50	33.33	83.33
10.00	20.00	11.11	40.00	14.29	14.29	0.00	12.50	0.00	0.00
20.00	50.00	33.33	60.00	42.86	42.86	44.44	75.00	66.67	16.67

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ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 22  
 PJ/Sage  
 Exposure: 5  
 Slope: 8 deg.  
 Sample Date: 1 Oct 1993

SEP 27 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
5.60	7.06	55.00	Artemisia tridentata
5.00	9.49	25.00	Pinus edulis
1.60	2.94	5.00	Chrysothamnus viscidiflorus
2.55	5.89	25.00	Artemisia nova
0.75	2.38	10.00	Amalanchier utahensis
0.25	1.09	5.00	Pseudotsuga menziesii
1.50	6.54	5.00	Symphoricarpos oreophilus
0.50	1.50	10.00	Chrysothamnus depressus

**FORBS**

7.00	8.28	55.00	Astragalus tenellus
1.90	2.84	35.00	Penstemon caespitosus
0.35	1.15	10.00	Leptodactylon pungens
0.25	1.09	5.00	Machaeranthera grindelioides

**GRASSES**

14.00	8.31	90.00	Elymus salinus
1.00	3.39	10.00	Stipa hymenoides

**COVER**

4.25	8.26		Overstory
37.75	9.68		Understory
15.00	12.85		Litter
30.50	13.22		Bareground
12.50	11.35		Rock

**% COMPOSITION**

40.11	20.71		Shrubs
24.14	20.16		Forbs
36.29	17.47		Grasses

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 23  
 Sage/Grass - Previously Disturbed  
 Exposure: SW  
 Slope: 10 deg.  
 Sample Date: 1 Oct 1993

EFFECTIVE:  
 SEP 27 1993

1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Artemisia tridentata	0.00	0.00	0.00	5.00	20.00	10.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	5.00	0.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Penstemon caespitosus	7.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus depressus	3.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Hymenoxys richardsonii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	20.00

GRASSES

Elymus salinus	25.00	20.00	30.00	10.00	0.00	20.00	0.00	0.00	0.00	5.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00
Elymus hispidus	0.00	0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00
Stipa hymenoides	0.00	15.00	0.00	0.00	10.00	0.00	0.00	0.00	30.00	15.00

COVER

Overstory	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Understory	35.00	40.00	30.00	30.00	35.00	40.00	35.00	20.00	40.00	40.00
Litter	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	10.00	5.00
Bareground	40.00	50.00	55.00	15.00	40.00	45.00	55.00	65.00	15.00	45.00
Rock	20.00	5.00	10.00	50.00	20.00	10.00	5.00	10.00	35.00	10.00

% COMPOSITION

Shrubs	0.00	12.50	0.00	33.33	71.43	25.00	0.00	0.00	0.00	0.00
Forbs	28.57	0.00	0.00	33.33	0.00	25.00	0.00	0.00	25.00	50.00
Grasses	71.43	87.50	100.00	33.33	28.57	50.00	100.00	100.00	75.00	50.00

EXHIBIT

SEP 27 1991

ST. JOHN'S, CANADA

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	5.00	5.00	5.00	10.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00	15.00

10.00	0.00	0.00	20.00	25.00	20.00	5.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	30.00	20.00	0.00	0.00	0.00	0.00	25.00	15.00	15.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30.00	30.00	30.00	20.00	25.00	25.00	25.00	35.00	40.00	35.00
5.00	5.00	5.00	10.00	5.00	10.00	10.00	10.00	10.00	10.00
55.00	15.00	40.00	40.00	60.00	55.00	60.00	45.00	30.00	30.00
10.00	50.00	25.00	30.00	10.00	10.00	5.00	10.00	20.00	25.00

0.00	0.00	0.00	0.00	0.00	0.00	60.00	14.29	25.00	0.00
0.00	0.00	33.33	0.00	0.00	20.00	20.00	14.29	37.50	42.86
100.00	100.00	66.67	100.00	100.00	80.00	20.00	71.43	37.50	57.14

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 23  
 Sage/Grass - Previously Disturbed  
 Exposure: SW  
 Slope: 10 deg.  
 Sample Date: 1 Oct 1993

Mean SDev Freq

Mean	SDev	Freq	
2.25	5.12	20.00	TREES & SHRUBS
1.25	2.68	20.00	Artemisia tridentata
0.25	1.09	5.00	Chrysothamnus viscidiflorus
0.25	1.09	5.00	Ceratoides lanata
			Artemisia nova

RECEIVED  
 SEP 27 1993  
 Department of Conservation

Mean	SDev	Freq	
0.85	2.59	10.00	FORBS
2.15	3.29	35.00	Penstemon caespitosus
2.75	5.58	25.00	Chrysothamnus depressus
			Hymenoxys richardsonii

Mean	SDev	Freq	
9.75	10.30	60.00	GRASSES
1.00	4.36	5.00	Elymus salinus
1.75	7.63	5.00	Agropyron cristatum
9.75	10.78	50.00	Elymus hispidus
			Stipa hymenoides

Mean	SDev		
0.00	0.00		COVER
32.00	6.40		Overstory
6.75	2.38		Understory
42.75	14.87		Litter
18.50	13.43		Bareground
			Rock

Mean	SDev		
12.08	20.62		% COMPOSITION
16.49	16.73		Shrubs
71.43	26.73		Forbs
			Grasses

EFFECTIVE:

SEP 27 1993

## ENERGY WEST - TRAIL MOUNTAIN

TMTN - 24

Sage/Serviceberry/Grass

Exposure: SW

Slope: 15 deg.

Sample Date: 29 Sept 1993

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
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## TREES &amp; SHRUBS

Artemisia tridentata	5.00	0.00	15.00	10.00	20.00	38.00	0.00	0.00	0.00	25.00
Amalanchier utahensis	0.00	25.00	0.00	30.00	0.00	0.00	25.00	55.00	10.00	0.00
Symphoricarpos oreophilus	0.00	0.00	55.00	10.00	0.00	0.00	0.00	0.00	5.00	0.00

## FORBS

Machaeranthera canescens	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leptodactylon pungens	0.00	0.00	0.00	0.00	0.00	10.00	5.00	0.00	10.00	5.00

## GRASSES

Elymus salinus	30.00	20.00	0.00	0.00	20.00	5.00	0.00	5.00	25.00	15.00
Bromus carinatus	0.00	5.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	10.00	0.00	0.00	15.00	5.00	0.00	0.00

## COVER

Overstory	0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Understory	40.00	25.00	65.00	60.00	50.00	45.00	45.00	65.00	50.00	45.00
Litter	25.00	40.00	25.00	30.00	35.00	25.00	5.00	25.00	30.00	10.00
Bareground	30.00	5.00	5.00	5.00	5.00	10.00	30.00	5.00	10.00	20.00
Rock	5.00	5.00	5.00	5.00	10.00	20.00	20.00	5.00	10.00	25.00

## % COMPOSITION

Shrubs	12.50	50.00	107.69	83.33	40.00	84.44	55.56	84.62	30.00	55.56
Forbs	12.50	0.00	7.69	0.00	0.00	22.22	11.11	0.00	20.00	11.11
Grasses	75.00	50.00	38.46	16.67	40.00	11.11	33.33	15.38	50.00	33.33

EFFECTIVE:

SEP 27 1991

THE UNIVERSITY OF TEXAS AT AUSTIN

11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00

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20.00 10.00 40.00 0.00 0.00 20.00 10.00 35.00 5.00 0.00  
0.00 0.00 0.00 0.00 0.00 0.00 10.00 0.00 0.00 0.00  
5.00 40.00 15.00 15.00 5.00 10.00 10.00 0.00 0.00 20.00

0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

15.00 15.00 0.00 25.00 45.00 20.00 30.00 30.00 25.00 30.00  
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
10.00 0.00 15.00 0.00 0.00 0.00 0.00 0.00 10.00 0.00

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0.00 0.00 0.00 15.00 0.00 0.00 0.00 0.00 0.00 0.00  
55.00 60.00 70.00 40.00 50.00 50.00 60.00 65.00 40.00 50.00  
20.00 25.00 20.00 35.00 20.00 10.00 10.00 20.00 10.00 10.00  
20.00 10.00 5.00 5.00 25.00 30.00 20.00 10.00 5.00 10.00  
5.00 5.00 5.00 5.00 5.00 10.00 10.00 5.00 45.00 30.00

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45.45 83.33 78.57 27.27 10.00 60.00 50.00 53.85 12.50 40.00  
9.09 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  
45.45 25.00 21.43 45.45 90.00 40.00 50.00 46.15 87.50 60.00

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ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 24  
 Sage/Serviceberry/Grass  
 Exposure: SW  
 Slope: 15 deg.  
 Sample Date: 29 Sept 1993

RECEIVED  
 EFFECTIVE:  
 SEP 27 1993  
 U.S. DEPARTMENT OF AGRICULTURE  
 FOREST SERVICE

Mean	SDev	Freq	
12.65	13.17	65.00	TREES & SHRUBS
7.75	14.45	30.00	Artemisia tridentata
9.50	14.22	55.00	Amalanchier utahensis
			Symphoricarpos oreophilus

Mean	SDev	Freq	
0.50	1.50	10.00	FORBS
1.75	3.27	25.00	Machaeranthera canescens
			Leptodactylon pungens

Mean	SDev	Freq	
17.75	12.50	80.00	GRASSES
1.50	5.50	10.00	Elymus salinus
3.25	5.31	30.00	Bromus carinatus
			Stipa hymenoides

Mean	SDev		
2.00	6.20		COVER
51.50	10.85		Overstory
21.50	9.63		Understory
13.25	9.26		Litter
11.75	10.64		Bareground
			Rock

Mean	SDev		
53.23	26.71		% COMPOSITION
4.69	7.07		Shrubs
43.71	21.39		Forbs
			Grasses

EFFECTIVE:  
SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 25

Sage/Grass/Rabbitbrush

Exposure: SW

Slope: 5 deg.

Sample Date: 30 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Artemisia tridentata	10.00	40.00	55.00	50.00	15.00	15.00	30.00	15.00	15.00	30.00
Chrysothamnus nauseosus	35.00	40.00	20.00	10.00	20.00	5.00	0.00	5.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

GRASSES

Elymus salinus	15.00	5.00	0.00	5.00	35.00	25.00	20.00	30.00	45.00	30.00
Stipa hymenoides	15.00	0.00	0.00	5.00	0.00	15.00	15.00	5.00	10.00	0.00

COVER

Total Living Cover	75.00	85.00	75.00	70.00	70.00	65.00	65.00	55.00	70.00	60.00
Litter	20.00	5.00	23.00	15.00	25.00	5.00	20.00	15.00	20.00	10.00
Bareground	3.00	5.00	1.00	10.00	3.00	5.00	13.00	25.00	8.00	25.00
Rock	2.00	5.00	1.00	5.00	2.00	25.00	2.00	5.00	2.00	5.00

% COMPOSITION

Shrubs	60.00	94.12	100.00	85.71	50.00	38.46	46.15	36.36	21.43	50.00
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	40.00	5.88	0.00	14.29	50.00	61.54	53.85	63.64	78.57	50.00

RECEIVED  
 SEP 27 1991

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
30.00	10.00	20.00	25.00	5.00	5.00	20.00	10.00	20.00	40.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	15.00	10.00	30.00	0.00	0.00	0.00

15.00	25.00	25.00	45.00	25.00	50.00	25.00	35.00	35.00	15.00
10.00	10.00	15.00	0.00	0.00	0.00	0.00	10.00	10.00	10.00

55.00	65.00	60.00	70.00	50.00	65.00	75.00	55.00	65.00	65.00
35.00	9.00	10.00	5.00	10.00	5.00	5.00	15.00	10.00	10.00
8.00	25.00	25.00	15.00	35.00	25.00	19.00	25.00	20.00	5.00
2.00	1.00	5.00	10.00	5.00	5.00	1.00	5.00	5.00	20.00

54.55	46.15	33.33	35.71	50.00	23.08	66.67	18.18	30.77	61.54
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45.45	53.85	66.67	64.29	50.00	76.92	33.33	81.82	69.23	38.46

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 25  
 Sage/Grass/Rabbitbrush  
 Exposure: SW  
 Slope: 5 deg.  
 Sample Date: 30 Sept 1993

Mean	SDev	Freq
23.66	14.00	100.00
6.75	11.97	35.00
0.25	1.09	5.00
0.25	1.09	5.00
1.00	4.36	5.00
2.75	7.33	15.00

TREES & SHRUBS

Artemisia tridentata  
 Chrysothamnus nauseosus  
 Chrysothamnus viscidiflorus  
 Gutierrezia sarothrae  
 Symphoricarpos oreophilus  
 Amalanchier utahensis

FORBS

25.25	13.27	95.00
6.50	5.94	60.00

GRASSES

Elymus salinus  
 Stipa hymenoides

65.75	8.26
13.60	7.94
15.00	9.88
5.65	6.06

COVER

Total Living Cover  
 Litter  
 Bareground  
 Rock

50.11	22.37
0.00	0.00
49.89	22.37

% COMPOSITION

Shrubs  
 Forbs  
 Grasses

RECEIVED  
 EFFECTIVE  
 SEP 27 1993  
 U.S. DEPARTMENT OF AGRICULTURE  
 WASHINGTON, D.C. 20250

UNEXPECTED

SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 26

Sage/Grass/PJ

Exposure: E

Slope: 5-10 deg.

Sample Date: 1 Oct 1993

1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00

TREES & SHRUBS

Artemisia tridentata	5.00	25.00	5.00	5.00	10.00	0.00	0.00	0.00	15.00	0.00
Pinus edulis	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus depressus	5.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00	10.00	5.00

FORBS

Machaeranthera canescens	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Penstemon pachyphyllus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Penstemon caespitosus	10.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Machaeranthera grindelii	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Tragalus tenellus	0.00	5.00	5.00	10.00	0.00	0.00	0.00	5.00	10.00	5.00
Melilotus officinalis	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00

GRASSES

Elymus salinus	20.00	0.00	15.00	5.00	20.00	0.00	0.00	10.00	0.00	30.00
Stipa comata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
Poa secunda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00
Agropyron cristatum	0.00	0.00	0.00	0.00	5.00	25.00	30.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	0.00	0.00	5.00	10.00	15.00	0.00	0.00	0.00
Stipa hymenoides	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00

COVER

Overstory	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Understory	45.00	40.00	40.00	50.00	50.00	40.00	50.00	45.00	50.00	60.00
Litter	5.00	5.00	10.00	10.00	10.00	15.00	25.00	10.00	15.00	10.00
Bareground	40.00	45.00	40.00	35.00	35.00	40.00	20.00	40.00	30.00	25.00
Rock	10.00	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00

% COMPOSITION

Shrubs	22.22	62.50	12.50	50.00	30.00	12.50	0.00	11.11	50.00	8.33
Forbs	33.33	12.50	37.50	40.00	10.00	0.00	10.00	11.11	20.00	8.33
Grasses	44.44	25.00	50.00	10.00	60.00	87.50	90.00	77.78	60.00	83.33

RECEIVED  
 SEP 27 1991  
 ... ..

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	5.00	5.00	15.00	10.00	35.00	0.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	15.00	15.00
0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	5.00	10.00	10.00	0.00	10.00	5.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	10.00	5.00	20.00	10.00	0.00	5.00	25.00	5.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.00	10.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	25.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	20.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
50.00	45.00	45.00	40.00	45.00	30.00	55.00	55.00	30.00	50.00
10.00	20.00	15.00	15.00	10.00	30.00	20.00	10.00	10.00	10.00
35.00	30.00	35.00	40.00	40.00	35.00	20.00	30.00	55.00	25.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
20.00	55.56	11.11	50.00	55.56	150.00	0.00	54.55	66.67	33.33
20.00	0.00	11.11	0.00	0.00	0.00	9.09	0.00	16.67	0.00
60.00	44.44	77.78	50.00	44.44	66.67	27.27	45.45	16.67	16.67

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 26  
 Sage/Grass/PJ  
 Exposure: E  
 Slope: 5-10 deg.  
 Sample Date: 1 Oct 1993

EFFECTIVE:  
 SEP 27 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
7.25	9.15	60.00	Artemisia tridentata
1.00	4.36	5.00	Pinus edulis
2.25	4.87	20.00	Chrysothamnus viscidiflorus
1.00	4.36	5.00	Artemisia nova
0.25	1.09	5.00	Amalanchier utahensis
4.25	3.96	60.00	Chrysothamnus depressus
<b>FORBS</b>			
0.25	1.09	5.00	Machaeranthera canescens
0.25	1.09	5.00	Penstemon pachyphyllus
0.75	2.38	10.00	Penstemon caespitosus
1.25	3.11	15.00	Machaeranthera grindelioides
2.75	3.34	45.00	Astragalus tenellus
0.25	1.09	5.00	Melilotus officinalis
<b>GRASSES</b>			
10.25	9.15	75.00	Elymus salinus
1.50	6.54	5.00	Stipa comata
2.75	6.22	20.00	Poa secunda
4.75	9.55	25.00	Agropyron cristatum
1.50	3.91	15.00	Bromus carinatus
3.25	6.18	30.00	Stipa hymenoides
<b>COVER</b>			
0.50	2.18		Overstory
45.75	7.46		Understory
13.25	6.18		Litter
34.75	8.29		Bareground
5.75	1.79		Rock
<b>% COMPOSITION</b>			
37.80	33.51		Shrubs
11.98	12.41		Forbs
51.87	23.71		Grasses

EFFECTIVE

SEP 27 1993

## ENERGY WEST - TRAIL MOUNTAIN

TMTN - 27

Grass/Sagebrush

Exposure: SE

Slope: 12 deg.

Sample Date: 1 Oct 1993

1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00

## TREES &amp; SHRUBS

Artemisia tridentata	5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	25.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	10.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## FORBS

## GRASSES

Elymus salinus	40.00	50.00	45.00	50.00	65.00	50.00	35.00	50.00	5.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Bromus carinatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
Agropyron cristatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00

## COVER

Total Living Cover	45.00	50.00	45.00	50.00	65.00	65.00	50.00	55.00	30.00	50.00
Litter	5.00	5.00	10.00	5.00	5.00	10.00	5.00	10.00	5.00	5.00
Bareground	45.00	10.00	40.00	35.00	25.00	20.00	15.00	30.00	50.00	35.00
Rock	5.00	35.00	5.00	10.00	5.00	5.00	30.00	5.00	15.00	10.00

## % COMPOSITION

Shrubs	11.11	0.00	0.00	0.00	0.00	7.69	30.00	9.09	83.33	20.00
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	88.89	100.00	100.00	100.00	100.00	92.31	70.00	90.91	16.67	80.00

EFFECTIVE  
 SEP 27 1991  
 ...

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	10.00	0.00	0.00	5.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
0.00	5.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00

30.00	35.00	40.00	30.00	45.00	0.00	15.00	35.00	30.00	40.00
20.00	5.00	0.00	0.00	0.00	50.00	30.00	15.00	30.00	20.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

50.00	50.00	40.00	50.00	45.00	50.00	55.00	50.00	60.00	65.00
5.00	10.00	10.00	19.00	4.00	10.00	10.00	5.00	10.00	10.00
35.00	35.00	45.00	30.00	50.00	15.00	30.00	40.00	25.00	20.00
10.00	5.00	5.00	1.00	1.00	25.00	5.00	5.00	5.00	5.00

0.00	20.00	0.00	40.00	0.00	0.00	18.18	0.00	0.00	7.59
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	80.00	100.00	60.00	100.00	100.00	81.82	100.00	100.00	92.31

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 27  
 Grass/Sagebrush  
 Exposure: SE  
 Slope: 12 deg.  
 Sample Date: 1 Oct 1993

RECEIVED  
 SEP 27 1993

Mean	SDev	Freq	
2.75	5.80	30.00	TREES & SHRUBS
0.75	2.38	10.00	Artemisia tridentata
0.25	1.09	5.00	Amalanchier utahensis
0.50	2.18	5.00	Artemisia nova
0.50	1.50	10.00	Symphoricarpos oreophilus
0.75	2.38	10.00	Ceratoides lanata
			Chrysothamnus viscidiflorus

FORBS

Mean	SDev	Freq	
34.50	17.17	90.00	GRASSES
9.00	13.84	40.00	Elymus salinus
0.50	2.18	5.00	Stipa hymenoides
1.50	6.54	5.00	Bromus carinatus
			Agropyron cristatum

COVER

51.00	8.31		Total Living Cover
7.90	3.56		Litter
31.50	11.41		Bareground
9.60	9.24		Rock

\* COMPOSITION

12.36	19.81		Shrubs
0.00	0.00		Forbs
87.64	19.81		Grasses

PROJECTIVE

SEP 27 1993

ENERGY WEST - TRAIL MOUNTAIN

TMTN - 28

Sage/Grass/Serviceberry/PJ

Exposure: SW

Slope: 8 deg.

Sample Date: 30 Sept 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00    9.00    10.00

TREES & SHRUBS

Artemisia tridentata	0.00	10.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00	20.00
Artemisia nova	5.00	0.00	0.00	5.00	10.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	5.00	5.00	0.00	0.00	0.00	5.00	5.00	0.00
Ceratoides lanata	0.00	0.00	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
Amalanchier utahensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00
Chrysothamnus depressus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Arenaria fendleri	5.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00
Penstemon caespitosus	5.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Machaeranthera grindelii	5.00	5.00	5.00	0.00	5.00	5.00	10.00	10.00	5.00	0.00
Leptodactylon pungens	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	10.00	0.00
Castilleja linariifolia	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Astragalus lancearius	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Astragalus megacarpus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GRASSES

Elymus salinus	25.00	15.00	10.00	20.00	15.00	15.00	15.00	10.00	25.00	5.00
Arrhenatherum elatius	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stipa hymenoides	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	5.00

COVER

Overstory	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Understory	45.00	40.00	35.00	35.00	45.00	50.00	35.00	35.00	60.00	60.00
Litter	10.00	10.00	10.00	5.00	10.00	10.00	5.00	10.00	10.00	10.00
Bareground	10.00	10.00	10.00	25.00	15.00	15.00	25.00	30.00	20.00	25.00
Rock	35.00	40.00	45.00	35.00	30.00	25.00	35.00	25.00	10.00	5.00

% COMPOSITION

Shrubs	11.11	25.00	28.57	42.86	55.56	40.00	0.00	14.29	41.67	75.00
Forbs	33.33	25.00	42.86	14.29	11.11	30.00	42.86	28.57	25.00	8.33
Grasses	55.56	37.50	28.57	57.14	33.33	30.00	42.86	57.14	41.67	16.67

RECEIVED

SEP 27 1991

Department of San Antonio

11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
20.00	5.00	0.00	0.00	15.00	30.00	10.00	0.00	5.00	30.00
0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	20.00	0.00
0.00	5.00	0.00	5.00	5.00	10.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	5.00	5.00	5.00	0.00	0.00	0.00	0.00	5.00
5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
35.00	35.00	25.00	0.00	0.00	15.00	10.00	30.00	10.00	20.00
0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	5.00	0.00
0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00	10.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65.00	50.00	40.00	50.00	60.00	55.00	45.00	45.00	50.00	50.00
5.00	5.00	5.00	5.00	15.00	5.00	5.00	5.00	10.00	10.00
25.00	20.00	30.00	25.00	10.00	15.00	10.00	25.00	35.00	10.00
5.00	25.00	25.00	20.00	15.00	25.00	40.00	25.00	5.00	30.00
30.77	30.00	0.00	10.00	50.00	72.73	44.44	11.11	50.00	60.00
15.38	0.00	37.50	20.00	8.33	0.00	11.11	22.22	0.00	20.00
53.85	70.00	62.50	70.00	41.67	27.27	22.22	66.67	50.00	40.00

ENERGY WEST - TRAIL MOUNTAIN  
 TMTN - 28  
 Sage/Grass/Serviceberry/PJ  
 Exposure: SW  
 Slope: 8 deg.  
 Sample Date: 30 Sept 1993

RECEIVED  
 SEP 27 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
8.00	9.67	60.00	Artemisia tridentata
1.25	2.68	20.00	Artemisia nova
0.95	1.96	20.00	Gutierrezia sarothrae
1.50	2.78	25.00	Ceratoides lanata
0.75	3.27	5.00	Chrysothamnus viscidiflorus
1.00	4.36	5.00	Amalanchier utahensis
2.50	6.80	15.00	Symphoricarpos oreophilus
1.50	2.78	5.00	Chrysothamnus depressus
<b>FORBS</b>			
1.00	2.00	20.00	Arenaria fendleri
1.75	2.38	35.00	Penstemon caespitosus
3.00	3.32	50.00	Machaeranthera grindelioides
1.25	2.68	20.00	Leptodactylon pungens
0.25	1.09	5.00	Castilleja linariifolia
0.75	1.79	15.00	Astragalus lancearius
0.75	2.38	10.00	Astragalus megacarpus
<b>GRASSES</b>			
16.75	9.91	90.00	Elymus salinus
1.50	5.50	10.00	Arrhenatherum elatius
3.00	7.97	15.00	Stipa hymenoides
<b>COVER</b>			
0.00	0.00		Overstory
47.50	9.01		Understory
8.00	2.92		Litter
19.50	7.89		Bareground
25.00	11.73		Rock
<b>% COMPOSITION</b>			
34.65	21.87		Shrubs
19.80	13.12		Forbs
45.23	15.67		Grasses

UP&L - TRAIL MOUNTAIN  
 Reference Area TMTN-9 (REF-9)  
 "B" - Pad and Road  
 Sage/Grass/PJ  
 Exposure: SW  
 Slope: 5 deg.  
 Sample Date: 31 July 1993

EFFECTIVE:  
 SEP 27 1993

	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
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TREES & SHRUBS

Artemisia tridentata	30.00	10.00	5.00	10.00	15.00	20.00	10.00	15.00
Symphoricarpos oreophilus	0.00	30.00	5.00	0.00	0.00	0.00	0.00	0.00

FORBS

Trifolium repens	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Hymenoxys richardsonii	0.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00
Eriogonum umbellatum	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Arenaria fendleri	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00

GRASSES

Elymus spicatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Koeleria macrantha	0.00	0.00	0.00	0.00	10.00	25.00	5.00	15.00
Bromus inermis	20.00	15.00	30.00	40.00	25.00	20.00	25.00	25.00
Elymus salinus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

COVER

Total Living Cover	50.00	65.00	45.00	50.00	55.00	65.00	50.00	60.00
Litter	25.00	20.00	10.00	10.00	10.00	10.00	4.00	4.00
Bareground	20.00	10.00	35.00	35.00	30.00	20.00	45.00	35.00
Rock	5.00	5.00	10.00	5.00	5.00	5.00	1.00	1.00

% COMPOSITION

Shrubs	60.00	61.54	22.22	20.00	27.27	30.77	20.00	25.00
Forbs	0.00	15.38	11.11	0.00	9.09	0.00	20.00	8.33
Grasses	40.00	23.08	66.67	80.00	63.64	69.23	60.00	66.67

EFFECTIVE:

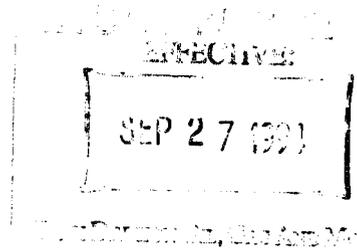
SEP 27 1991

9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
5.00	10.00	5.00	0.00	15.00	15.00	10.00	35.00	5.00	25.00	25.00	5.00
15.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	5.00	25.00	20.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	0.00	0.00	30.00	0.00	0.00	0.00	20.00	0.00	10.00	0.00	0.00
0.00	30.00	10.00	0.00	10.00	0.00	15.00	0.00	10.00	0.00	0.00	0.00
10.00	10.00	25.00	10.00	10.00	0.00	20.00	0.00	45.00	0.00	0.00	35.00
0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00	20.00	10.00
50.00	50.00	40.00	40.00	60.00	50.00	45.00	55.00	65.00	60.00	65.00	55.00
10.00	10.00	10.00	10.00	10.00	5.00	10.00	10.00	10.00	25.00	15.00	10.00
35.00	35.00	45.00	45.00	25.00	40.00	40.00	30.00	20.00	10.00	15.00	25.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	10.00
40.00	20.00	12.50	0.00	66.67	30.00	22.22	63.64	15.38	83.33	69.23	18.18
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60.00	80.00	87.50	100.00	33.33	70.00	77.78	36.36	84.62	16.67	30.77	81.82

UP&L - TRAIL MOUNTAIN  
 Reference Area TMTN-9 (REF-9)  
 "B" - Pad and Road  
 Sage/Grass/PJ  
 Exposure: SW  
 Slope: 5 deg.  
 Sample Date: 31 July 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
13.50	9.10	95.00	Artemisia tridentata
6.50	10.01	40.00	Symphoricarpos oreophilus
<b>FORBS</b>			
0.50	2.18	5.00	Trifolium repens
0.50	1.50	10.00	Hymenoxys richardsonii
0.50	2.18	5.00	Eriogonum umbellatum
0.25	1.09	5.00	Arenaria fendleri
<b>GRASSES</b>			
4.00	8.60	20.00	Elymus spicatus
6.50	8.82	40.00	Koeleria macrantha
18.25	13.06	80.00	Bromus inermis
3.25	8.70	10.00	Elymus salinus
<b>COVER</b>			
53.75	7.89		Total Living Cover
11.40	5.62		Litter
29.75	10.89		Bareground
5.10	2.02		Rock
<b>% COMPOSITION</b>			
35.40	22.68		Shrubs
3.20	5.95		Forbs
61.41	22.99		Grasses

SEP 27 1993



UP&L - TRAIL MOUNTAIN

Reference Area

"C" - Pad TMTN-10 (REF-10)

Sage/Grass/PJ

Exposure: S SW

Slope: 7 deg.

Sample Date: 15 July 1993    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00

TREES & SHRUBS

Artemisia tridentata	5.00	0.00	5.00	0.00	0.00	10.00	0.00	5.00
Amalanchier utahensis	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00
Symphoricarpos oreophilus	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00
Chrysothamnus depressus	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Orthocarpus tolmiei	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leptodactylon pungens	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
Penstemon pachyphyllus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Castilleja linariifolia	0.00	0.00	1.00	5.00	0.00	5.00	10.00	0.00
Astragalus tenellus	5.00	0.00	0.00	0.00	15.00	5.00	5.00	5.00
Stanleya pinnata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machaeranthera grindelii	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
Antennaria fendleri	10.00	0.00	5.00	15.00	0.00	0.00	5.00	0.00

GRASSES

Bromus inermis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus salinus	0.00	25.00	14.00	20.00	15.00	20.00	15.00	25.00

COVER

Total Living Cover	40.00	25.00	35.00	45.00	40.00	55.00	35.00	35.00
Litter	15.00	10.00	40.00	15.00	10.00	25.00	10.00	5.00
Bareground	40.00	55.00	20.00	10.00	30.00	15.00	25.00	50.00
Rock	5.00	10.00	5.00	30.00	20.00	5.00	30.00	10.00

% COMPOSITION

Shrubs	50.00	0.00	42.86	0.00	12.50	45.45	0.00	14.29
Forbs	50.00	0.00	17.14	55.56	50.00	18.18	57.14	14.29
Grasses	0.00	100.00	40.00	44.44	37.50	36.36	42.86	71.43

EFFECTIVE:  
 SEP 27 1991  
 ... ..

	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
10.00	0.00	5.00	0.00	5.00	5.00	25.00	0.00	10.00	15.00	15.00	0.00	
0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	
0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5.00	10.00	0.00	5.00	5.00	5.00	5.00	0.00	5.00	0.00	0.00	0.00	
0.00	10.00	10.00	0.00	0.00	5.00	25.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10.00	25.00	10.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	
15.00	7.00	25.00	30.00	30.00	5.00	5.00	30.00	15.00	15.00	5.00	30.00	
45.00	55.00	55.00	50.00	50.00	30.00	60.00	40.00	40.00	30.00	35.00	40.00	
20.00	10.00	10.00	25.00	25.00	10.00	10.00	5.00	20.00	25.00	10.00	10.00	
15.00	0.00	25.00	15.00	20.00	55.00	25.00	50.00	35.00	25.00	50.00	45.00	
20.00	35.00	10.00	10.00	5.00	5.00	5.00	5.00	5.00	20.00	5.00	5.00	
22.22	0.00	9.09	20.00	30.00	33.33	41.67	0.00	25.00	50.00	42.86	25.00	
44.44	87.27	45.45	20.00	10.00	50.00	50.00	25.00	37.50	0.00	0.00	0.00	
33.33	12.73	45.45	60.00	60.00	16.67	8.33	75.00	37.50	50.00	57.14	75.00	

UP&L - TRAIL MOUNTAIN  
 Reference Area  
 "C" - Pad TMTN-10(REF-10)  
 Sage/Grass/PJ  
 Exposure: S SW  
 Slope: 7 deg.  
 Sample Date: 15 July 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
5.75	6.57	60.00	Artemisia tridentata
1.50	3.57	15.00	Amalanchier utahensis
0.75	3.27	5.00	Symphoricarpos oreophilus
0.25	1.09	5.00	Chrysothamnus depressus
0.75	1.79	15.00	Chrysothamnus viscidiflorus
0.50	2.18	5.00	Artemisia nova
0.25	1.09	5.00	Pinus edulis
<b>FORBS</b>			
0.15	0.65	5.00	Orthocarpus tolmiei
1.00	2.00	20.00	Leptodactylon pungens
0.25	1.09	5.00	Penstemon pachyphyllus
3.05	3.28	55.00	Castilleja linariifolia
4.25	6.38	45.00	Astragalus tenellus
0.50	2.18	5.00	Stanleya pinnata
0.50	1.50	10.00	Machaeranthera grindelioides
4.50	6.50	45.00	Antennaria fendleri
<b>GRASSES</b>			
0.75	3.27	5.00	Bromus inermis
17.30	9.31	95.00	Elymus salinus

<b>COVER</b>		
42.00	9.41	Total Living Cover
15.50	8.65	Litter
30.25	15.93	Bareground
12.25	9.68	Rock

<b>% COMPOSITION</b>		
23.21	17.74	Shrubs
31.60	23.87	Forbs
45.19	24.20	Grasses

INSPECTED  
 SEP 27 1993  
 DISTRICT OFFICE, CASAS ADIDAS

UP&L - TRAIL MOUNTAIN  
 Reference Area  
 "D" - TMTN-11 (REF-11)

PJ  
 Exposure: SW  
 Slope: 6 deg.

EFFECTIVE:  
 SEP 27 1993

Sample Date: 1 Aug 1993      1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00

TREES & SHRUBS

Pinus edulis	0.00	20.00	0.00	0.00	45.00	40.00	40.00	0.00
Artemisia tridentata	5.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
Chrysothamnus viscidiflor	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ephedra viridis	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00
Artemisia nova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysothamnus depressus	0.00	0.00	0.00	0.00	5.00	0.00	0.00	10.00
Purshia tridentata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Juniperus osteosperma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FORBS

Astragalus megacarpus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Astragalus tenellus	10.00	0.00	10.00	0.00	0.00	0.00	0.00	5.00
Machaeranthera grindelii	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
Erigeron sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
Leptodactylon pungens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
Castilleja liniaefolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

GRASSES

Stipa hymenoides	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Elymus salinus	15.00	25.00	25.00	5.00	0.00	10.00	0.00	0.00
Elymus spicatus	0.00	5.00	0.00	0.00	0.00	0.00	0.00	10.00

COVER

Overstory	0.00	35.00	0.00	0.00	40.00	45.00	25.00	0.00
Understory	35.00	20.00	40.00	40.00	10.00	5.00	25.00	45.00
Litter	5.00	10.00	5.00	5.00	40.00	40.00	40.00	5.00
Bareground	50.00	30.00	45.00	40.00	5.00	5.00	5.00	45.00
Rock	10.00	5.00	10.00	15.00	5.00	5.00	5.00	5.00

% COMPOSITION

Shrubs	28.57	35.36	0.00	87.50	100.00	80.00	100.00	22.22
Forbs	28.57	0.00	37.50	0.00	0.00	0.00	0.00	55.56
Grasses	42.86	63.64	62.50	12.50	0.00	20.00	0.00	22.22

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9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
0.00	0.00	0.00	5.00	0.00	5.00	0.00	25.00	0.00	0.00	50.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	5.00	5.00	0.00	20.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
15.00	5.00	0.00	5.00	5.00	5.00	0.00	0.00	15.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	10.00	5.00	0.00	5.00	0.00	0.00	5.00	0.00	0.00	0.00
20.00	0.00	20.00	5.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
0.00	10.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	5.00	5.00	25.00	5.00	5.00	15.00	10.00	5.00	50.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	40.00	0.00
45.00	25.00	40.00	25.00	40.00	40.00	15.00	40.00	40.00	30.00	15.00	55.00
5.00	5.00	20.00	5.00	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00
10.00	60.00	35.00	65.00	40.00	45.00	35.00	40.00	50.00	55.00	35.00	35.00
40.00	10.00	5.00	5.00	10.00	5.00	20.00	15.00	5.00	10.00	5.00	5.00
44.44	60.00	12.50	40.00	62.50	25.00	75.00	75.00	37.50	0.00	90.91	9.09
55.56	0.00	75.00	40.00	12.50	12.50	12.50	12.50	25.00	66.67	0.00	0.00
0.00	40.00	12.50	20.00	25.00	62.50	12.50	12.50	37.50	33.33	9.09	90.91

UP&L - TRAIL MOUNTAIN  
 Reference Area  
 "D" - TMTN - 11 (REF-11)  
 PJ  
 Exposure: SW  
 Slope: 6 deg.  
 Sample Date: 1 Aug 1993

Mean	SDev	Freq	
<b>TREES &amp; SHRUBS</b>			
11.50	17.54	40.00	Pinus edulis
2.25	7.66	15.00	Artemisia tridentata
0.50	1.50	10.00	Chrysothamnus viscidiflorus
0.50	2.18	5.00	Ephedra viridis
2.00	4.58	25.00	Artemisia nova
3.25	4.82	40.00	Chrysothamnus depressus
0.25	1.09	5.00	Purshia tridentata
1.25	5.45	5.00	Juniperus osteosperma
<b>FORBS</b>			
1.25	2.68	20.00	Astragalus megacarpus
4.25	6.76	35.00	Astragalus tenellus
0.75	1.79	15.00	Machaeranthera grindelioides
0.75	1.79	15.00	Erigeron sp.
0.75	3.27	5.00	Leptodactylon pungens
0.50	1.50	10.00	Castilleja liniaefolia
<b>GRASSES</b>			
1.00	2.55	15.00	Stipa hymenoides
10.50	12.24	75.00	Elymus salinus
0.75	2.38	10.00	Elymus spicatus
<b>COVER</b>			
10.50	16.58		Overstory
31.50	13.05		Understory
11.75	12.38		Litter
36.50	17.40		Bareground
9.75	8.14		Rock
<b>% COMPOSITION</b>			
49.33	32.32		Shrubs
21.69	24.40		Forbs
28.98	24.41		Grasses

EFFECTIVE:  
 SEP 27 1993

**PacifiCorp commits to include any changes stipulated by BLM for 1994 Drilling Program.**

United States  
Department of  
Agriculture

Forest  
Service

Manti-LaSal  
National Forest

599 West Price River Dr.  
Price, Utah 84501

Reply to: 2820/7730

Date: August 23, 1994

Mr. Scott M. Childs  
Property Management Administrator  
Interwest Mining Company  
One Utah Center, Suite 2000  
Salt Lake City, Utah 84140-0020

Dear Scott:

Enclosed is an executed copy of the Road Use Permit for your 1994 Coal Exploration program on Trail Mountain.

The 90 tons of gravel placed on the Cottonwood Road, FDR 50040, has completed your damage obligation under the previous Road Use Permit. That permit is now terminated and the associated performance bond no longer required.

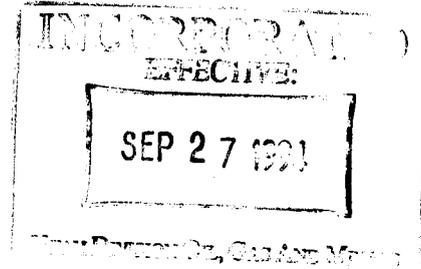
If you have any questions relating to the terms or conditions of the permit, feel free to give us a call at (801) 637-2817.

*George A. Morris*

for  
GEORGE A. MORRIS  
Forest Supervisor

enclosure

cc: D-2  
A. Howe



cc: VAL PAYNE  
CHUCK SEMBESKI  
KARL HOUKKEPER  
DALE WILSON



EFFECTIVE:

U.S. Department of Agriculture - Forest Service  
**ROAD USE PERMIT**  
 (Re: FSM 7770)

Authority: Acts of 6/30/14, 4/24/50, 6/12/60 and 10/14/64;  
 16 U.S.C. 498, 572, 530 and 532-38 AND  
 43 U.S.C. 1702, 1761, 1764, AND 1765)

SEP 27 1991

PacifiCorp

Attention: Scott M. Child  
 C/O - Interwest Mining Company

of One Utah Center, Suite 2000, 210 South Main, SLC, Utah 84140-0020

(Name)

(Address &amp; Zip Code)

(hereafter called the permittee) is hereby granted use of the following road(s) or road segments:

**Forest Development Roads (FDR):**

FDR #50040 (Cottonwood Road) from the interior Forest Boundary (T.17S., R.6E, Section 25) 3.1 miles from the junction with State Route 29 north-westerly to its junction with FDR #50034 (Trail Mountain Road) (T.16S., R.6E, Section 27) for a distance of 6.65 miles (excluding 0.5 miles of fee land within the Forest);

and

FDR #50034 (Trail Mountain Road) from its junction with FDR #50040 (Cottonwood Road) (T.16S., R.6E, Section 27) southerly to its terminus in Section 34 of T. 17 S., R. 6 E., for a distance of 12 miles;

and

FDR #52175 (Un-named road) from its junction with FDR #50034 (Trail Mountain Road) (T.17S., R.6E, Section 34) southerly to its terminus in Section 34 (T.17S., R.6E) for a distance of 0.40 miles;

and

FDR #52182 (un-named road) from its junction with FDR #50034 (Trail Mountain Road) (T.17S., R.6E, Section 27) southerly to its terminus in Section 27 (T.17S., R.6E, Section 25) for a distance of 0.40 miles;

on the Manti-La Sal National Forest, subject to the provisions of this permit including clauses 1 through 17, on page(s) 1 through 3 for the purpose of hauling, transporting personnel, equipment, supplies and materials for road maintenance, water-well drilling, and coal exploration drilling.

The exercise of any of the privileges granted in this permit constitutes acceptance of all the conditions of the permit.

1. **WORK REQUIRED TO ACCOMMODATE PERMITTED USE.** In accordance with this use, the permittee shall perform the work described below and in accordance with plans and specifications attached hereto:

Pre-haul maintenance of FDR #52175 and FDR #52182

2. **USE PLANS.** Prior to June 1 each year this permit is in effect, permittee shall notify the Ferron District Ranger, P.O. Box 310, 98 South Main, Ferron, Utah, 84523 - (801-384-2371) in writing of the approximate time when such use will commence, the anticipated duration of such use, the names and addresses of permittee's contractors or agents who will use the road on behalf of permittee, the estimated extent of use, and such other information relative to permittee's anticipated use as the Forest Service may from time to time reasonably request. If and when during the year there is any significant change with respect to the information so supplied by permittee, the permittee will notify the Ferron District Ranger promptly in writing of such change. Plans and changes will be approved by the Manti-La Sal National Forest Supervisor before use may commence.

3. **COMPLIANCE WITH LAWS AND REGULATIONS.** The Permittee, in exercising the privileges granted by this permit, shall comply with the regulations of the Department of Agriculture and all Federal, State, county and municipal laws, ordinances or regulations which are applicable to the area or operations covered by this permit.

4. **USE NONEXCLUSIVE.** The privileges granted in this permit to use this road are not exclusive. The Forest Service may use this road and authorize others to use it at any and all times. The permittee shall use said road in such manner as will not unreasonably or unnecessarily interfere with the use thereof by other authorized persons, including Forest Service.

5. **RULES GOVERNING USE.** The permittee, its agents, employees, contractors or employees of contractors, shall comply with all reasonable rules prescribed by the Forest Service for control and safety in the use of this road and to avoid undue damage to the road. Such rules will include:

- (1) Upon reasonable notice, closing the road or restricting its use when, due to weather conditions or the making of alterations or repairs, unrestricted use would in Forest Service judgement, cause excessive damage, or create hazardous conditions;
- (2) Upon reasonable notice, closing the road during periods when, in Forest Service judgement, there is extraordinary fire danger;
- (3) Traffic controls, which in Forest Service judgement, are required for safe and effective use of the road by authorized users thereof;
- (4) Prohibition on the operation on this road of any vehicles or equipment having cleats or other tracks which will injure the surface thereof;

- (5) Prohibition on the operation of vehicles (of a width in excess of 96 inches and a gross weight of vehicles and load in excess of 80,000 pounds.
- (6) Regulation of the number of vehicles so as to prevent undue congestion of this road.
- (7) The Permittee shall not use an "active ingredient" as defined in Section 2 of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (86 Stat. 973), in violation of said act on the Land described in this permit.
- (8) Other - Heavy equipment may not be moved on Forest Development Roads on the following dates:

July 23 - 25, 1994  
 September 3 - 6, 1994  
 October 6 - 11, 1994

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6. **INSURANCE.** Permittee or his contractors and assigns shall be required to carry public liability and property damage insurance for the operation of vehicles in the amounts established by applicable state laws, cooperative agreements, or easements issued on the subject road or roads. In any event, the permittee must carry liability insurance and property damage insurance of not less than \$100,000 for injury or death to one person, \$300,000 for injury or death to two or more persons, and \$100,000 for damage to property. The permittee itself shall be responsible for furnishing to the Manti-La Sal National Forest Supervisor proof of satisfactory insurance when said insurance is to be furnished by other than the permittee. Proof of satisfactory insurance may be required by the Manti-La Sal National Forest Supervisor prior to hauling over the road(s) and will be for the duration of the permit and such insurance policy shall bear an endorsement requiring the issuing company to give 10 days prior written notice to the Manti-La Sal National Forest Supervisor, 599 West Price River Drive, Price, Utah 84501, of cancellation or material change.

7. **MAINTENANCE.** The permittee shall bear the expense of maintenance proportionate to his use. This expense will be borne by

Recurring Maintenance: FDR #50040 - \$108/mile x 6.65 mile x 30%	= \$ 215.46 (Maintenance in lieu of)
Recurring Maintenance: FDR #50034 - \$162/mile x 12.00 miles x 85%	= \$1652.40 (Maintenance in lieu of)
Recurring Maintenance: FDR #52175 - \$165/mile x 0.40 miles x 85%	= \$ 56.10 (Maintenance in lieu of)
Recurring Maintenance: FDR #51820 - \$165/mile x 0.40 mile x 62%	= \$ 40.92 (Maintenance in lieu of)

Deferred Maintenance: FDR #50040 - 2663 ESU's x \$0.026/ESU/Mi. x 6.65 miles	= \$ 460.43 (Payment required)
Deferred Maintenance: FDR #50034 - 2663 ESU's x \$0.029/ESU/Mi. x 10.80 miles	= \$ 834.05 (Payment required)
Deferred Maintenance: FDR #52175 - 1434 ESU's x \$0.028/ESU/Mi. x 0.40 miles	= \$ 16.06 (Payment required)
Deferred Maintenance: FDR #52182 - 410 ESU's x \$0.028/ESU/Mi. x 0.40 miles	= \$ 4.59 (Payment required)

Payment required \$1,315.13

When deposit or payments are required in lieu of performance of maintenance the rate will be N/A which is agreed to be the cost of such works; the deposits or payments to be made at such times and in such amounts as requested by the N/A Provided, however, that the rate shall be revised upward or downward on N/A of each year hereafter, based on estimated costs and uses anticipated; Provided further, that payment shall not relieve the permittee from liability for repair of damages due to carelessness or negligence on its part or on the part of its contracts or agents.

Maintenance shall be performed in accordance with Forest Service specifications or requirements for maintenance as hereinafter listed, or as may be mutually agreed upon from time to time and shall consist of (1) current maintenance as necessary to preserve, repair, and protect the roadbed, surface and all structures and appurtenances, and (2) resurfacing equivalent in extent to the wear and loss of surfacing caused by operations authorized by this permit.

**7a. MAINTENANCE AND RESURFACING REQUIREMENTS AND SPECIFICATIONS.**

Total Maintenance of 12.0 miles of FDR # 50034 for 1994. (In lieu of payment)

8. **PERFORMANCE BOND.** In the event the permittee is to perform his proportionate share of road maintenance, road resurfacing, or betterment, as determined and within time periods established by the Forest Supervisor, the Forest Service may require as a further guarantee of the faithful performance of such work that the permittee furnish and maintain a surety bond satisfactory to the Forest Service in the sum of twenty-five thousands dollars (\$25,000), or in lieu of a surety bond, deposit into a Federal depository, as directed by the Forest Service, and maintain therein cash in the sum of twenty-five thousand dollars (\$25,000), or negotiable securities of the United States having market value at time of deposit of not less than twenty-five thousand (\$25,000). As soon as security for the performance of road maintenance (and betterment) requirements or the settlement of claims incident thereto is completed, unencumbered cash guarantees or negotiable securities deposited in lieu of surety bond will be returned to the permittee.

9. **FIRE PREVENTION AND SUPPRESSION.** The permittee shall take all reasonable precautions to prevent and suppress Forest fires. No material shall be disposed of by burning in open fires during the closed season established by law or regulation without a permit from the Forest Service.

10. **DAMAGES.** The permittee shall exercise diligence in protecting from damage the land and property of the United States covered by and used in connection with this permit, and promptly upon demand shall pay the United States for any damage resulting from negligence, or from violation of the terms of this permit or of any law or regulation applicable to the National Forests, by the permittee, or by his agents, contractors, or employees of the permittee acting within the scope of their agency, contract, or employment.

11. **OFFICIALS NOT TO BENEFIT.** No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit that may arise herefrom unless it is made with a corporation for its general benefit.

12. **OUTSTANDING RIGHTS.** This permit is subject to all outstanding rights.

13. **SUSPENSION.** Upon the failure of the permittee, its agents, employees or contractors to comply with any of the requirements of this permit, the officer issuing the permit may suspend operations in pursuance of this permit.

14. **TERMINATION.** This permit shall terminate on October 15, 1995 unless extended in writing by the Forest Service. It may be terminated upon breach of any conditions herein.

15. In the event of any conflict between any of the preceding printed clauses or any provision thereof and any of the following clauses or any provisions thereof, the following clauses will control.

None

16. **SAFETY.** Unless otherwise agreed in writing, when Permittee's Operations are in progress adjacent to or on Forest Service controlled roads and trails open to public travel, Permittee shall provide the use with adequate warning of hazardous or potentially hazardous conditions associated with Permittee's Operation. A specific traffic control plan for each individual project shall be agreed to by Permittee and Forest Service prior to commencing operations. Devices shall be appropriate to current conditions and shall be covered or removed when not needed. Except as otherwise agreed, flagger and devices shall be as specified in the "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD), and in specifications attached hereto.

17. Drivers of all vehicles hauling shall have a copy of this agreement in their possession. This agreement will be presented, on request, to any Forest Officer.

This permit is accepted subject to all of its terms and conditions.

ACCEPTED	 Permittee (Name & Signature)	Date 8-5-94
APPROVED	 Issuing Officer (Name & Signature)	Date 8/19/94

ARON L. HOWE  
ACTING Forest Supervisor

EFFECTIVE:  
SEP 27 1994

PACIFIC CORP 1994 DRILL PLAN

ATTACHMENTS 4-9

# ***PACIFICORP***

***1994 TRAIL MOUNTAIN DRILLING PLAN  
DRILL HOLES TMTN-16 THROUGH TMTN-28***

***APPLICANT:***

***PACIFICORP  
ONE UTAH CENTER  
201 SOUTH MAIN, SUITE 2100  
SALT LAKE CITY, UTAH 84140-0021  
(801) 220-2000***

ATTACHMENTS 4-9

**CULTURAL RESOURCE EVALUATION**  
**OF THIRTEEN PROPOSED EXPLORATORY DRILL**  
**LOCATIONS & ACCESS ROUTES**  
**IN THE TRAIL MOUNTAIN LOCALITY**  
**OF EMERY COUNTY, UTAH**

Report Prepared for Energy West / Utah Power / PacifiCorp

U.S. Forest Service (Dept. of Agriculture) Special-Use Permit  
AERC Project 1405 (UPL-93-14)

Utah State Project No.: UT-93-AF-566f

Principal Investigator  
F. Richard Hauck, Ph.D.



**ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH  
CORPORATION (AERC)**

181 North 200 West, Suite 5  
P.O. Box 853  
Bountiful, Utah 84011-0853

October 27, 1993



# ARCHEOLOGICAL - ENVIRONMENTAL RESEARCH CORPORATION

P. O. Box 853 Bountiful, Utah 84011-0853  
Tel: (801) 292-7061, 292-9668

October 26, 1993

**Subject:** CULTURAL RESOURCE EVALUATION OF THIRTEEN  
PROPOSED EXPLORATORY DRILLING LOCATIONS &  
ACCESS ROUTES IN THE TRAIL MOUNTAIN LOCALITY  
OF EMERY COUNTY, UTAH

**Project:** Energy West, Inc., - 1993 Development Program

**Project No.:** UPL-93-14

**Permit No.:** Department of Agriculture Special-Use Permit

**Utah State  
Project No.:** Ut-93-AF-566f

**To:** Mr. Val Payne, Energy West, P.O. Box 1005, Huntington, Utah 84528

Mr. Ira Hatch, District Ranger, Manti-La Sal National Forest, Ferron Ranger  
District, Ferron, Utah 84532

**Info:** Antiquities Section, Division of State History, 300 Rio Grande, Salt Lake City,  
Utah 84101

## **ABSTRACT**

An intensive cultural resource evaluation has been conducted for Energy West of thirteen proposed exploratory drill locations and associated access routes situated in the Ferron Ranger District of the Manti-La Sal National Forest in the Trail Mountain locality of Emery County, Utah. This evaluation involved ca. 4.16 miles of right of way and ca. 10 acres associated with the 13 drill locations for a total of 60 acres. The survey was conducted by F. Richard Hauck and Walter Lenington of AERC on September 24 and 25, 1993. These two archaeologists accompanied by Glade Hadden returned to the project area on October 11, 1993 and recorded the cultural resources that were discovered during the earlier field examinations.

No previously recorded significant or National Register eligible cultural resources will be adversely affected by the proposed development.

No newly identified paleontological loci were discovered during the examination.

A single diagnostic isolated artifact was observed and collected from the access route into Units 23 and 27 during the evaluation. This projectile point consists of a Gypsum style atlatl point identified as Isolate 1405R/x1.

Two prehistoric resource loci were identified and recorded during the evaluations (42EM 2349 and 42EM 2350). Site 42EM 2349, an Archaic open occupation, is considered to be a significant cultural resource that should be avoided by future exploration and development. Site 42EM 2350, a previously destroyed lithic scatter is not significant.

AERC recommends project clearance based on adherence to the stipulations noted in the final section of this report.

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## GENERAL INFORMATION

On September 24 and 25, 1993, AERC archaeologists F. Richard Hauck and Walter Lenington conducted an intensive cultural resource evaluation for Energy West involving 13 proposed coal exploratory drill locations and associated access routes located on Trail Mountain in Emery County, Utah. On October 11, a field team composed of F.R. Hauck, Glade Hadden, and W. Lenington returned to the project area to record the two cultural sites identified on the preliminary evaluation and to map one of those sites (42EM 2349) which is situated in the immediate locality of proposed TMTN Unit 21. A total of ca. 4.16 miles of new access routes and 10 acres of drill pads were examined for a total of 60 acres. This project is situated within the Manti-La Sal National Forest on federal lands administered by the Ferron Ranger District.

The purpose of the field study and this report is to identify and document cultural site presence and assess National Register potential significance relative to established criteria (cf., Title 36 CFR 60.6). The proposed development of these exploratory drill locations and access routes requires an archaeological evaluation in compliance with U.C.A. 9-8-404, the Federal Antiquities Act of 1906, the Reservoir Salvage Act of 1960-as amended by P.L. 93-291, Section 106 of the National Historic Preservation Act of 1966-as amended, the National Environmental Policy Act of 1969, the Federal Land Policy and Management Act of 1979, the Archaeological Resources Protection Act of 1979, the Native American Religious Freedom Act of 1978, the Historic Preservation Act of 1980, and Executive Order 11593.

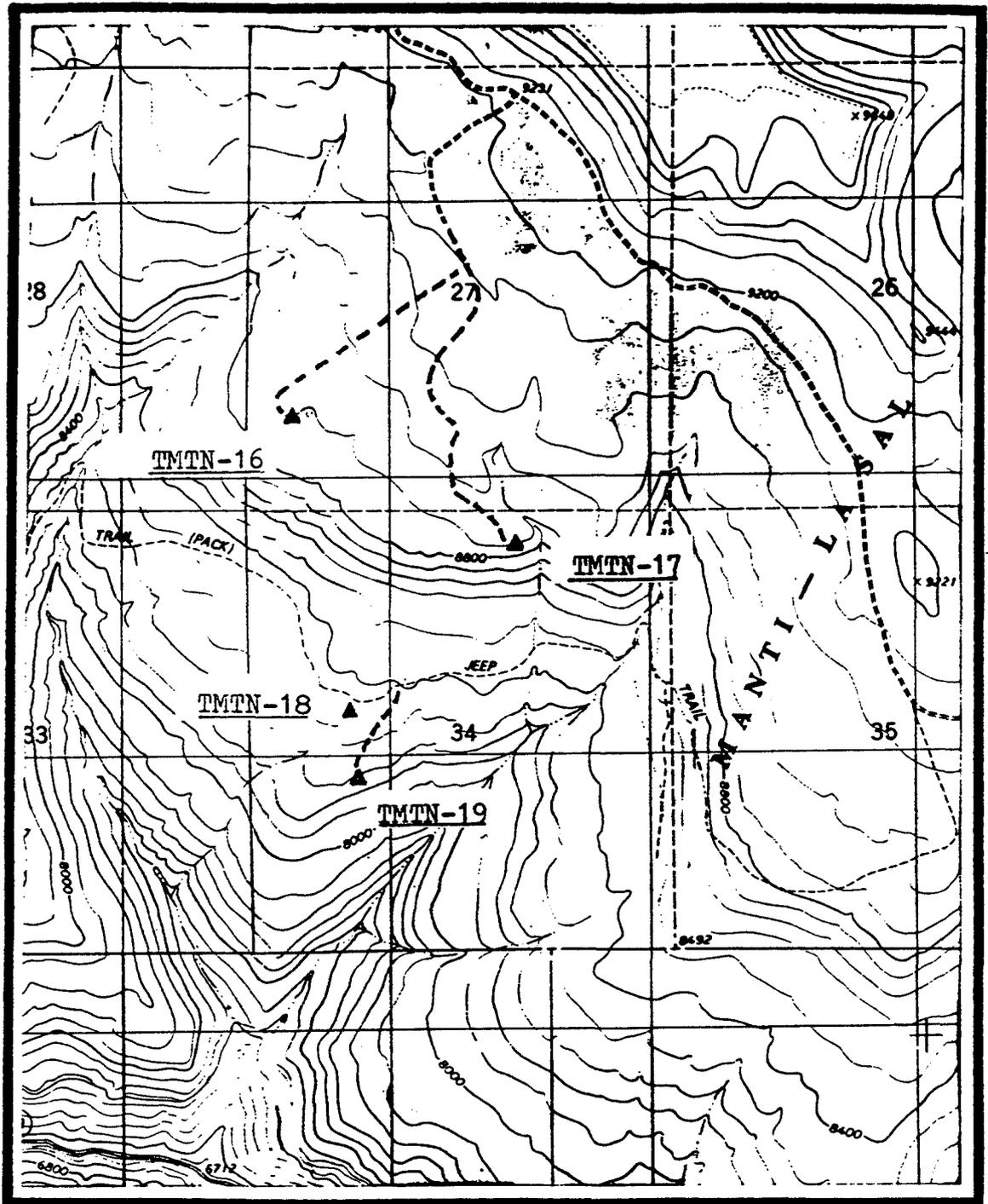
In addition to documenting cultural identity and significance, mitigation recommendations relative to the preservation of cultural data and materials can be directed to the Utah State Historical Preservation Office, Antiquities Section and to the Manti-La Sal National Forest supervisor's office. This work was done under U.S. Department of Agriculture special-use permit issued by the Ferron Ranger District.

### Project Location

The 13 proposed exploratory drill locations and associated access routes are situated on high altitude terraces associated with the southern portion of Trail Mountain in central Utah. These units are located as follows:

- Unit TMTN-16: SW 1/4 of Section 27, Township 17 South, Range 6 East
- Unit TMTN-17: NE 1/4 of Section 34, Township 17 South, Range 6 East
- Unit TMTN-18: NW 1/4 of Section 34, Township 17 South, Range 6 East
- Unit TMTN-19: SW 1/4 of Section 34, Township 17 South, Range 6 East
- Unit TMTN-20: NW 1/4 of Section 2, Township 18 South, Range 6 East
- Unit TMTN-21: NE 1/4 of Section 3, Township 18 South, Range 6 East
- Unit TMTN-22: NW 1/4 of Section 2, Township 18 South, Range 6 East
- Unit TMTN-23: NE 1/4 of Section 2, Township 18 South, Range 6 East
- Unit TMTN-24: NE 1/4 of Section 34, Township 17 South, Range 6 East

AERL



T. 17 South  
 R. 6 East  
 Meridian: SL  
 Quad: Mahogany  
 Point, Utah

**MAP 1**  
 Cultural Resource Survey  
 of Proposed Drilling Units  
 in the Trail Mountain  
 Locality of Emery County

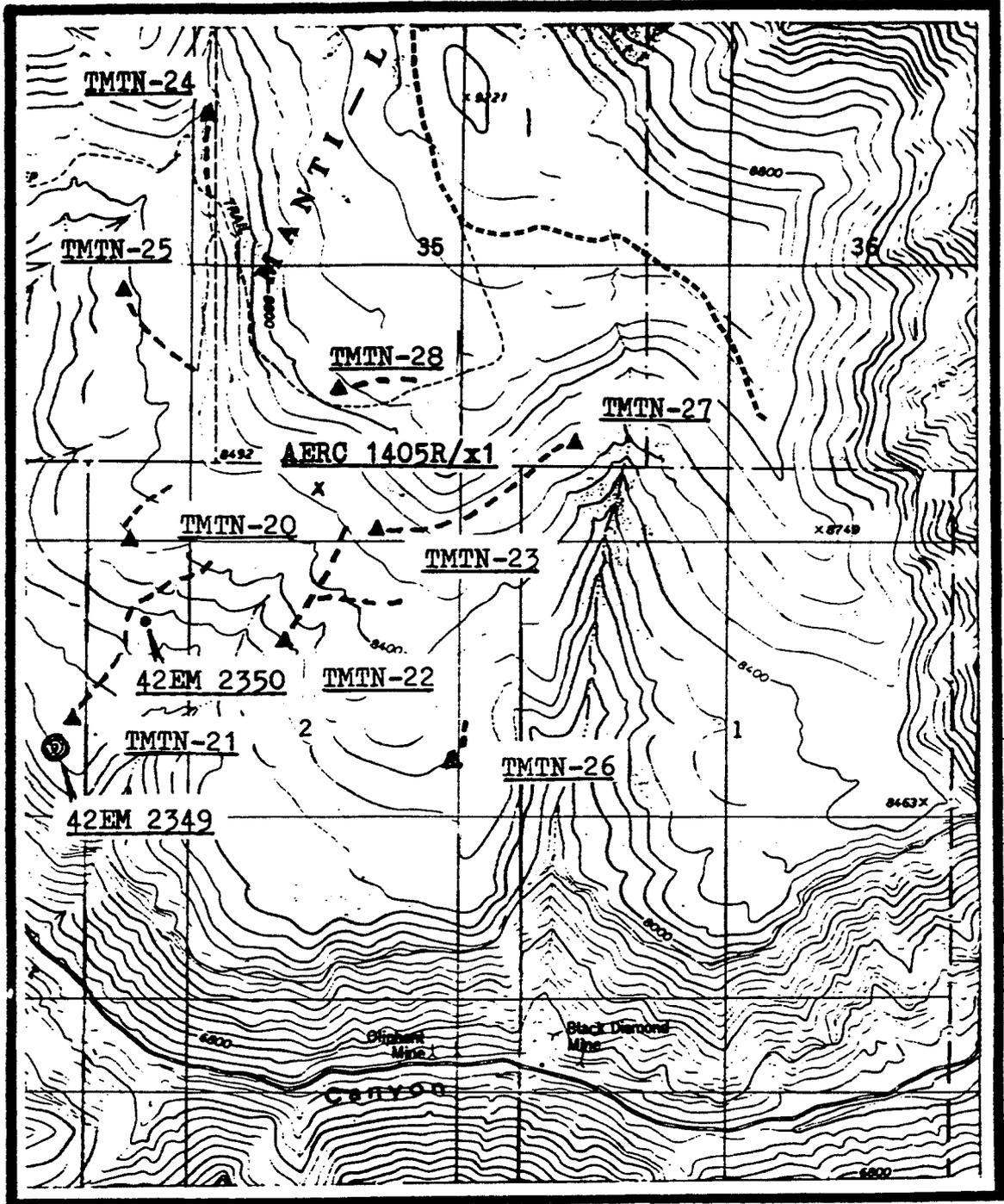
**Legend:**  
 Drilling Location ▲  
 Access Route - - -

4  
 N

Project: UPL-93-14  
 Series: Central Utah  
 Date: 10-20-93



AERC



T. 17 & 18 S.  
 R. 6 East  
 Meridian: SL  
 Quad: Mahogany  
 Point, Utah

**MAP 2**  
 Cultural Resource Survey  
 of Proposed Drilling Units  
 in the Trail Mountain  
 Locality of Emery County

**Legend:**  
 Drilling Location ▲  
 Access Route - - -  
 Cultural Site ⊙  
 Isolated Artifact x



**Project:** UPL-93-14  
**Series:** Central Utah  
**Date:** 10-20-93  
**Scale:** 1:24000



Unit TMTN-25: SE 1/4 of Section 34, Township 17 South, Range 6 East  
Unit TMTN-26: NE 1/4 of Section 2, Township 18 South, Range 6 East  
Unit TMTN-27: SE 1/4 of Section 35, Township 17 South, Range 6 East  
Unit TMTN-28: SW 1/4 of Section 35, Township 17 South, Range 6 East

The project location is in the Straight Canyon-Train Mountain locality of Emery County, Utah. It is situated on the Mahogany Point, Utah 7.5 minute topographic quad.

### Environmental Description

The project area is situated at the 8000 to 9200 foot elevation zone above sea level. Open sage and grass rangeland, Ponderosa/Fir stands, and Aspen communities are associated with the upper terraces on Trail Mountain. Pinyon-Juniper and transitional woodlands are common to the intermediate slopes and canyon walls overlooking Straight Canyon and Joes Valley.

The vegetation in the project area consists mainly of high elevation rangeland species including scattered *Chrysothamnus spp.*, *Artemisia spp.*, *Lupinus*, *Achillia*, *Penstemon*, *Berberis* and a variety of grasses. Isolated stands of Aspen (*Populus tremuloides*), Mountain Mahogany (*Cercocarpus montanus*), and Douglas Fir (*Pseudotsuga mensezeii?*) can be found in protected pockets within the general Pinyon-Juniper woodland that characterizes the southern terraces and slopes of Trail Mountain.

The geological associations within the project area consists of the North Horn Formation sandstones and derived soils which is of undifferentiated Cretaceous/Tertiary age.

### PREVIOUS RESEARCH IN THE LOCALITY

#### File Search

A records search of the site files and maps at the Antiquities Section of the State Historic Preservation Office in Salt Lake City was conducted on July 15, and again on October 18, 1993. The National Register of Historic Places has been consulted and no registered historic or prehistoric properties will be affected by the proposed development.

A variety of known cultural sites are situated on the southern and central ridges of East Mountain, on adjacent Trail Mountain, and in both Huntington and Cottonwood Canyons as reported by a number of archaeologists.

Archaeological studies of importance that have been conducted adjacent to the present lease area include the 1974 Forest Service preliminary excavations at Joes Valley Alcove or Site 42EM 693/1932 (DeBloois, Green, and Wylie 1979). This valuable site was found to contain

stratigraphic occupations that date to the Middle and Late Archaic and Formative Stages. Recently, the University of Utah has conducted field school excavations at that same site (McDonald 1990:personal communication) resulting in the discovery of cultural materials that will provide pertinent information on prehistoric subsistence in the locality.

During the extensive sample survey program conducted by AERC in 1977 related to the Central Coal Project (see Hauck 1979), three 160 acre sample units were evaluated within the general project area. Sample Unit No. FN 15 was located within the project area in the SW 1/4 of Section 25, Township 15 South, range 6 East. Samples FC 1 and FC 3 were located near the south border of the project area respectively in the SE quarter of Section 11 and in the NW quarter of Section 7, Township 16 South, Ranges 6 and 7 East. Site 42EM 856, a moderate size lithic scatter, was the single prehistoric cultural resource identified during this study.

AERC has conducted four archaeological programs adjacent to the present project area for Utah Power & Light Company. These studies were accomplished in 1979, 1980, 1990, and 1991. The 1979 project involved both intensive surface evaluations and excavation on private and BLM administered lands in Cottonwood Canyon. Among the sites recorded in the canyon during that program, Sites 42EM 959 (Harvest Moon Shelter) and 42EM 960 (Peephole Site) were subsequently excavated by AERC (Hauck and Weder 1982). Both shelters were found to contain Archaic and Formative occupational components.

In 1980, AERC conducted a 15% sample survey program of 18,000 acres for Utah Power & Light Company in the southern portion of East Mountain. This survey resulted in the identification and reporting of four cultural resource sites 42EM 1307-1310 and a variety of isolated artifacts which demonstrate the presence of Archaic, Formative, and Late Prehistoric occupations in the locality (Hauck and Weder 1980).

An intensive surface inventory (Class III) of 2280 acres on East Mountain was initiated in 1990 by AERC for Utah Power & Light Company (see Norman 1990). This study resulted in the identification and recording of three prehistoric sites – 42EM 2222-2224 and isolated artifacts that are associated with both Archaic and Late Prehistoric activities.

During the fall of 1991, AERC initiated a 15% sample survey on Trail Mountain and in upper Cottonwood Canyon of 8,025 acres (Hauck 1991b). A total of 15 sites, 14 of them containing prehistoric components was recorded during that Class II survey. Those sites included 42EM 2258 through 42EM 2272 featuring a historic wagon trail in Cottonwood Canyon, a prehistoric hunting blind, and a variety of lithic scatters and open occupations.

In 1992, AERC initiated a sample survey of the northern portion of East Mountain for Genwal Coal Company (Hauck 1992b). Seven prehistoric cultural resource activity loci (Sites 42EM 2296 through 42EM 2302) and a variety of isolated diagnostic artifacts were observed and recorded during that program. Anasazi Gray Ware (Tusayan Corrugated) vessel fragments were observed and documented on two separate high-altitude sites. The full range of diagnostic

artifacts identified during this inventory demonstrate definite Late Archaic and Formative occupations within the locality.

AERC has also conducted numerous small-scale evaluations on East Mountain, in Huntington Canyon and on adjacent Trail Mountain. Trail Mountain evaluations were initiated in 1983, 1987 and 1988 for exploratory drill locations and access routes (see Hauck 1983, 1987, 1988a, 1988b). Several isolated artifacts were observed and recorded during several of these surveys. These artifacts include a Rose Spring arrow point (Hauck 1987) and a non-diagnostic dart point fragment (Hauck 1988b). Site 42EM 2114 was also recorded by AERC (Hauck 1987). This site is situated just outside the present survey tract (see Map 5) and consists of a significant Early to Middle Archaic campsite which contained a variety of lithic material and hearths. In 1990, AERC returned to Trail Mountain to conduct surface evaluations for Utah Power & Light Company of a series of proposed coal exploratory drilling locations and access routes (Hauck 1990a, 1990b, and 1993). Richard Beaty identified several isolated artifacts west of North Point Spring during one of these surveys and a cultural activity locus at that spring was hypothesized on the basis of that association (Hauck 1990b). In 1991, AERC conducted a sample survey project on Trail Mountain and in Cottonwood Canyon for Utah Power involving about 1000 acres of intensive survey. A total of 15 cultural resource sites including one historic trail and wagon road was recorded including Sites 42EM 2258 through 42EM 2272 (Hauck 1991b). More recently, Site 42EM 2330, a lithic scatter possibly of Early Archaic derivation has been recorded on the southern end of Trail Mountain (Hauck 1993).

Since 1976, AERC has conducted a total of 28 cultural resource evaluations for Utah Power & Light Company on the southern and central portions of East Mountain and in the adjacent canyons (Norman 1990:4). This firm has also initiated a roadway and well pad survey for Meridian Oil Company adjacent to the Genwal lease area (Hauck 1987), for Coal Systems/Nevada Electric Investment Company within the Genwal lease area (Hauck 1989), evaluations of the Genwal transmission line corridors in 1989 resulted in the recording of Sites 42EM 2185, 2186, and 2187 (Norman 1989), and for drilling locations on the mountain related to the development of Genwal Coal Company (Hauck 1991a).

Other firms have also conducted archaeological investigations in this general locality. A survey in Rilda Canyon resulted in the identification of Sites 42EM 1330, 1331, and 1332 (Farmer 1980). In 1982 a Class II sample survey in the Crandall Canyon and Mill Fork Canyon was initiated by Utah Archaeological Research Corporation without significant results (Cook 1982). Keith Montgomery conducted surface evaluations in 1988 for Meridian Oil Company in the bottom of Cottonwood canyon but encountered no cultural resources (Montgomery 1988). Other investigations in this locality have yielded limited results (cf., Christensen 1980, Cook 1980, Gillio 1975, Howell 1980, 1981, 1982).

Archaeological excavations in the general project area include U.S. Forest Service and University of Utah excavations at the Joes Valley Rock Shelter (Deblois, Green and Wylie 1979), AERC's 1980 excavations of occupation sites 42EM 959 and 42EM 960 in Cottonwood Canyon (Hauck and Weder 1982), Forest Service test excavations at Sherman Shelter or Site

42EM 722 in Crandall Canyon (Wikle 1981, 1988) and the more recent excavations in Huntington Canyon conducted by Abajo Archaeology (Howell, Davis and Peterson 1986).

### Prehistory and History of the Cultural Region

Currently available information indicates that the Wasatch Plateau and adjacent Colorado Plateau Cultural Regions have been occupied by a variety of cultures beginning perhaps as early as 10,000 B.C. These cultures, as identified by their material remains, demonstrate a cultural developmental process that begins with the earliest identified Paleoindian peoples (10,000 – 7,000 B.C.) and extends through the Archaic (ca. 7,000 B.C. – A.D. 300), and Formative (ca. A.D. 400 – 1100) Stages, and the Late Prehistoric-Protohistoric periods (ca. A.D. 1200 – 1850) to conclude in the Historic-Modern period which was initiated with the incursion of the Euro-American trappers, explorers, and settlers. Basically, each cultural stage – with the exception of the Late Prehistoric hunting and gathering Shoshonean bands – features a more complex life-way and social order than occurred during the earlier stage of development (Hauck 1991:53). For a more comprehensive treatment of the prehistory and history of this region see Archaeological Evaluations in the Northern Colorado Plateau Cultural Area (Hauck 1991).

### Site Potential in the Project Development Zone

Previous archaeological evaluations in the general project area have resulted in the identification and recording of a variety of cultural resource sites having eligibility for potential nomination to the National Register of Historic Places (NRHP). The majority of these sites are lithic scatters containing biface thinning and reduction materials generally procured in this highland mountain/plateau complex. Occupations are also frequently identified in this locality. Sites associated with the rock shelters on the main canyon floors and open occupations on the mountain ridges and upper slopes generally appear to have been occupied during the Middle and Late Archaic Stages with occasional indications of Formative Stage activity based on radiometric dates and the recovery of associated artifacts. The major canyons appear to have been more actively occupied during the Formative Stage by the Fremont peoples based on the Huntington Canyon and Cottonwood Canyon excavations. To-date, very sparse evidence of Late Prehistoric (Numa) activity has been documented in the general area.

Site density appears to range from zero to five sites per section base on topographic factors. Sections which feature slopes and narrow canyons appear to have little potential for containing significant prehistoric or historic activity loci. Sections which feature ridge tops and knolls associated with springs and seeps and sections which contain the broader canyons and valleys with flowing streams have the greatest potential for containing significant sites.

The 1991 and 1992 archaeological evaluations in the East Mountain and Trail Mountain sample units have resulted in the identification of a significantly higher site density in the upland areas than previously identified within this locality. The 1980 AERC sample survey of 2705

acres on the southern portion of East Mountain resulted in the discovery of three prehistoric sites for a Site/Acre Ratio of 1:760 (cf., Hauck and Weder 1980). In 1990, AERC returned to East Mountain and completed a 2280 acre intensive survey on the central portion of the mountain spine. That study resulted in the documentation of four sites for a Site/Acre Ratio of 1:676 (cf., Norman 1990). The 715 acres associated with the 1991 Trail Mountain highland sample unit study contained a total of 11 prehistoric sites resulting in a Site/Acre Ratio of 1:65. This statistic suggests that in comparison with East Mountain, Trail Mountain has 10 times the site density (Hauck 1991c:27). (For additional information on Site/Acre Densities in other regions see Hauck 1991b). In a recent report on this general locality, Hauck (1991c:27-28) discusses the site density variations between the two adjacent mountain spines. That discussion is repeated below.

It is presently difficult to understand why such a site density difference exists between East Mountain and Trail Mountain for the two are only three miles apart. It is unlikely that this difference is due to any variation in archaeological field methods. Possibly an environmental factor may account for this distinct contrast, e.g., water availability or resource density.

One cultural difference between the two mountain spines that is presently apparent relates to site location. Of the known 13 prehistoric sites on East Mountain, 12 sites are positioned at the heads of drainage systems (Norman 1990:13). These sites appear to be located in association either with water sources or with the ancient access routes that extended down off the plateau to parallel the drainages leading to the canyon floors. A similar pattern is not readily apparent on Trail Mountain. Only Site 42EM 2263 at North Point Spring is possibly related to a highland-lowland access trail via Pack Trail Canyon. All of the other 10 newly identified sites on Trail Mountain are associated with the central spine on that mountain and are displayed in a north-south pattern paralleling the mountain's central ridge.

Cultural diversity is probably not the reason for the density and location differences between the two mountains. Both mountains register some Early Archaic presence based on the identification of Northern Side-notch points (4900 - 3300 B.C.) on Trail Mountain Site 42EM 2114 (Hauck 1987) and on East Mountain at Site 42EM 1310 (Hauck and Weder 1980:57). Both mountains contain dominant occupations attributable to both Middle and Late Archaic peoples (2500 B.C. - A.D. 200) based on the presence of Elko series points (42EM 1308 [Hauck and Weder 1980:Figures 5E and 5F] 42EM 2114 [Hauck 1987], 42EM 2260 [Figure 1D, 1E, 1F, and 1H]), Gypsum points (Hauck and Weder 1980:Figure 5B and 5C), and a single San Rafael Side-notch point (Hauck and Weder 1980:Figure 5D).

Formative Stage (A.D. 400 - 1100) presence on both mountains is attributable more by the discovery of isolated Rose Spring arrow points than by

site associations. Only Site 42EM 1308 on East Mountain has provided a Formative component (cf., Hauck and Weder 1980:Figure 5I, 58). The only known Formative presence on Trail Mountain is demonstrated by isolates 1114R/x1 (Hauck 1987) and 1281R/x11 (cf., Figure 1A in Hauck 1991c).

Numa (post A.D. 1200) activity on the highlands is limited to two isolated Desert Side-notch fragments found on East Mountain (Hauck and Weder 1980:Figure 5J and Norman 1990:Figure 4D).

## FIELD EVALUATIONS

### Methodology

Intensive evaluations of the access corridors addressed in this report consisted of the archaeologists walking doubled 15 meter-wide transects along the access routes and within a 30 to 40 meter radius of each staked drilling location.

Observation of cultural materials results in intensive examinations to determine the nature of the resource (isolate or activity locus). The analysis of each specific cultural site results in its subsequently being sketched, photographed, and appropriately recorded on standard Intermountain Antiquities Computer System (IMACS) forms. Cultural sites are then evaluated for significance utilizing the standards described below and mitigation recommendations are considered as a means of preserving significant resources which may be situated within the development zone.

### Site Significance Criteria

Prehistoric and historic cultural sites which can be considered as eligible for nomination to the National Register of Historic Places have been outlined as follows in the National Register's Criteria for Evaluation as established in Title 36 CFR 60.6:

The quality of significance in American ... archaeology ... and culture is present in ... sites ... that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

- a. That are associated with events that have made a significant contribution to the broad patterns of our history; or
- b. that are associated with the lives of persons significant in our past; or
- c. that embody the distinctive characteristics of a type, period, or method of construction ... ; or
- d. that have yielded, or may be likely to yield, information important in prehistory or history.

In addition to satisfying one or more of these general conditions, a significant cultural resource site in Utah will generally be considered as being eligible for inclusion in the National Register if it should advance our current state of knowledge relating to chronology, cultural relationships, origins, and cultural life ways of prehistoric or historic groups in the area.

In a final review of any site's cultural significance, the site must possess integrity and at least one of the above criteria to be considered eligible for nomination to the National Record of Historic Places.

### Results of the Inventory

No previously recorded cultural sites will be adversely affected by the proposed development associated with the quarry operation.

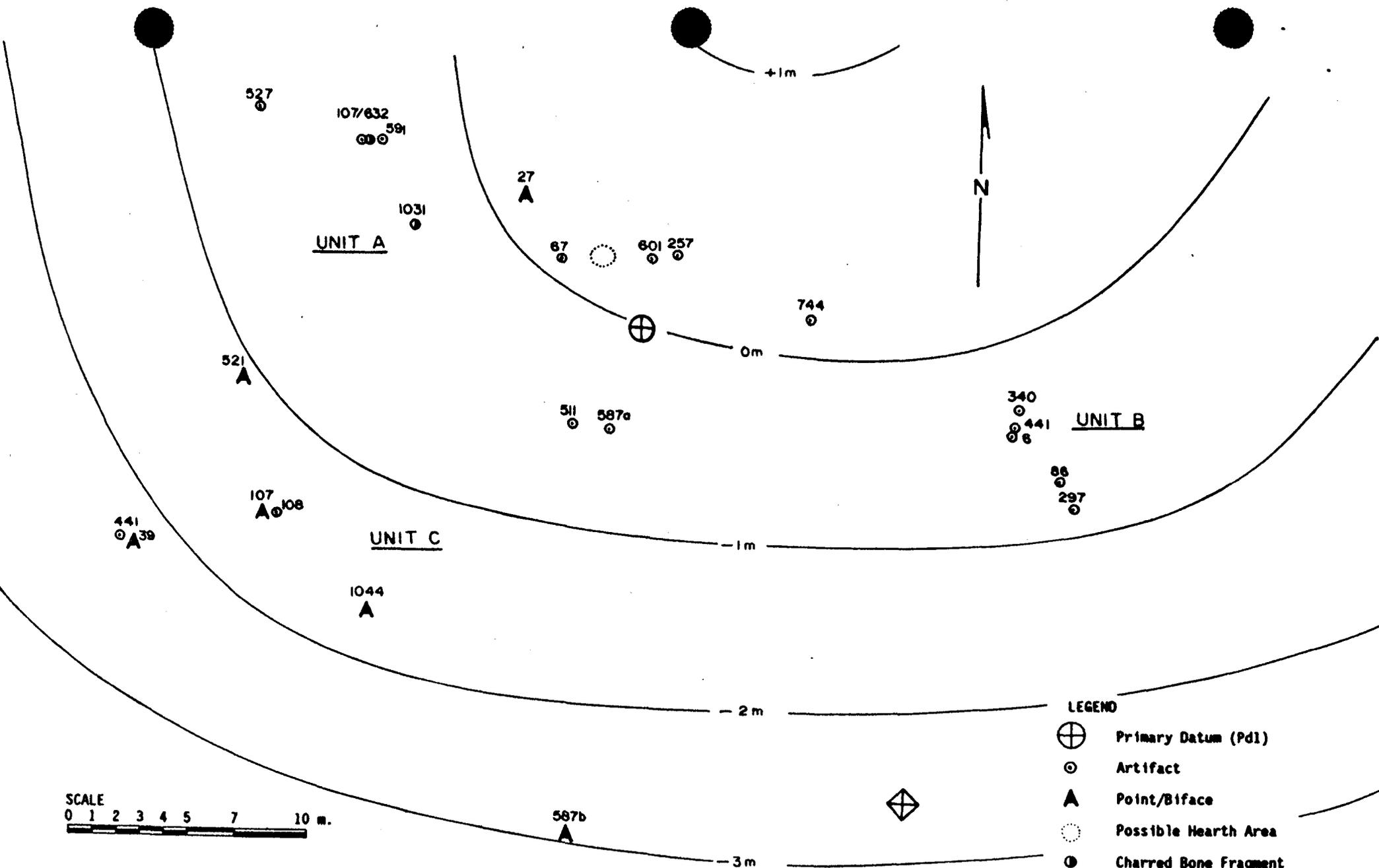
One isolated artifact was observed and collected from the access road corridor during the initial survey. This isolate (AERC 1405R/x1) consists of a Gypsum dart point which is of Late Archaic vintage. The location of discovery is shown on Map 2. A sketch of the isolate is shown in Figure 1.

No paleontological loci were observed or recorded during the evaluation.

During the preliminary evaluations of the drilling locations, two prehistoric cultural loci were identified. These sites include 42EM 2349 and 42EM 2350. Site descriptions, significance assessments, and mitigation recommendations concerning these two resources are as follows:

#### **SITE 42EM 2349 (AERC 1405R/1), see Map 2**

Site 42EM 2349 consists of a 30 x 30 meter lithic scatter on thin soils riding on partially exposed bedrock. This site contains three separate units as shown in the site map (see Map 3). Unit A is the main occupation area on the terrace rim. Unit B is a lithic scatter to the east of Unit A and is also located on the terrace rim. Unit C comprises the scatter of debitage and materials on the slope below Unit A. The proposed center for Drilling Unit TMTN No. 21 is within Unit C. Lithic artifacts are composed mainly of secondary and tertiary flakes of mainly tan-white mottled chert and C1 chert (white transparent chert). The site also contains three biface blade fragments and three projectile point fragments. All three were dart points with two being diagnostic side-notch points (see artifact sketches in Figure 2). One of the diagnostic points is obsidian. A fragment of a metate and a trimmed metate blank were also observed on the site. A possible hearth feature is associated with a deflated and dispersed concentration of oxidized sandstone fragments. This possible feature lacks depth and any potential for containing a radiocarbon sample that would date the site. Based on the two diagnostic dart points, this site probably is of Late Archaic affiliation. This scatter appears to be associated with camping activities, core and blank reduction and retouch activities. Soil depth is between 0 and 15 cm.



SCALE  
0 1 2 3 4 5 7 10 m.

- LEGEND**
- ⊕ Primary Datum (Pd1)
  - ⊙ Artifact
  - ▲ Point/Biface
  - Possible Hearth Area
  - Charred Bone Fragment
  - ⊞ Original Center for TMTN-21 Unit

MAP 3: Site 42EM 2349 Site Map



FIGURE 1: Isolate 1405R/x1 Sketch  
(actual size)



FS 27 (obsidian)



FS 1046 (brown chert)

FIGURE 2: Projectile Points from Site 42EM 2349  
(actual size)

This site is a significant resource with marginal depth potential, diagnostic artifacts and a possible hearth feature. This site represents an Archaic occupational locus and qualifies for NRHP consideration under criterion d of Title 36 CFR 60.6.

Site 42EM 2349 is situated within the proposed location for drill unit TMTN No. 21. If that location is built on this site it will result in the complete destruction of the cultural resource. AERC recommends that the drilling location is shifted at least 50 meters to the north and up-slope from its present position in order to avoid any disturbance to this cultural site (Note: suggested relocation position of this drilling pad is shown on Map 2).

**SITE 42EM 2350 (AERC 1405R/2), see Map 2**

Site 42EM 2350 consists of a 10 x 20 meter lithic scatter on soils that have been disturbed by blading and contour ditch-berm construction. Site contains secondary and tertiary flakes of mainly tan-white mottled chert and white chert. Site area has been so badly destroyed by surface alteration the size and exact nature of this cultural resource is unknown.

This site is not a significant resource because it has lost its context among the artifacts and has therefore lost its integrity. This site does not qualify for NRHP consideration under any of the criteria of Title 36 CFR 60.6.

Site 42EM 2350 is situated within the proposed access route for drill unit TMTN No. 21. If that access route is bladed across this site it will result in additional disturbance to this cultural resource. Although the site is not significant, AERC recommends that the access route be bladed within the newly flagged zone ca. 30 meters to the west of the site in order to avoid any further disturbance to this cultural site.

## CONCLUSION AND RECOMMENDATIONS

Two prehistoric cultural resources have the potential for being adversely impacted during the development of the drilling location and access route for proposed TMTN Unit No. 21 in their present locations; Site 42EM 2349 is within the original drilling development zone; Site 42EM 2350 is within the access route into that location.

AERC recommends that a cultural resource clearance be granted to Energy West/Utah Power/PacifiCorp relative to the development of this proposed project based upon adherence to the following stipulations:

1. Site 42EM 2349 is a significant resource and should be avoided by the proposed drilling operation associated with TMTN Unit No. 21. AERC recommends that this drilling site be moved at least 150 feet (50 meters) to the north of its present location so that surface modification from the development of the drill site does not extend into the standing timber where this site is situated.
2. Site 42EM 2350 is a non-significant cultural resource that can be avoided by moving the access route into TMTN Unit 21 about 30 meters to the west into an alternative access route that has been flagged.
3. vehicular traffic, personnel movement, construction and restoration operations should be confined to the flagged areas and corridors examined as referenced in this report, and to the existing roadways and/or evaluated access routes.
4. All personnel should refrain from collecting artifacts and from disturbing any significant cultural resources in the area.
5. The authorized official should be consulted should cultural remains from subsurface deposits be exposed during construction work or if the need arises to relocate or otherwise alter the location of the exploration area.



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President and Principal  
Investigator

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**APPENDIX**

**Site 42EM 2349 Artifact Descriptions**

**SITE 42EM 2349 -- LIST OF ARTIFACTS**  
(see Site Map for Locations)

<b>Field Sample Number (FS)</b>	<b>Artifact Description</b>	<b>Lithic Material</b>
527	Core Shatter	Silicified Limestone
107	Secondary Flake	" "
632	Charred Bone Fragment	
591	Tertiary Flake	Silicified Limestone
1031	Charred Bone Fragment	
587a	Secondary Flake	Silicified Limestone
511	Tertiary Flake	Reddish Chert
27	Dart Point Base	Obsidian
	Side-notch	
67	Core Shatter Fragment	White Quartzite
601	Ground Stone Fragment	Metate ?
257	Core Shatter	White Quartzite
744	Primary Flake	Gray Shale
340	Core Fragment	Medium brown Chert
6	Secondary Flake	Tan-white mottled Chert
441	" "	" " "
86	Primary Flake	" " "
297	Secondary Flake	" " "
587b	Biface Blade Fragment	" " "
1044	Dart Point Base	Medium brown Chert
	Side-notch	
39	Point Midsection	Tan-white mottled Chert
447	Secondary Flake	White Chert
521	Point Base (Dart ?)	White Chert
	possible Corner-notch	
488	Secondary Flake	Tan-white mottled Chert

**1994 EAST MOUNTAIN DRILLING  
DRILL HOLES TMTN-16 THROUGH TMTN-28  
RECLAMATION COSTS**

**EQUIPMENT**

<b>Backhoe</b>	<b>\$30.00</b>
<b>D8 Dozer</b>	<b>\$70.00</b>

**HOURLY RATE**

**MANPOWER**

<b>Supervisor</b>	<b>\$28.00</b>
<b>Operator</b>	<b>\$27.23</b>

**HOURLY RATE**

**COST SUMMARY**

<u>AREA</u>	<u>HRS</u>	<u>EQUIPMENT</u>	<u>LABOR</u>	<u>MATERIALS</u>	<u>COSTS</u>
Drill Pad TMTN-16	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-17	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-18	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-19	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-20	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-21	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-22	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-23	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-24	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-25	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-26	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-27	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Drill Pad TMTN-28	24.0	Dozer \$1,680 Backhoe \$720	1 Supervisor \$672 1 Operator \$654	\$35	\$3,761
Main Access Road to TMTN-16 and TMTN-17	48.6	Backhoe \$1,458	1 Supervisor \$1,361 1 Operator \$1,323	\$30	\$4,172
Access Road to TMTN-16	82.6	Backhoe \$2,478	1 Supervisor \$2,313 1 Operator \$2,249	\$30	\$7,070
Access Road to TMTN-17	84.6	Backhoe \$2,538	1 Supervisor \$2,369 1 Operator \$2,304	\$30	\$7,241
Access Road to TMTN-18	1.1	Backhoe \$33	1 Supervisor \$31 1 Operator \$30	\$30	\$124

Access Road to TMTN-19	40.3	Backhoe \$1,209	1 Supervisor \$1,128 1 Operator \$1,097	\$30	\$3,464
Access Road to TMTN-20	18.5	Backhoe \$555	1 Supervisor \$518 1 Operator \$504	\$30	\$1,607
Access Road to TMTN-21	24.8	Backhoe \$744	1 Supervisor \$694 1 Operator \$675	\$30	\$2,143
*Access Road to TMTN-22 (1st Route)	37.2	Backhoe \$1,116	1 Supervisor \$1,042 1 Operator \$1,013	\$30	\$3,171
(2nd Route)	29.2	Backhoe \$876	1 Supervisor \$818 1 Operator \$ 795	\$30	\$2,519
Access Road to TMTN-23	1.2	Backhoe \$36	1 Supervisor \$34 1 Operator \$33	\$30	\$133
Access Road to TMTN-24	17.6	Backhoe \$528	1 Supervisor \$493 1 Operator \$479	\$30	\$1,530
Access Road to TMTN-25	33.5	Backhoe \$1,005	1 Supervisor \$938 1 Operator \$912	\$30	\$2,885
Access Road to TMTN-26	13.4	Backhoe \$402	1 Supervisor \$375 1 Operator \$365	\$30	\$1,172
Access Road to TMTN-27	50.1	Backhoe \$1,503	1 Supervisor \$1,403 1 Operator \$1,364	\$30	\$4,300
Access Road to TMTN-28	13.8	Backhoe \$414	1 Supervisor \$386 1 Operator \$376	\$30	\$1,206
Drill Hole Abandonment and Sealing	104	**Drill Rig Standby Time \$175	**	\$32,609	\$50,809
<b>TOTAL</b>	<b>808.5</b>	<b>\$64,295</b>	<b>\$44,660</b>	<b>\$33,484</b>	<b>\$142,439</b>

\*Assumed Route 1 in Total, since this would be the worst case scenario.  
\*\* Labor is included in machine cost.

**1994 TRAIL MOUNTAIN DRILLING PROGRAM  
WATER FOR DRILLING - WATER RIGHTS**

1. **Estimate of water used for drilling, road maintenance, etc.**

**Approximate 445,714 gallons of water will be needed for the total project.**

**TOTAL PROJECT = 445,714 GALLONS OR 1.37 ACRE FEET**

2. **Source of water for drilling and associated water rights.**

**Water will be obtained from the following sources:**

**A pond located in NE $\frac{1}{4}$  NE $\frac{1}{4}$  of Section 28, Township 17 S, Range 6 E, identified as 28-1P.**

**A spring located in the NE $\frac{1}{4}$  NW $\frac{1}{4}$  of Section 2, Township 18 S, Range 6 E, identified as 18-2-1.**



State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF WATER RIGHTS

Michael G. Leavitt  
Governor

Ted Stewart  
Executive Director

Robert L. Morgan  
State Engineer

Southeastern Area  
489 South Carbon Avenue  
P.O. Box 718  
Price, Utah 84501-0718  
801-637-1309

August 1, 1994

Cottonwood Creek Consolidated Irrigation Company  
P.O. Box 856  
Castle Dale, Utah 84513

Utah Power  
1407 West North Temple Suite 270  
Salt Lake City, Utah 84140

Re: Temporary Change Application Number t18228 (93-Area)  
Expiration Date: October 31, 1994

Dear Applicants:

The above referenced Temporary Change Application is hereby approved. A copy is enclosed for your information and records.

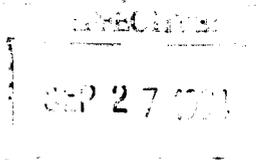
If you have any questions, please feel free to contact me.

Sincerely,

Mark P. Page  
Regional Engineer

pc: Clyde Magnuson, Commissioner

Enclosure  
MPP/mjk



# APPLICATION FOR TEMPORARY CHANGE OF WATER

## STATE OF UTAH

Rec. by \_\_\_\_\_  
Fee Paid \$ \_\_\_\_\_  
Receipt # \_\_\_\_\_  
Microfilmed \_\_\_\_\_  
Roll # \_\_\_\_\_

For the purpose of obtaining permission to make a temporary change of water in the State of Utah, application is hereby made to the State Engineer, based upon the following showing of facts, submitted in accordance with the requirements of Section 73-3-3 Utah Code Annotated 1953, as amended.

\*WATER RIGHT NO. \_\_\_\_\_ \*APPLICATION NO. t \_\_\_\_\_

Changes are proposed in (check those applicable)

\_\_\_\_\_ point of diversion.  place of use.  nature of use. \_\_\_\_\_ period of use.

### 1. OWNER INFORMATION

Name: Cottonwood Creek Consolidated Irrig. Co. and Utah Power \*Interest: 100 %

Address: Utah Power - 1407 West North Temple, Suite 270

City: Salt Lake City State: Utah Zip Code: 84140

2. \*PRIORITY OF CHANGE: \_\_\_\_\_ \*FILING DATE: \_\_\_\_\_

\*Is this change amendatory? (Yes/No): \_\_\_\_\_

3. RIGHT EVIDENCED BY: Stock ownership in Cottonwood Creek Consolidated Irrig. Co.,  
Cert. #781 for 2.41 shares (93-2175)

Prior Approved Temporary Change Applications for this right: 93-93-01

\*\*\*\*\* HERETOFORE \*\*\*\*\*

4. QUANTITY OF WATER: \_\_\_\_\_ cfs and/or 2.41 ac-ft.

5. SOURCE: Cottonwood Creek

6. COUNTY: Emery

7. POINT(S) OF DIVERSION: S. 300 ft. and E. 500 ft. from the NW Cor. Sec. 24,  
T. 18S. R 7E. S18&M.

Description of Diverting Works: Concrete diversion dam, intake structure, pumps and pipeline

### 8. POINT(S) OF REDIVERSION

The water has been rediverted from \_\_\_\_\_ at a point: \_\_\_\_\_

Description of Diverting Works: \_\_\_\_\_

SEP 27 1993

### 9. POINT(S) OF RETURN

The amount of water consumed is \_\_\_\_\_ cfs or 2.41 ac-ft.

The amount of water returned is \_\_\_\_\_ cfs or \_\_\_\_\_ ac-ft.

The water has been returned to the natural stream/source at a point(s): \_\_\_\_\_

\*These items are to be completed by the Division of Water Rights.

20. NATURE AND PERIOD OF USE

Irrigation: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Stockwatering: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Domestic: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Municipal: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Mining: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Power: From \_\_\_/\_\_\_/\_\_\_ to \_\_\_/\_\_\_/\_\_\_
Other: From 7/1/93 to 10/31/93

21. PURPOSE AND EXTENT OF USE

Irrigation: \_\_\_\_\_ acres. Sole supply of \_\_\_\_\_ acres.
Stockwatering (number and kind): \_\_\_\_\_
Domestic: \_\_\_\_\_ Families and/or \_\_\_\_\_ Persons.
Municipal (name): \_\_\_\_\_
Mining: \_\_\_\_\_ Mining District at the \_\_\_\_\_ Mine.
Ores mined: \_\_\_\_\_
Power: Plant name: \_\_\_\_\_ Type: \_\_\_\_\_ Capacity: \_\_\_\_\_
Other (describe): Exploratory Drilling on Trail Mountain

22. PLACE OF USE

Legal description of place of use by 40 acre tract(s): See Attachment

23. STORAGE

Reservoir Name: \_\_\_\_\_ Storage Period: from \_\_\_\_\_ to \_\_\_\_\_
Capacity: \_\_\_\_\_ ac-ft. Inundated Area: \_\_\_\_\_ acres.
Height of dam: \_\_\_\_\_ feet.
Legal description of inundated area by 40 tract(s): \_\_\_\_\_

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SEP 27 1993

24. EXPLANATORY

The following is set forth to define more clearly the full purpose of this application. Include any supplemental water rights used for the same purpose. (Use additional pages of same size if necessary):
PacifiCorp's Energy West will be conducting exploratory drilling on Trail Mountain. The drilling will require 60,000 gallons to complete the project.

\*\*\*\*\*

The undersigned hereby acknowledges that even though he/she/they may have been assisted in the preparation of the above-numbered application through the courtesy of the employees of the Division of Water Rights, all responsibility for the accuracy of the information contained herein, at the time of filing, rests with the applicant(s).

Morgan Moor
Signature of Applicant(s)

**Pacificorp will prepare bonding for the 1994 Drilling Project upon DOGM review and approval.**

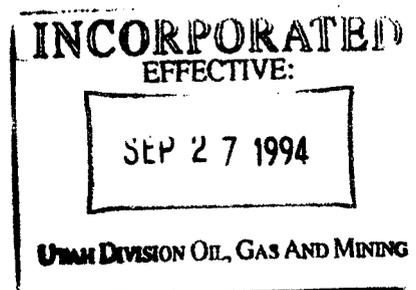
**This information will be submitted upon DOGM review and approval of the proposed bond.**

**Pacificorp will post an advertisement in the local paper upon DOGM review and approval.**

**The affidavit of publication will be provided after approval and publication.**

**SOIL SURVEY REPORT**  
**TRAIL MOUNTAIN**  
**DRILL SITES: TMTN 16-28**

**1994**



Prepared by

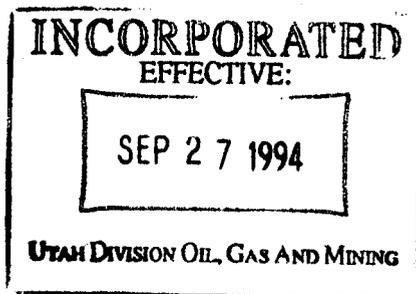
*MT. NEBO SCIENTIFIC, INC.*  
330 East 400 South, Ste. 6  
P.O. Box 337  
Springville, Utah 84663  
(801) 489-6937

for

*PACIFICORP/ENERGY WEST*  
P.O. Box 1005  
Huntington, Utah 84528

by

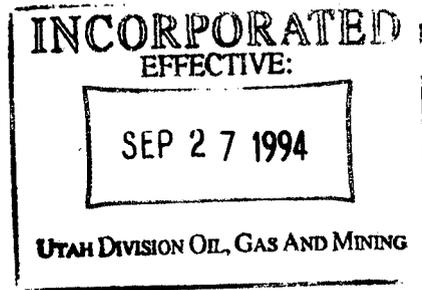
James H. Nyenhuis  
Cert. Professional Soil Scientist, ARCPACS 2753  
1427 Wildwood Road  
Fort Collins, CO 80521



Report: March 31, 1994

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**SOIL SURVEY REPORT**  
**TRAIL MOUNTAIN**  
**DRILL SITES: TMTN 16-28**

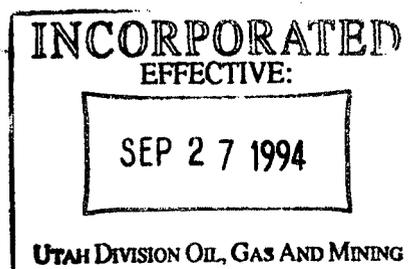
1994

**INTRODUCTION**

This report is prepared subsequent to a field study performed to characterize the soil resources and determine the potential soil salvage depths of the proposed 1994 Trail Mountain Exploratory Drilling areas. Thirteen drill-hole pad areas and access road corridors (numbered TMTN 16 through 28) were inventoried.

The project site is located in the southern portion of the top of Trail Mountain (in Sections 27, 34, and 35 of T17S, R6E; and Sections 1 and 2 of T18S, R6E), above and to the west of the PacifiCorp Trail Mountain underground coal mine near Huntington, Utah. The Trail Mountain Mine is approximately 15 miles west-northwest of Huntington, in Cottonwood Canyon of the Wasatch Plateau (part of the High Plateaus section of the Colorado Plateau).

**OBJECTIVES**



The basic objectives of the field investigation were to map and describe the soils of the study areas in sufficient detail to

characterize their physical and chemical properties and depths to which they may be salvaged as a source of topsoil for reclamation purposes. Thus, the site-specific characteristics of the soil that may influence soil salvage, stockpiling, and redistribution were inventoried. A detailed soil survey, including mapping, description, suitability evaluation, and report preparation was needed to generate the required information. Based on discussion with the State of Utah Department of Natural Resources Division of Oil, Gas and Mining (UDOGM), soil sampling for laboratory analysis was not necessary for this project.

The general objectives relating to the soil survey are as follows:

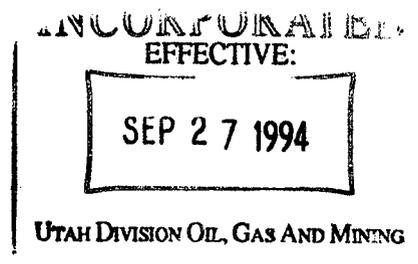
Satisfy the soils data requirements of the Manti-LaSal National Forest Special Stipulations for the 1994 Trail Mountain Exploratory Drilling;

Satisfy the soils requirements of UDOGM as found in UDOGM Guidelines for Management of Topsoil and Overburden for Underground and Surface Mining (Leatherwood and Duce, 1988);

Collect and review all existing soils, geologic, climatic, hydrologic, and vegetation information to gain a basic understanding of the soils and related disciplines on site prior to initiation of field work;

Describe, evaluate, and report site-specific soils data;

Prepare a soils report, including recommended soil salvage depths, to aid in the completion of the reclamation planning documents needed for final permit application approval.

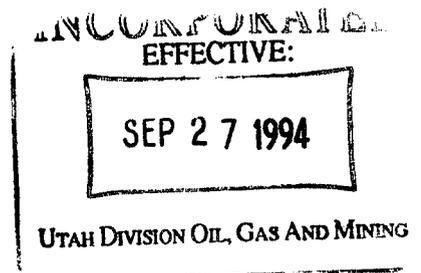


## METHODS - SCOPE OF WORK

### Existing Data Review and Evaluation

All existing soils and related discipline information for the general study area was compiled and reviewed prior to initiation of the soils field work. This review included: (1) unpublished Manti-LaSal National Forest (FS) soils information for Trail Mountain, a part of the uncompleted FS, Manti Division, soil survey (Manti-LaSal NF, 1993), and (2) the existing Order 2 soil survey information for the Battlegrounds Watershed Improvement Plan (Manti-LaSal NF, 1985) which includes the study area. The Soil Conservation Service (SCS) Soil Survey of Carbon Area, Utah (Jensen and Borchert, 1988) does not include the study area, although it includes information (soil series descriptions, soil interpretations for range and engineering concerns, and some laboratory data) for many soils the FS has mapped on Trail Mountain.

Project maps and air photos were also reviewed to become familiar with the study area and locate dominant topographic features as well as probable access routes to and from the acreage to be characterized.

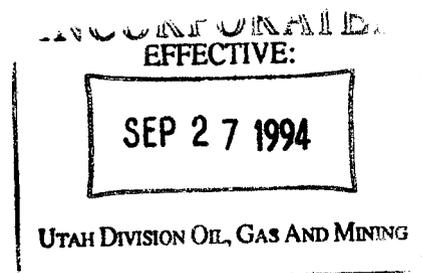


It should be noted that all methods for soil survey work performed as part of this project are standard methods for detailed Order 1 soil surveys. All procedures and methods were in accordance with current SCS, FS, and State of Utah reclamation-related soil survey methods for coal mining and related projects. Furthermore, all technical specifications were in accordance with current standards and procedures of the USDA-SCS National Cooperative Soil Survey Program.

### Soil Mapping

Mr. James Nyenhuis, a certified professional soil scientist/soil classifier (ARCPACS 2753), mapped soils at the Order 1 level of intensity for all of the 13 proposed drill-hole pads and access roads during October, 1993. The drill-hole pad areas were each approximately 1 acre in size, including topsoil storage piles, and the access roads were approximately 15' (12' wide and 3' berm) in width and of variable length.

The mapping was done utilizing: (1) a 7.5 minute topographic quadrangle map (Mahogany Point, 1979) on which the FS soils mapping had been overlain, (2) a 1"=1000' scale PacifiCorp topographic base map on which the drill-hole pads and access roads had been located, and (3) several 9"x 9" color air photo



prints, dated 10-31-89, also on which the drill pads and access roads had been located.

The purpose of the survey was to provide PacifiCorp with a detailed soils inventory of the study area that can be used for determination of suitable and unsuitable soil characteristics, as well as subsequent determination of soil salvageability. Therefore, site-specific characteristics of the soils that may influence soil suitability, salvage, stockpiling, and redistribution were emphasized.

All standards and procedures for soil mapping and profile description were in accordance with current SCS methods, as described in the recently revised Soil Survey Manual (Soil Survey Staff, 1992a); National Soils Handbook, as currently amended (Soil Survey Staff, 1992b); and Keys to Soil Taxonomy, fifth edition (Soil Survey Staff, 1992c), and applicable UDOGM topsoil and overburden guidelines (Leatherwood and Duce, 1988).

Criteria to establish suitability of soil (topsoil) or soil substitute material were those contained in the UDOGM table "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining" (Leatherwood and Duce, 1988). This information is presented as Table 1 for this report.

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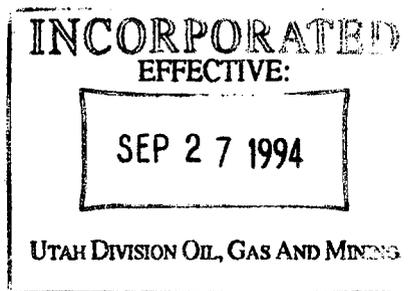
Upon initiation of soils field work, each soil type was located on the ground. Within each drill-hole pad and access road corridor, traverses were walked to determine overall soil characteristics. Several soil auger holes were dug and examined in visually representative locations. Several artificial-cut exposures that exist throughout the study area were also observed. Based on these preliminary observations, a representative site (typical pedon) was selected within each area for detailed soil pedon description and evaluation.

#### Soil Profile Description

Each typical soil pedon was described according to current methods and standards of the National Cooperative Soil Survey. Descriptions were completed to a variable depth depending largely on rock fragment content of the substratum and/or depth to shallow sandstone or shale bedrock if encountered. The following parameters were described, by horizon, for each soil pedon description: horizon symbol, depth, and boundary; color; texture; structure; consistence; coarse fragment content; and the amount, size, and depth of major roots. In addition, general site information was recorded at each sampling site including existing dominant vegetation, physiography-landform, slope, aspect, erosion condition, drainage class, and depth to saturated zone or ground water if encountered.

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As stated in the objectives, soil sampling for laboratory analysis was not performed as part of this project. Discussion with Mr. Henry Sauer, UDOGM soil scientist, prior to initiation of field work indicated soil sampling for laboratory analysis, although a required part of UDOGM Guideline 2, was not necessary for this project because of the type (exploratory drilling not mining) and length



**TABLE 1**  
**SOIL SUITABILITY CRITERIA**

UDOGM: Overburden Evaluation for Vegetative Root Zone\*

Parameters	Good	Fair	Poor	Unacceptable
pH	6.1-8.2	5.1 to 6.1 8.2 to 8.4	4.5 to 5.0 8.5 to 9.0	less than 4.5 greater than 9.0
Ec mmhos/cm 25°C	0 to 2	2 to 8	8 to 15	greater than 15
Saturation %	25%-80%		less than 25% greater than 80%	
Texture	sl, l, sil, scl, vsl, fsl	c, sicl, sc, ls, lfs	sic, s, sc, c, cos, fs, vfs	g, vcos
SAR	0-4	5-10	10-12 Fine Texture 10-15 Coarse Texture	12 Fine Texture 15 Coarse Texture
Selenium	less than 0.1 mg/Kg			greater than 0.1 mg/Kg
Boron	less than 5.0 mg/Kg			greater than 5.0 mg/Kg
Acid/Base Potential	<u>greater than -5 tons CaCO<sub>3</sub></u> 1,000 tons material			<u>less than -5 tons CaCO<sub>3</sub></u> 1,000 tons material
% Coal fines	Undetermined at this time			
Available water capacity (in/in)	greater than 0.10	0.05-0.10	less than 0.05	
Rock Fragments (% volumes)				
3 inches	0-15	15-25	25-30	greater than 30
3-10 inches	0-15	15-25	25-30	greater than 30
10 inches	0-3	3-7	7-10	greater than 10

Many native species have their roots in soils that are determined unsuitable by these values. Occasionally soil materials rated good by these standards have poor vegetation success. Therefore, plant growth trails may be required where reestablishment of native species is desirable.

UTAH DIVISION OF OIL, GAS AND MINES

SEP 27 1994

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of disturbance (less than one month) (Sauer, 1993). Each dominant soil type at each drill-hole area and access road corridor was fully described at a typical location a minimum of one time each.

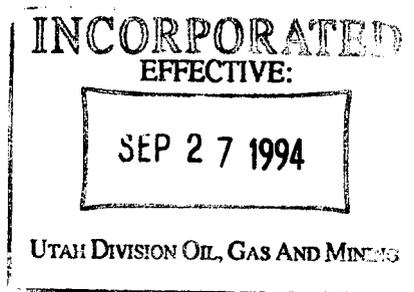
### Data Evaluation and Report Preparation

All field data has been analyzed and evaluated using standard soil suitability, interpretation, and classification criteria. Soils were classified according to current Soil Taxonomy criteria as stated in fifth edition of Keys to Soil Taxonomy (Soil Survey Staff, 1992c), and correlated to FS and SCS soil series as appropriate.

Correlation of site-specific soils with SCS soil series names allows use of established SCS soil interpretation values such as hydrologic group number (for runoff evaluation), "K" factors (for use in water erosion hazard evaluations), and "WEG" group number (wind erodibility group status for wind erosion hazard evaluation) for the site-specific soils. In addition, one may quantitatively determine the "K" factor ~~and~~ <sup>INCORPORATED</sup> ~~from use of~~ <sup>EFFECTIVE:</sup> the field data and appropriate nomographs.

All soils have been evaluated relative to topsoil suitability criteria contained in the UDOGM ~~guideline~~ <sup>UTAH DIVISION OIL, GAS AND MINING</sup> "Overburden

Evaluation for Vegetative Root Zone" (Leatherwood and Duce, 1988) presented as Table 1 of this report and deemed appropriate for this project. All unsuitable soil horizons or whole soils have been listed and the limitations described.

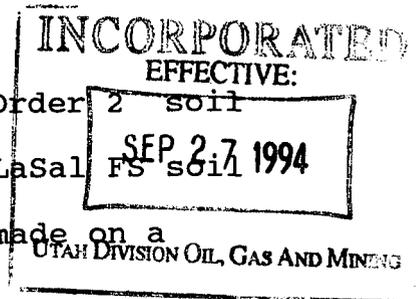


## RESULTS AND DISCUSSION

### Existing Data Review and Evaluation

The 1994 Trail Mountain Drilling project will occur in an area of Trail Mountain which has been altered as a result of the Battlegrounds Watershed Improvement Project. This watershed project was initiated by the Ferron Ranger District, of the Manti-LaSal NF, in 1985. The objective of this project is "to stabilize sediment source areas and protect the watershed lands from erosion and runoff resulting from intense summer thunderstorms and maintain the productive capacity of the soil" (Manti-LaSal NF, 1985). Flash floods carrying considerable sediment have been witnessed originating from this area. The Battleground area drains south into Straight Canyon one and one-half miles above Cottonwood Canyon. To maintain and improve soil productivity, the plan set as its goal a reduction of annual erosion losses to within the soil loss tolerance (T-values) of the soils, less than 3 tons per acre per year. Forms of treatment in the project area include contour furrows, contour trenches, protection fences, gully swaling, and gully plugs.

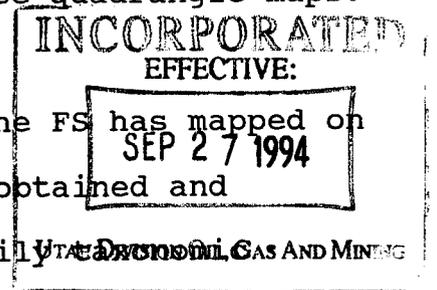
As part of the Battlegrounds project, an Order 2 soil survey was conducted by Mr. Dan Larsen, Manti-LaSal scientist in Price, in 1985. A soils map was made on a



1"=15,840' scale aerial photograph dated 1976. Ten map units were delineated in a detailed manner on the photograph. The map unit taxons were soil subgroups described to the family level. All map units were complexes with two or three soil taxons in each unit. Soils were briefly described and no samples were taken or analyzed in a soils laboratory. It appears that this survey was done very well, although soils were not correlated to the soil series level, samples were not taken, and the soil map was not transferred to a topographic base.

The Manti-LaSal NF has done additional work in the study area as part of the Manti-LaSal, Manti Division, soil survey. The 1985 soil mapping was reviewed and slightly revised to be consistent with the overall map unit legend and associated mapping of the current Manti survey (Larsen, 1993). This survey, which is in progress at the present time, correlates soils to the "soil series family" level of classification which is more detailed than that for the Battlegrounds survey. The Manti survey has very detailed map unit descriptions and Dan Larsen is currently revising and completing Manti-specific soil series family taxonomic descriptions. In addition, all soil mapping has been transferred to 7.5 minute, topographic base quadrangle maps.

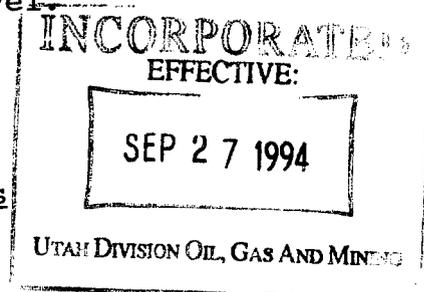
All mapping unit descriptions for soils the FS has mapped on the Trail Mountain PacificCorp study area were obtained and reviewed as well as the recent soil series family taxonomic descriptions.



descriptions. In addition, Dan Larsen provided Jim Nyenhuis with a Mahogany Point 7.5 minute topo quad on which he had put the soil mapping unit delineations and symbols for the study area. Comparing the 1985 Battlegrounds survey information with the current FS Manti survey, it appears the 1985 mapping was slightly more detailed perhaps because it was on an air photo base as well as conducted at the Order 2 level versus the Order 3 level for the Manti survey. However, the Manti survey is more detailed in its correlation of soils to the soil series family level and in information provided in the map unit descriptions.

It is the intent of the current PacifiCorp survey to build on a base of the best parts of the two previous surveys (the more detailed soils descriptive information from the Manti survey and the more detailed soil mapping of the Battlegrounds survey) and provide: (1) detailed Order 1 soil mapping of the thirteen proposed drill hole areas and access road corridors, and (2) site-specific soil profile descriptions and classification, and correlation to the soil series family level.

Soil Survey Map and Map Unit Descriptions

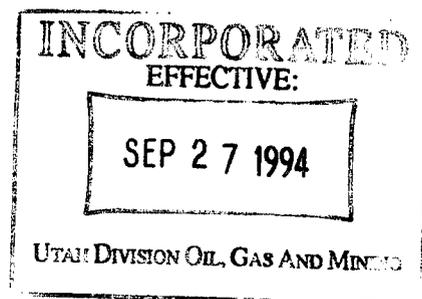


Given the Order 1 (most detailed) level of soil mapping for this project and the small size of each drill area (about one acre), only one dominant soil was present at each site. In

addition, only the drill-hole areas and associated access road corridors were to be mapped and characterized as part of the PacifiCorp survey. A soils map is not strictly necessary in this situation where the scale of the base map is not sufficient to delineate soil consociations (one soil type per map unit) for small one-acre areas, and all of the soils information for each drill area can be presented in text and table format.

It is important, however, to provide a soils map at a less detailed level of intensity for the overall project area. A soils map has been prepared at a scale of 1"=1000', based on the Manti survey mapping, and is attached to this report. The legend on the map includes all map unit symbols and names. Also included on the map are the proposed 1994 drill hole areas and access road corridors.

The Manti survey map unit descriptions have been referenced without change although the map unit delineations on the map have been slightly revised based on the field work experience of the PacifiCorp survey. The seven Manti survey map unit descriptions that encompass the Trail Mountain study area are included as Appendix C.

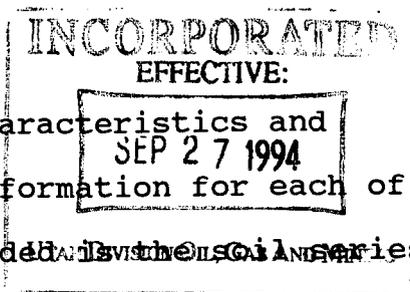


## Soil Profile Descriptions

Thirteen soil profiles (numbered TMTN 16 through 28) were described at representative locations within the study area, one for each of the drill hole/access road areas. All of the original field soil profile descriptions, classified and correlated to the soil series family level, are included in numerical order as Appendix A of this report. For comparison, official soil series descriptions, completed by Dan Larsen in July 1993 for Clayburn, Rabbitex, and Trag, and by the SCS in January 1983 for Frandsen and January 1980 for Reva, are provided as Appendix D.

Soil landscape photographs, presented as color laser copies, are included as Appendix B. These soil landscape photographs were taken at each of the proposed drill-hole areas and include the surveyor's lath for each site and the soil shovel in the pictures.

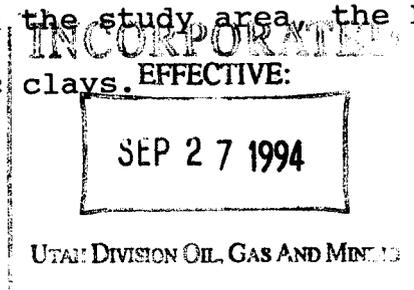
Table 2, Trail Mountain Soil Characteristics and Interpretations, summarizes soils information for each of the drill-hole/access road areas. Included in the soil series name for each drill-hole area, texture of the surface and upper subsoil horizons, recommended soil salvage depths for both drill pad and access road, the applicable FS map unit number, the wind and water erosion hazard rating, and a general, qualitative



reclamation suitability rating with limiting factors as appropriate.

The current erosion status of the proposed drill-hole areas, as stated on the field soil profile description forms (TMTN 16 through 28) is based on a qualitative judgement of the condition of the land today. A statement of potential wind and water erosion hazard, based on soil texture of the surface layers, wind erodibility group class, and "K" factors, is included in Table 2. Any quantitative soil erosion loss potentials should be based on estimates provided in the FS Battleground Watershed Improvement Plan, and included in the PacifiCorp 1994 Trail Mountain Exploration Drilling Soil Stripping and Stockpiling Plan.

All of the soil profile descriptions were located within the North Horn geologic formation with the exception of TMTN 26 which is situated within the Price River formation. The North Horn is a mixture of lithologies in the study area, containing freshwater limestone, bentonitic clays, siltstone, and sandstone. The Price River is dominantly sandstone but in places the upper part of the formation contains some shale. In the study area, the Price River also contains some bentonitic clays.



Soil Suitability and Recommended Soil Salvage Depths

A reclamation potential suitability evaluation of each described soil profile (TMTN 16 through 28) was performed based on comparison with criteria and threshold values contained in the UDOGM table "Overburden Evaluation for Vegetative Root Zone" (Leatherwood and Duce, 1988). A copy of the UDOGM table is included as Table 1 in this report. The evaluation depended largely on information obtained during the field survey given that site-specific soils laboratory data was not necessary for this project. Because of the detailed Order 1 level of soil survey, the suitability evaluation of the typical soil profiles represents the suitability of the associated drill-hole areas and access road corridors.

The soil disturbance associated with exploratory drilling is generally surficial in nature. The blading of access roads and grading of drill pads only involves the surface few feet. As a result, the recommended soil salvage depth (RSD) is limited to the surface and upper subsoil horizons because the lower soil material generally would not be affected and need not be salvaged.

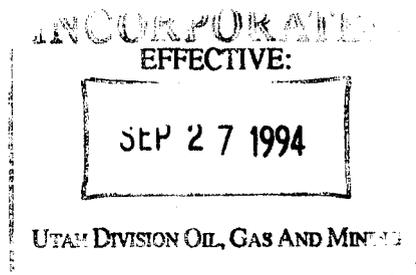


Table 2

Trail Mountain Soil Characteristics and Interpretations

Drill Hole Number <sup>1</sup>	Soil Series <sup>2</sup>	Texture of Salvaged Soil <sup>3</sup>	Recommended Soil Salvage Depth (In.) <sup>4</sup>		FS Map Unit <sup>6</sup>	Erosion Hazard		Reclamation Suitability
			Drill Pad	Access Road		Wind <sup>11</sup>	Water <sup>12</sup>	
16	Clayburn	Loam/Clay Loam	17	17	411	High	Moderate	Good
17	Clayburn	Loam/Clay Loam	17	17	411	High	Moderate	Good
18	Rabbitex	Loam/Clay Loam	16	16	24	High	Moderate	Good
19	Frandsen	Gravelly Loam/Loam	12	12	25	Moderate	Moderate	Good
20	Reva	Cobbly Loam	10	12	24	Moderate	Moderate	Poor (45% Coarse Fragments)
21	Reva	Cobbly Sandy Loam/ Cobbly Silty Clay Loam	8	8	23 <sup>9</sup>	Moderate	Low	Poor (38% Coarse Fragments; SiCL texture 2-8")
22	Trag Variant	Gravelly Sandy Loam/ Loam	15	15 <sup>5</sup>	23 <sup>9</sup>	Moderate	Low	Good
23	Frandsen	Gravelly Silt Loam/ Loam	14	14	24 <sup>10</sup>	Moderate	Moderate	Good
24	Rabbitex	Gravelly Silt Loam/ Gravelly Clay Loam	13	13	24	Moderate	Moderate	Fair (27% Coarse Fragments)
25	Rabbitex	Loam/Loam	18	18 <sup>6</sup>	24	High	Moderate	Good
26	Rabbitex	Loam/Loam	18	18	24	High	Moderate	Good
27	Frandsen	Silt Loam/Loam	12	12	24 <sup>10</sup>	High	High	Good
28	Reva	Gravelly Sandy Loam/ Gravelly Loam	8	8 <sup>7</sup>	23 <sup>9</sup>	Moderate	Low	Poor (36% Coarse Fragments)

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UTAH DIVISION OF OIL, GAS AND MINERALS

SEP 27 1994

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Table 2 (Continued)

Footnotes:

- <sup>1</sup> TMTN (Trail Mountain). These drill pad and access road locations are found on the Soils Map attached to this report.
- <sup>2</sup> Soil Series names are taken from the Manti La Sal FS soil survey. Soil taxonomic classifications are listed below and include soil depth and date of most recent SCS/FS soil series description. Site specific Trail Mountain soil profile descriptions completed as part of this PacifiCorp soil survey are included in Appendix A.  
  
Clayburn (TMTN 16, 17); Fine-loamy, mixed Argic Pachic Cryoboroll (deep); SCS 3/77, FS 7/93  
Frandsen (TMTN 19, 23, 27); Fine-loamy, mixed, frigid Calcic Ustochrept (moderately deep); SCS 1/83  
Rabbitex (TMTN 18, 24, 25, 26); Fine-loamy, mixed Typic Calciboroll (deep); FS 7/93  
Reva (TMTN 20, 21, 28); Loamy-Skeletal, mixed (calcareous), frigid Lithic Ustorthent (shallow); SCS 1/80  
Trag Variant (TMTN 22); Fine-loamy, mixed Typic Argiboroll (moderate deep); FS 7/93 - description is for Trag
- <sup>3</sup> This is the texture, including coarse fragment modifier, of the recommended salvaged portion of the soil profile, i.e., the surface layer (A horizon) and upper layer of the subsoil (upper B horizon). Complete soil descriptions are found in Appendix A, Soil Profile Descriptions. Gravelly or cobbly modifiers indicate 15 to 35% coarse fragments (% by volume).
- <sup>4</sup> Recommended soil salvage depth is based on site-specific data taken at each drill pad and access road site.
- <sup>5</sup> Recommended soil salvage is 6" along the first 150' of road option from main road to the north. Road option to east from TMTN 22 is less preferred due to large drainage gully adjacent to drill pad site.
- <sup>6</sup> Recommended soil salvage depth is 16" along the first 160' of access road.
- <sup>7</sup> Recommended soil salvage depth is 8" except a few small spots (15% of area) have only 2 to 4 inches, and an additional 5% of the area has no soil to salvage due to an extremely flaggy surface (large, flat sandstone boulders).
- <sup>8</sup> Forest Service soils map unit in which the drill pad is located. Map Unit numbers taken from current, unpublished soils information on file with Mr. Dan Larsen, FS soil scientist, Price Utah. See Appendix C for FS Map Unit descriptions.
- <sup>9</sup> Reva and Trag Variant are inclusions in FS map unit 23. They would be grouped with the 10% inclusions of rock outcrop and other finer textured soils as described in Map Unit 23.
- <sup>10</sup> Frandsen in an inclusion in FS Map Unit 24. Although not listed as an inclusion the FS Map Unit 24 description, it is present based on the site-specific PacifiCorp survey.
- <sup>11</sup> Wind Hazard Ratings classes are defined in the SCS National Soils Handbook, July 1983.
- <sup>12</sup> Water Hazard Ratings taken from "texture-K factor relationship information," SCS-Wyoming state Office, Casper Wyoming. February 1983.
- <sup>13</sup> Reclamation suitability evaluation (good, fair, poor, unacceptable) taken from UDOGM Soil Suitability Criteria Table (Leatherwood and Luce, 1988). Limiting factors are listed for those soils having fair or poor evaluations.

19

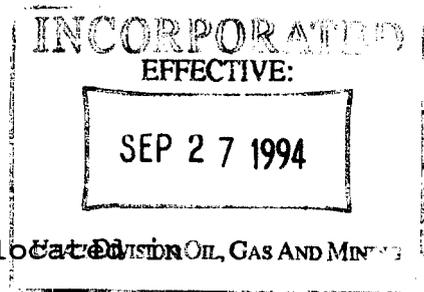
U.S. DIVISION OF FORESTS AND WILDLIFE  
RECORDS SECTION  
SEP 27 1994  
EFFECTIVE: 11:00 AM

Based on available FS soil descriptions and PacifiCorp field data, there appear to be no limiting chemical soil parameters such as pH, electrical conductivity (EC), sodium adsorption ratio (SAR), boron or selenium. Soil textures of the surface and upper subsoil layers are loam, silt loam, sandy loam, and clay loam with variable coarse fragment content (ranging from 0 to 45%). Most reclamation suitability evaluations are good (9 drill hole areas) with one fair (TMTN-24) due to about 27% coarse fragments, and three poor (TMTN-20, 21, and 28) due to 36 to 45% coarse fragments.

The following is a brief discussion of the soils, vegetation, and reclamation suitability on each of the proposed 1994 Trail Mountain exploratory drilling areas. A complete description of drill pads and access roads is contained in the PacifiCorp 1994 Trail Mountain Exploration Drilling Soil Stripping and Stockpiling Plan. The Plan also includes soil salvage volume estimates.

*TMTN 16 and 17 - Clayburn*

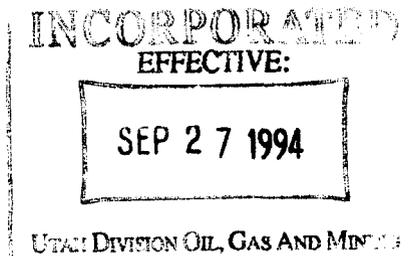
The drill pads and access roads are located in the sagebrush/grass/serviceberry (TMTN-16) and sagebrush/grass/serviceberry/snowberry (TMTN-17) plant communities on relatively level to sloping (2 to 12%) terrain. These drill holes will require reopening about 2000' of road from



TM-7, all of which is off the permitted area. In addition, TMTN-16 will require opening about 1850' of new road off the main, reopened access road (all of which is off the permitted area), and about 1550' of new road and drill pad all of which is on the permitted area. Likewise, drill hole TMTN-17 will require reopening about 400' of road off the main, reopened access road (all of which is off the permitted area), reopening about 1450' of road (all of which is on the permitted area), and about 1630' of new road and drill pad (all of which is on the permitted area).

The Clayburn soil has a RSD of 17 inches for both the drill pads and access roads. Soil textures are loam (surface layer) over clay loam (upper subsoil horizon). Reclamation suitability is good with no limiting parameters.

*TMTN 18 - Rabbitex*



Drill hole TMTN-18 is located in a ~~sagebrush/~~ grass/serviceberry plant community and will require pad construction and opening about 47' of new road off an existing road all of which is on the permitted area. Slopes are nearly level to gently sloping (1 to 6%). The Rabbitex soil has a RSD of 16 inches for both the drill pad and access road. Soil textures are loam (surface layer) over clay loam (upper subsoil horizon). Reclamation suitability is good with no limiting parameters.

TMTN 19 - Frandsen

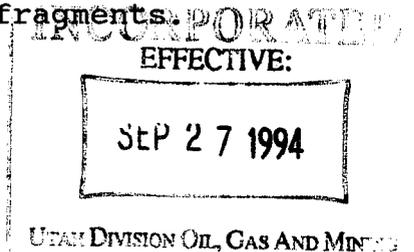
Drill hole TMTN-19 is located in a pinyon-juniper/sagebrush/grass plant community and will require pad construction and opening about 1660' of new road off an existing road all of which is on the permitted area. The Frandsen soil has a RSD of 12 inches for both the drill pad and access road. Soil textures are gravelly loam (surface layer) over loam (upper subsoil horizon). Reclamation suitability is good.

TMTN 20 - Reva

Drill hole TMTN-20 is located in a sagebrush/grass plant community and will require pad construction and opening about 760' of new road off the 1993 drill access road all of which is on the permitted area. The Reva soil has a RSD of 10 inches on the drill pad and 12 inches on the access road. Soil textures are cobbly loam. Reclamation suitability is poor due to the presence of about 45% coarse (rock) fragments.

TMTN 21 - Reva

Drill hole TMTN-21 is located in a ~~pinyon-juniper~~ plant community and will require pad construction and opening of about 1020' of new road off the 1993 TMTN-10 drill pad all of which is on the permitted area. The Reva soil has a RSD of 8 inches for



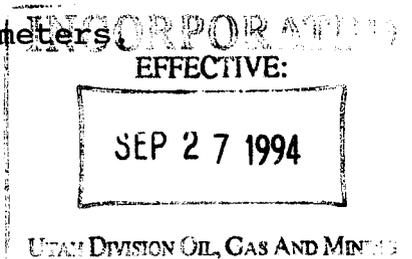
both the drill pad and access road. Soil textures are cobbly sandy loam for the surface layer over cobbly silty clay loam for the subsoil horizon. Reclamation is poor due to the presence of about 38% coarse (rock) fragments.

*TMTN 22 - Trag Variant*

Drill hole TMTN-22 is located in a pinyon-juniper/sagebrush/grass plant community and two routes have been investigated for accessing the drill pad area. The first route would require pad construction and opening about 1530' of new road off the 1993 drill access road above the TMTN-23 proposed location, all of which is on the permitted area. The second route would require pad construction and opening about 1200' of new road off the 1993 drill access road below TMX-8, all of which is on the permitted area. The Trag Variant soil has a RSD of 15 inches for both the drill pad and access road options except 6 inches along the first 150' of the first road option. Soil textures are gravelly sandy loam over loam. Reclamation suitability is good with no limiting parameters.

*TMTN 23 - Frandsen*

Drill hole TMTN-23 is located in a sagebrush/grass plant community and will require pad construction and opening of about 50' of new road off the 1993 drill access road, all of which is



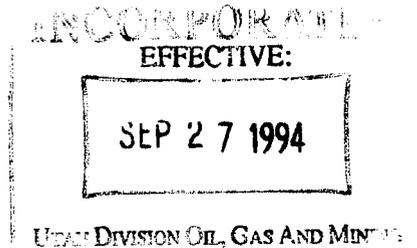
on the permitted area. The Frandsen soil has a RSD of 14 inches for both the drill pad and access road. Soil textures are gravelly silt loam over loam. Reclamation suitability is good with no limiting parameters.

*TMTN 24 - Rabbitex*

Drill hole TMTN-24 is located in a sagebrush/grass/serviceberry plant community and will require pad construction and opening about 725' of new access road off an existing road all of which is on the permitted area. The Rabbitex soil has a RSD of 13 inches for both the drill pad and access road. Soil textures are gravelly silt loam over gravelly clay loam. Reclamation suitability is fair with about 27% coarse (rock) fragments.

*TMTN 25 - Rabbitex*

Drill hole TMTN-25 is located in a sagebrush/~~grass~~ grass/rabbitbrush plant community and will require pad construction and opening about 1380' of new access road off an existing road all of which is on the permitted area. The Rabbitex soil has a RSD of 18 inches for both the drill pad and access road. Soil texture is loam. Reclamation suitability is good with no limiting parameters.



*TMTN 26 - Rabbitex*

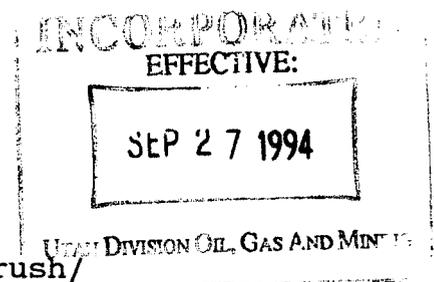
Drill hole TMTN-26 is located in a sagebrush/grass/pinyon-juniper plant community and will require pad construction and opening about 550' of new access road off the 1993 drill access road all of which is on the permitted area. The Rabbitex soil has a RSD of 18 inches for both the drill pad and access road. Soil texture is loam. Reclamation suitability is good with no limiting parameters.

*TMTN 27 - Frandsen*

Drill hole TMTN-27 is located in a sagebrush/grass plant community and will require pad construction and opening about 2060' of new access road off of TMTN-23 drill pad, all of which is on the permitted area. The Frandsen soil has a RSD of 12 inches for both the drill pad and access road. Soil textures are silt loam over loam. Reclamation suitability is good with no limiting parameters.

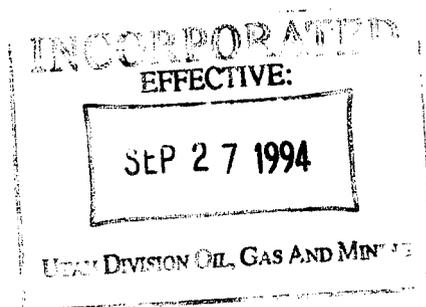
*TMTN 28 - Reva*

Drill hole TMTN-28 is located in a sagebrush/  
grass/serviceberry plant community and will require pad construction and opening about 570' of new access road off an existing road all of which is on the permitted area. The Reva



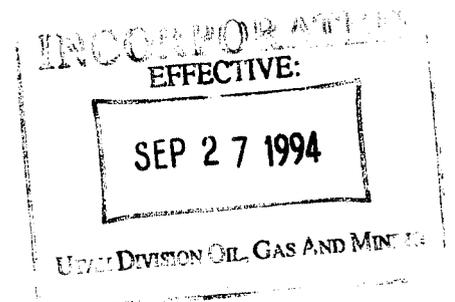
soil has RSD of 8 inches for both the drill pad and access road although a few small spots (about 15% of the area) have only 2 to 4 inches of suitable soil, and an additional 5% of the area has no soil to salvage due to an extremely flaggy surface (large, flat sandstone boulders). Soil textures are gravelly sandy loam over gravelly loam. Reclamation suitability is poor due to about 36% coarse (rock) fragments.

In summary, there is sufficient suitable soil material in the surface layers of Trail Mountain soils to provide a good reclamation medium for the PacifiCorp 1994 Trail Mountain Exploratory Drilling Project. Past reclamation experience on Trail Mountain also indicates a high potential for reclamation success given the adherence to soil salvage recommendations and FS and State of Utah project stipulation.



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**APPENDIX A**  
**TRAIL MOUNTAIN SOIL PROFILE DESCRIPTIONS**

**INCORPORATED**  
**EFFECTIVE:**  
**SEP 27 1994**  
**UTAH DIVISION OIL, GAS AND MINES**

Soil type Clayburn

File No.

Area <u>TRAIL MTN</u>		Date <u>10-27-93</u>	Stop No. <u>TMTN 16</u>
Classification <u>Fine-bandy Argic Pachic Cryoboroll (deep)</u>			
Location <u>SW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>, Section 27 T17S, R6E</u>			
N. veg. (or crop) <u>page-grass, scattered Mt brush: PJ &amp;</u>		Climate	
Parent material <u>local colluvial and residuum from mixed <sup>sedimentary</sup> <del>rocks</del> nearby</u>			
Physiography <u>low ridge sideslope</u>			
Relief	Drainage <u>well</u>	Salt or alkali <u>—</u>	
Elevation	Gr. water <u>deep</u>	Stoniness <u>see below</u>	
Slope <u>6-12%</u>	Moisture <u>B+E moist</u>		
Aspect <u>SSW</u>	Root distrib. <u>Com M, F, VF 0-16; Few F, VF</u>	% Clay *	
Erosion status <u>- slight</u>	% Coarse fragments * <u>see below</u>	<u>16-30</u>	% Coarser than V.F.S. *
Permeability			
Additional notes			

soil is deep to very deep over weath. mixed sedimentary rocks  
surface not quite gravelly  
Salvage to 17", both drill pad & road

\* Control section average

Horizon	Depth	Color		Clay % Texture	Structure	Consistence			Reac- tion	Bound- ary	Coarse Fragments
		Dry	Moist			Dry	Moist	Wet			
A	0-3	7.5YR 4/3	7.5YR 4/2	20% Loam	M M GR	SH	FR	SS/SP	SE	CS	GR 14%
Bt	3-17	10YR <sup>ped face</sup> 3/3	10YR <sup>crusted</sup> 4/3	33% CL	M CO PR	H	FR	S/P	E0	GW	GR 14%
Bc	17-30	10YR 5/3	10YR 4/3	28% CL	Massive	H	FR	S/P	EM	GW	GR 15 CB 15-LS frags
C	30-40	10YR 5/3	10YR 5/4	28% SCL	Massive	H	FR	S/P	EM	-	GR 15 CB 20-LS frags

INCORPORATED  
EFFECTIVE:

SEP 27 1994

SOIL DIVISION OIL, GAS AND MINES

Soil type Clayburn

File No:

Area TRAIL MTN

Date 10-27-93

Stop No. TMTN 17

Classification Fine-loamy Argic Pachic Gypsoboll (deep)

Location NE 1/4, NW 1/4, Section 34, T17S, R6E

N. veg. (or crop) Sage-grass, scattered occ mtn brush

Climate

Parent material colluvium and residuum from mixed sedimentary

Physiography ridge lower slope

Relief

Drainage well

Salt or alkali

Elevation

Gr. water deep

Stoniness

Slope 6-12%

Moisture Bt sl. moist

Aspect SSE

Root distrib. Com M, F, VF 0-17; Few F, VF

% Clay \*

Erosion Slight under sage

% Coarse fragments \* see below

71-32

% Coarser than V.F.S. \*

Permeability moderate downslope

Additional notes

assume the LAC pad will be more toward base and away from the dug trench drainage

Salvage 17" both drill pad & rd.

\* Control section average

Horizon	Depth	Color		Clay % Texture	Structure	Consistence			Reaction	Boundary	Coarse Fragments
		Dry	Moist			Dry	Moist	Wet			
A	0-9	10YR 4/3	10YR 3/3	20 Loam	Mm GR	SO	VFR	SS/SP	SE	CS	10% GR
Bt	9-17	10YR 3/3	10YR 3/2	32 Clay loam	M CO SBK	SH	FR	S/P	SE	GS	5% GR
Bc	17-32	2.5Y 4/3	2.5Y 4/4	28 s1 CL	Massive H	H	FI	VS/P	EM	GW	10% GR 5% CB
C	32-40+	2.5Y 5/4	2.5Y 4/4	28 CL	Massive H	H	FI	S/P	EM	GW	20% GR 10% CB
Cr	40+	weath shale									

EFFECTIVE:

SEP 27 1994

U.S. DIVISION OF OIL, GAS AND MINERAL RESOURCES

Soil type *Rabbitey*

File No.

Area <i>TRAIL MTN</i>		Date <i>10-27-93</i>	Stop No. <i>TMTN 18</i>
Classification <i>Fine-loamy, mixed Typic Calciboroll (deep)</i>			
Location <i>SW 1/4, NW 1/4, section 34, T19S, R6E</i>			
N. veg. (or crop) <i>grass-sage</i>		Climate	
Parent material <i>mixed colluvium and alluvium over residuum from sedimentary rocks</i>			
Physiography <i>bench</i>			
Relief	Drainage <i>well</i>	Salt or alkali <i>-</i>	
Elevation	Gr. water <i>deep</i>	Stoniness <i>10% GR on surface</i>	
Slope <i>3%</i>	Moisture <i>all dry</i>		
Aspect <i>SSE</i>	Root distrib. <i>Com F, VF and Few M 0-16, Few</i>	% Clay *	
Erosion <i>Status - moderate</i>	% Coarse fragments * <i>see below</i>	$\frac{M, F, VF}{16-31}$	% Coarser than V.F.S. *
Permeability			
Additional notes			
<i>in FS map unit 24</i>			
<i>Salvage to 16" on both pad and access road</i>			

\* Control section average

Horizon	Depth	Color		Texture	Structure	Consistence			Reaction	Boundary	Coarse Fragments
		Dry	Moist			Dry	Moist	Wet			
A	0-3	10YR 5/3	10YR 4/3	<sup>24</sup> Loam	M M PL	SO	VFR	SS/SP	EM	CS	10% SR
Bt	3-16	10YR 4/3	10YR 3/3	<sup>30</sup> CL	M M SBK	SH-H	FR	S/P	EM	GS	10% GR
Ba	16-31	10YR 5/3	10YR 5/4	Loam	Massive	H	FR	S/P	ES	GW	10% GR
C	31-44	2.5Y 5/4	2.5Y 4/4	SICL	Massive	H	FE	V/P	ES	GW	15% GR 5% CB
Cr	44+	weathers shale									

EFFECTIVE:

SEP 27 1994

UNIT DIVISION OIL GAS AND MINES