VALLEY CAMP OF UTAH, INC.
SCOFIELD ROUTE
HELPER, UTAH 84526

DATE: MARCH 24, 1990

MS. INA LEE MAGNUSON
EMERY COUNTY RECORDER
EMERY COUNTY COURTHOUSE
CASTLE DALE, UTAH 84513

DEAR MS. MAGNUSON:

THIS LETTER SERVES AS COVER FOR ONE (1) COPY OF VALLEY CAMP OF UTAH, INC., FIVE-YEAR MINE PERMIT RENEWAL APPLICATION, DELIVERED TO THE EMERY COUNTY COURTHOUSE BY STEVEN K. TANNER.

SINCERELY,

STEVEN K. TANNER

RECEIVED: Ina Lee J Magnuson
EMERY COUNTY RECORDER

DATE: 3-23-90

VALLEY CAMP OF UTAH, INC.
SCOFIELD ROUTE
HELPER, UTAH 84526

INTRODUCTION

This Five-Year Mine Permit Renewal Application is submitted by Valley Camp of Utah, Inc., "Valley Camp" is a wholly owned and controlled by The Valley Camp Coal Company, a private corporation. The capital stock of The Valley Camp Coal Company is wholly owned and controlled by Quaker State Corporation.

This submittal is a complete reorganization of the existing Underground Mining and Reclamation Permit, Belina Complex. ACT/007/001, Carbon County and is prepared as a Site Specific Underground Mining and Reclamation Permit.

The FORMAT for this submittal follows the State of Utah R614 Rules Organization of the Coal Mining Reclamation Act of 1979.

The TEXT is subdivided into eight (8) sections as follows:

HEADING	SECTION
COAL MINE PERMITTING	R614-301-100.
SOILS	R614-301-200.
BIOLOGY	R6140301-300.
LAND USE AND AIR QUALITY	R614-301-400.
ENGINEERING	R614-301-500.
GEOLOGY	R614-301-600.
HYDROLOGY	R614-301-700.
BONDING	R614-301-800.

The APPENDICIES are subdivided into eight (8) sections as follows:

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The MAPS are subdivided into eight (8) sections as follows:

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COAL MINE PERMITTING. R614-301-100.

R614-301-100. COAL MINE PERMITTING: PERMIT APPLICATION REQUIREMENTS.

R614-301-112. Identification of Interests.

Valley Camp of Utah, Inc., is the Mine Permit Renewal applicant and operator on the subject properties. The principal place of business for Valley Camp of Utah, Inc., is Scofield, Utah. The address is Scofield Route, Helper, Utah, 84526. The telephone number is (801) 448-9420.

R614-301-112.100.

Valley Camp of Utah, Inc., is a Utah corporation. The capital stock of Valley Camp of Utah, Inc., is wholly owned and controlled by The Valley Camp Coal Company. The Valley Camp Coal Company's principal corporate offices are located at 206 Seneca Street, P. O. Box 900, Oil City, PA. 16301. The Valley Camp Coal Company is a corporation organized and existing under the laws of the State of Delaware. The capital stock of The Valley Camp Coal Company is wholly owned and controlled by Quaker State Corporation, P. O. Box 989, Oil City, PA. 16301. Lists of Valley Camp of Utah, Inc., and its parent companys' officers and directors are shown below:

Officers and Directors
Quaker State Corporation

Quentin E. Wood	Chairman
Jack W. Corn	President & CEO
Walter B. Cook	Executive Vice President
Conrad A. Conrad	Vice President & CFO
Lee R. Forker	Director
Thomas A. Gardner	Director
H. Bryce Jordan	Director
W. Craig McClelland	Director
Kenton E. McElhattan	Director
William J. McFate	Director
Delbert J. McQuaide	Director

Officers & Directors
The Valley Camp Coal Co.

James D. Berry, III	Chairman & CEO
James L. Litman	Vice President-Mining
David E. Lung	Vice President-Finance
A. Perry Mason	Vice President-Marketing
Jack W. Corn	Director
Lee R. Forker	Director
William J. McFate	Director
Quentin E. Wood	Director
Rich Winkler	Director

Officers & Directors
Valley Camp of Utah,Inc.

James L. Litman	Vice Chairman & CEO
Walter L. Wright	President & COO
David E. Lung	Secretary & Treasurer
Richard K. Sager	Assistant Secretary
John S. Kirkham	Assistant Secretary
James D. Berry, III	Director

Kanawha and Hocking Coal and Coke Company is a subsidiary of The Valley Camp Coal Company, and provides rights necessary for conducting mining operations by Valley Camp of Utah, Inc., through various property agreements. A listing of the officers and directors of Kanawha and Hocking Coal and Coke Company is shown below:

Officers & Directors
Kanawha & Hocking Coal & Coke Company

James L. Litman	Executive Vice President
David E. Lung	Secretary & Treasurer
John S. Kirkham	Assistant Secretary
A. Perry Mason	Director

R614-301-112.200.

The resident agent of Applicant for the purpose of service of notices and orders related to operations under this Permit Renewal is:

W. L. Wright
President & Chief Operating Officer
Valley Camp of Utah, Inc.
Scofield Route
Helper, Utah 84526
(801)448-9456

The resident agent of Applicant pursuant to the laws of the State of Utah for service of civil process is:

C. T. Corporation
175 South Main Street
Salt Lake City, Utah 84111
(801)364-1228

R614-301-112.300.

N/A

R614-301-112.400.

Valley Camp of Utah, Inc., has not operated any surface coal mining operation in the United States within the five years preceding the date of this permit renewal. Valley Camp Coal Co., has operated underground coal mining operations during the stated time period under the same corporate name. A listing of those mines, associated permit numbers and regulatory agencies responsible for the permits is shown below:

Regulatory Authority: West Virginia Department of Natural Resources.

Permit No.	Facility
179-70	V.C. No. 10 Mine
438-70	V.C. No. 10 Mine
576-70C	V.C. No. 14 Mine
586-70	V.C. No. 10 Mine
27-71	Prospecting Permit
333-71	V.C. No. 6 Mine
26-72	V.C. No. 10 Mine
59-72	Prospecting Permit
118-72	V.C. No. 10 Mine
154-72	Witcher Cr. Mine
236-72	V.C. No. 14 Mine
4-73	V.C. No. 14 Mine
10-73	Prospecting Permit
48-73	V.C. No. 10 Mine
104-73	V.C. No. 6 Mine
4-74	Prospecting Permit
73-74	Prospecting Permit
16-75	V.C. No. 6 Mine
197-75	Prospecting Permit
205-75	V.C. No. 6 Mine
260-76	V.C. No. 6 Mine

Regulatory Authority: West Virginia Department of Mines.

Permit No.	Facility
D-145	V.C. No. 9 Tunnel
D-318	Alexander Mine
D-319	V.C. No. 3 Mine
D-4122	V.C. No. 1 Mine
D-5295	V.C. No. 21A Mine
D-5763	V.C. No. 5A Mine
D-5925	V.C. No. 30 Mine
D-6172	V.C. No. 31 Mine
D-6337	V.C. No. 32 Mine
D-6632-S	V.C. No. 32A Mine
D-66739	V.C. No. 34 Mine
D-6747-S	V.C. No. 32B Mine
D-6799	V.C. No. 12A Mine
D-6800	V.C. No. 15A Mine
D-6801	V.C. No. 15 Mine
D-8083	V.C. No. 35 Mine
D-8084	V.C. No. 36 Mine
D-8213	V.C. No. 37 Mine
D-8661	V.C. No. 39 Mine
D-8740	V.C. No. 40 Mine
D-8839	V.C. No. 41 Mine
D-8840	V.C. No. 42 Mine
D-10668	V.C. No. 43 Mine
4779	#6 Strip Mine
15477	#17 Strip Mine
14377	#46 Strip Mine
1880	#45 Strip Mine

Regulatory Authority: Mine Safety and Health Administration:

Permit No.	Facility
46-01348	V.C. No. 10 Mine
46-01349	V.C. No. 5A Mine
46-01351-0	V.C. No. 6 Mine
46-01352	V.C. No. 31 Mine
46-01353	V.C. No. 30 Mine
46-01354	V.C. No. 9 Tunnel
46-01440-0	Alexander Mine
46-01482-0	V.C. No. 3 Mine
46-01483-0	V.C. No. 1 Mine
46-01977	V.C. No. 12A Mine
46-02121	V.C. No. 34 Mine
46-02422	V.C. No. 14 Mine
46-02423	V.C. No. 10A Mine
46-02513	V.C. No. 14A Mine
46-03178	V.C. No. 37 Mine
46-03305	V.C. No. 15 Mine
46-03307	V.C. No. 15A Mine
46-03308	V.C. No. 35 Mine
46-03309	V.C. No. 36 Mine
46-03867	V.C. No. 46 Mine
46-03886	V.C. No. 39 Mine
46-04053	V.C. No. 40 Mine
46-04135	V.C. No. 41 Mine
46-04136	V.C. No. 42 Mine
46-05551	V.C. No. 17 Mine
46-05630	V.C. No. 18 Mine
46-05906	V.C. No. 43 Mine
46-06103	V.C. No. 45 Mine

Regulatory Authority: West Virginia Department of Natural Resources.

Permit No.	Facility
143-73	V.C. No. 46 Mine
154-77	V.C. No. 17 Mine
47-79	V.C. No. 6 Mine
18-80	V.C. No. 45 Mine
EM-19	V.C. No. 36 Mine
EM-20	V.C. No. 9 Tunnel
EM-21	V.C. No. 12A Mine
EM-22	V.C. No. 40 Mine
EM-23	V.C. No. 15A Mine
EM-24	V.C. No. 15 Mine
EM-30	V.C. No. 42 Mine
H-57	Witcher Creek Road
H-318	V.C. No. 17 Road
H-348	V.C. No. 17 Road
H-473	V.C. No. 15 Road
H-473	V.C. No. 43 Road
I-508	Bufflick Tipple
I-527	Witcher Bathhouse
I-540	Shrewsbury Office
I-543	KC&NW RR Tipple
P-553	V.C. No. 8 Prep.
R-507	No. 36 & No. 40 Dam
R-523	Donaldson Prep
UO-634	V.C. No. 43 Mine

The list of permits, licenses, and identification numbers applicable to the Mine Permit Area is as follows:

U.S. Geological Survey
2040 Administration Bldg.
1745 W. 1700 S.
Salt Lake City, UT 84138

Mining and Reclamation Plan. Approval letter dated February 10, 1977. Emphasis on mining operation and coal resources.

Office of Surface Mining (Western Field Operations)
Reclamation & Enforcement
Brooks Tower, Second Floor
1020 15th Street
Denver, CO 80202

Mining and Reclamation Plan. Included in permit application to the State of Utah. Emphasis on surface operation and reclamation.

U.S. Environmental Protection Agency
Region VIII
999 18th Street
Denver Place - Suite 500
Denver, CO 80202-2405

Prevention of Significant Deterioration Permit. Not required as per letter dated May 7, 1980, and May 23, 1975, from Utah Dept. of Health.

Oil Spill Prevention Control and Countermeasure Plan. Plan is on file at the Mine Office. Applies to facility drainage, bulk storage tanks, transfering, loading and unloading.

National Pollutant Discharge Elimination System Permits. Number UT-022985 approved March 1, 1988. Processed by Utah State and approved by EPA.

U.S. Forest Service
Price, Utah 84501

Surface Distribution and Reclamation Plan. Agreement dated September 25, 1979. Emphasis on subsidence and hydrology.

U.S. Treasury Department
Washington, D.C.

Explosive Storage and Useage Permit. When explosives are used they are obtained and handled according to state and federal regulations. Pertains to use of explosives underground.

U.S. Federal Communication Commission.
Washington, D.C.

License for Industrial Radio Service No. 8710393611, 11/17/87. License for Private Operational Fixed Microwave Radio Service No. 805830, 7/13/84.

** R614-301-100. **

Mine Safety and Health Administration
U.S. Dept. of Labor
P.O. Box 25367
Denver Federal Center
Denver, CO 80225

Operator Safety Plans and ID Numbers.
Belina No. 1 Mine - No. 42-01279 issued February 12, 1976.
Belina No. 2 Mine - No. 42-01280 issued February 12, 1976.
Valcam Loadout Facility - No. 42-01995 issued November 13, 1986.

Roof Control Plan. Approved September 9, 1988, and reviewed every 6 months.

Ventilation System-Methane and Dust Control Plan. Approved April 11, 1989, and reviewed every 6 months.

Fan Stoppage Plan. Approved July 28, 1980.

Firefighting and Evacuation Plan. Exercise every 90 days.

Utah Department of Health.
Division of Environmental Health
288 North 1460 West PO Box 16690
Salt Lake City, Utah 84116-0690

Air Quality. Approved by letter, August 17, 1981.

Utah Division of Oil, Gas, and Mining.
355 W. North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Mining and Reclamation. ACT/007/001.

State Engineer
Division of Water Rights
200 Empire Bldg.
231 E. 400 S.
Salt Lake City, Utah 84111

Belina Water Well. Water rights exchange application No.1691.

Utah No. 1. Water Well. Water rights exchange application No.77-17.

Alpine School District. 50 North Center, American Fork, Utah 84003. March 25, 1976. Lease of culinary water.

Carbon County
Carbon County Courthouse
Price, Utah 84501

Business License. Mining: Jan. 1, 1989. No. 89044
Valcam: Jan. 1, 1989. No. 89045

R614-301-112.500. thru 301-112.600.

The legal or equitable owners of record of the areas that are affected by, or contiguous to, surface operations and facilities of Valley Camp of Utah, Inc., are shown on, Surface Ownership Map (R614-301-112.500.). A complete listing of Surface Owners and their addresses are shown below:

Surface Ownership

United States of America, Dept. of Agriculture, U.S. Forest Service, 599 West Price River Drive, Price, Utah, 84501

Kanawha & Hocking Coal and Coke Company, P.O. Box 218, Triadelphia, West Virginia, 26059

Milton A. & Bessie Oman, 61 South Main, Salt Lake City, Utah, 84115

Jack & Sei Otani, P.O. Box 501, Clear Creek, Utah, 84517

Della L. & Hilda M. Madsen, Meadow, Utah, 84644

Hellenic Orthodox Church, Price, Utah, 84501

J. Mark & James C. Jacob, 754 S. Cherry, Orem, Utah, 84057

Gust G. Kalatzes, Koula & Helen Marakis, P.O. Box 576, 150 E. 1st S. and P.O. Box 805, 160 E. 1st S., Price, Utah, 84501

Evangelos George Telonis, c/o Angelo Georgedes, 761 N. 300 E., Price, Utah 84501

Robert & Ellen Radakovich, 340 N. 600 E., Price, Utah 84501

Alpine School District, 50 North Center, American Fork, Utah,

Rescu-Med, Inc., P.O. Box 1115, Provo, Utah, 84601

Louis & Anna Kosec, Rt. #1, Box 12, Helper, Utah, 84526

Brent L. & Reese A. Bawden, Alan Alexander, 1145 S. 2030 E., Price, Utah, 84501

L.D.S. Church, 336 S. 3rd E., Salt Lake City, Utah, 84111

Coastal States Energy Co., 175 East 400 South, Salt Lake City, Utah 84111

Lutheran High School Assn., 2222 North Santiago Blvd.,Orange CA. 92667

Anthony J. Theis, Rt. 1 P.O. Box 33 New Ulm, Texas 78950

Utah Natural Gas, c/o Mountain Fuel Supply Co., P.O. Box 11368, Salt Lake City, Utah, 84111

** R614-301-100. **

The legal or equitable owners of record of the coal to be mined, and the coal contiguous to the coal to be mined, are shown on Coal Ownership Map (R614-301-112.600.). A complete listing of Coal Ownership and their addresses are shown below:

Coal Ownership

Kanawha & Hocking Coal & Coke Company, P.O. Box 218, Triadelphia, West Virginia, 26059

United States of America, Dept. of the Interior, Bureau of Land Management, University Club Building, Salt Lake City, Utah, 84138

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

Western Reserve Coal Company, Inc., c/o Dean Phillips, P.O. Box 188, Lewiston, Missouri, 63452

Kaiser Steel Corporation, 300 Lakeside Drive, Oakland, California, 94666

Coastal States Energy Company, Nine Greenway Plaza, Houston, Texas, 77046

Noal Tanner, 2796 North Arapahoe Lane, Provo, Utah, 84601

Carbon County, County Courthouse, Price, Utah, 84501

Evangelos George Telonis, c/o Angelo Georgedes, 761 N. 300 E., Price, Utah, 84501

The holders of record of any leasehold interest in areas to be affected by surface operations or facilities and the holders of record of any leasehold interest to be mined are discussed and presented in detail in Section R614-301-114. (Right of Entry and Operation Information).

There is no purchaser of record under a real estate contract of areas to be affected by surface operations and facilities or the coal to be mined.

R614-301-112.700. MSHA I.D. Numbers.

The Mine Safety and Health Administration identification numbers for the subject mines and support facility are:

Belina No. 1 Mine	42-01279
Belina No. 2 Mine	42-01280
Valcam Loadout Facility	42-01995

R614-301-112.800.

There are no properties contiguous to the Mine Permit Area which are subject to any pending options or other undisclosed interests held or made by the applicant.

R614-301-113. Violation Information.

R614-301-113.110.

Valley Camp of Utah, Inc., nor any subsidiary, affiliate or persons controlled by or under common control of The Valley Camp Coal Company have had a Federal or State Mining Permit suspended or revoked in the last five years.

R614-301-113.120.

Neither Valley Camp of Utah Inc. or any of the entities or persons referred to in this section have had a mining bond or similar security deposited in lieu of bond forfeited.

R614-301-113.200. thru 301-113.250.
N/A

R614-301-113.300. thru 301-113.350.

Valley Camp of Utah, Inc., has not received any violations with respect to surface coal mining operations, but has received the following violations concerning underground coal mining operations:

1. Issued by OSM on December 4, 1979, NOV No. 79-5-3-40.
   a. "Material placed on downslope below road cut", in violation of 30 CFR 211.40 (b) and 717.14 (c). No penalty points or civil penalty assessed.

   b. "Failure to maintain access and haulroads as required",

in violation of 30 CFR 717.17 (j) (1) and 211.40 (b). Violation was vacated.

c. "Failure to pass surface drainage from the disturbed areas through sedimentation ponds", in violation of 30 CFR 717.17 (a) and 211.40 (b). Violation was vacated.

2. Issued by OSM on January 8, 1980, NOV No. 80-5-18-7. "Failure to maintain culvert which drains access road", in violation of 30 CFR 717.17 (j) (3) (ii). Violation was vacated. Abatement was completed January 9, 1980.

3. Issued by OSM on June 23, 1980, NOV No. 80-5-7-15. "Failure to salvage topsoil", in violation of 30 CFR 717.20 (a). Final assessment was 29 points and no civil penalty. Abatement was completed July 22, 1980.

4. Issued by DOGM on August 7, 1980, NOV No. 80-1-3-2.
a. "Failure to pass surface drainage from the disturbed area through a sedimentation pond", in violation of 30 CFR 717.20 (a). Final assessment was 11 points and $200.00. Abatement was completed December 19, 1980.

b. "Failure to maintain ditches and culverts", in violation of 30 CFR 717.17(j) (3) (ii). Final assessment was 9 points and no civil penalty. Abatement was completed Aug. 11,1980.

5. Issued by OSM on December 10, 1980, NOV No. 80-V-15-12. "Operating without an approved permit", in violation of PL 95-87, Section 502 (a) and 211.10 (c). Violation was vacated.

6. Issued by DOGM on June 1, 1981, NOV No. 81-2-5-2.
a. "Failure to post topsoil markers on topsoil or other vegetation supporting material", in violation of UMC 817.11 (g). Final assessment was 24 points and no civil penalty. Violation was terminated July 9, 1981.

b. "Failure to protect topsoil from wind and water erosion, unnecessary compaction or contamination which lessens the capability of the material to support vegetation when redistributed", in violation of UMC 817.23 (b). Final assessment was 24 points and no civily penalty. Abatement was completed July 9, 1981.

7. Issued by DOGM on July 9, 1981, NOV No. N81-3-11-2.
a. "Failure to comply with terms and conditions of interim permit", in violation of UMC 771.19. Final assessment was 30 points and $400.00. Abatement was completed August 7, 1981.

b. "Failure to post perimeter markers", in violation of UMC 817.11 (d). Final assessment was 10 points and $100.00. Abatement was completed July 20, 1981.

8. Issued by DOGM on August 5, 1981, NOV No. 81-2-10-1. "Failure to comply with terms and conditions of permit-failure to minimize erosion to the extent possible", in

violation of UMC 771.19 and UMC 817.45. Final assessment was 17 points and $170.00. Abatement was completed August 21, 1981.

9. Issued by DOGM on December 17, 1981, NOV No. 81-2-17-1. "Operating without a permit, failure to conduct mine operations in accordance with an approved mine plan, unauthorized disposal of underground development waste outside the permit area", in violation of UCA 1953 40-10-9 (1), UMC 771.19, and UMC 817.71 (a). Final assessment was 0 points and no fine. Abatement was completed December 17, 1981.

10. Issued by DOGM on July 21, 1982, NOV No. 82-1-9-2.

    a. "Failure to operate in accordance with approved plan, failure to maintain sediment", in violation of UMC 817.46 (e), UMC 771.19 and UMC 817.45. Final assessment was 32 points and $440.00. Abatement was completed October 20, 1982.

    b. "Failure to meet effluent limitations", in violation of UMC 817.41 (c). Final assessment was no points or fine. Abatement was completed before July 1, 1983.

11. Issued by DOGM on October 1, 1982, NOV No. 82-4-11-1. "Failure to maintain sedimentation ponds to prevent short circuiting and ensure that water discharged from the disturbed area complies with all State and Federal water quality limitations. Failure to meet applicable State and Federal effluent limitations", in violation of UCA 40-10-18 (2) (i) (ii), UMC 817.41 (c), UMC 817.42 (a) (7), UMC 817.42 (c) and UMC 817.46 (e). Final assessment was 10 points and $180.00. Abatement was completed October 1, 1982.

12. Issued by DOGM on April 12, 1983, NOV No. 83-1-1-1. "Failure to comply with applicable water quality effluent limitations", in violation of UCA 40-10-22, UMC 817.41 (c), and UMC 817.42 (a) (f). Final assessment was 27 points and $340.00. Abatement was completed by July 11, 1983.

13. Issued by DOGM on April 12, 1983, NOV No. 83-7-4-1. "Failure to pass all surface drainage from the disturbed areas through a sedimentation pond, a series of sedimentation ponds, or a treatment facility, before leaving the permit area. Failure to maintain sediment control facilities to prevent to the extent possible additional contributions of sediment to stream flow runoff outside the permit area", in violation of UCA 40-10-18 (2) (i) (ii), UMC 817.42 (a), UMC 817.42 (a) (f), and UMC 817.45 (i). Final assessment was 24 points and $280.00. Abatement was completed Apr. 26, 1983.

14. Issued by DOGM on April 13, 1983, NOV No. 83-7-5-1. "Failure to post perimeter markers in a manner that clearly marks the perimeter of all areas affected by surface operations or facilities", in violation of UMC 817.11.

Final assessment was no points and no fine. Abatement was completed April 13, 1983.

15. Issued by DOGM on July 26, 1983, NOV No. 83-7-6-1. "Operating without a permit, failure to conduct underground coal mining activities in accordance with an approved plan", in violation of UCA 40-8-17 (1), UCA 40-10-9, and UMC 771.19. Final assessment was 48 points and $920.00. Abatement was completed September 1, 1983.

16. Issued by DOGM on July 26, 1983, NOV No. C-83-1-1-1. "Failure to meet effluent limitations", in violation of UCA 40-10-22, UMC 817.41 (c) and UMC 817.42 (a) (7). Final assessment was no points and no fine. Abatement was completed August 18, 1983.

17. Issued by DOGM on February 1, 1984, NOV No. N84-7-2-10. "Failure to meet effluent limitations", in violation of UCA 40-10-18 (2) (i) (ii) and UMC 817.42 (a) (7). Final assessment of 82 points and $1120.00.

18. Issued by DOGM on April 26, 1984, NOV No. N84-7-6-1. "Failure to meet effluent limitations", in violation of UCA 40-10-18 (2) (i) (ii) and UMC 817.42 (a) (7). Final assessment was 28 points and $360.00. Abatement was completed October 28, 1985.

19. Issued by DOGM on August 8, 1984, NOV No. N84-7-9-1. "Failure to meet effluent limitations", in violation of UCA 40-10-18 (2) (i) (ii), and UMC 817.42 (a) (7). Final assessment was 36 points and $520.00. Abatement was completed September 10, 1984.

20. Issued by DOGM on November 15, 1984 NOV No. N84-2-23-2. "Failure to maintain sediment control measures to function as designed", in violation of UMC 817.45 and UMC 771.19. Final assessment was 27 points and $340.00. Abatement was completed November 27, 1984.

21. Issued by DOGM on March 5, 1985, NOV No. N85-2-3-2.
    a. "Failure to maintain runoff diversions in order to pass all surface drainage from the disturbed area through a sedimentation pond", in violation of UMC 817.42 (a) (1), UMC 817.45, UCA 40-10-18 (2) (i) (ii). Final assessment was no points and no fine. Abatement was completed April 12, 1985.

    b. "Failure to maintain sediment control measures to function in accordance with approved designs", in violation of UMC 817.45, UMC 771.19, and UCA 40-10-18 (2) (i) (ii). Final assessment was no points and no fine. Abatement was completed May 6. 1985.

22. Issued by DOGM on June 27, 1985, NOV No. N85-2-10-2.
    a. "Failure to notify the Division within 5 days of receipt of analytical results of NPDES discharge samples, which indicated non-compliance with the applicable effluent limitations", in violation of UMC 817.52 (b) (i) (ii).

Final assessment was no points and no fine. Abatement was completed July 12, 1985.

b. "Failure to clearly mark buffer zone", in violation of UMC 817.11 (e) and UMC 817.57 (b). Final assessment was no points and no fine. Abatement was completed July 16, 1985.

23. Issued by DOGM on July 22, 1985, NOV No. N85-2-11-1. "Failure to meet applicable effluent limitations", in violation of UMC 817.42 (b) and UCA 40-10-18 (2) (i) (ii). Final assessment was 40 points and $420.00. Abatement was completed July 12, 1985.

24. Issued by DOGM on August 3, 1985, NOV No. N85-2-12-1. "Conducting mining activities without a permit", in violation of UMC 771.19 and UCA 40-10-9 (1). Final assessment was 24 points and no fine. Abatement was completed April 28, 1985.

25. Issued by DOGM on January 17, 1986, NOV No. N86-8-2-1. "Failure to maintain class 1 road, and to control or minimize erosion and siltation, air and water pollution, and damage to public or private property", in violation of UMC 817.150, UMC 817.153, and UCA 40-10-18 (2) (ii) (j). Final assessment was no points and no fine. Abatement was completed January 30, 1986.

26. Issued by DOGM on July 18, 1986, NOV No. N86-9-8-1. "Failure to pass surface drainage through a treatment facility before leaving permit area", in violation of UMC 817.42 (a) (1), UCA 40-10-18 (i), and UCA 40-10-18 (i) (ii). Final assessment was 13 points and $130.00. Abatement was completed August 19, 1986.

27. Issued by DOGM on September 30, 1986, NOV No. N86-9-11-1. "Failure to comply with terms and conditions of the approved permit. Failure to collect water monitoring data at the approved frequency", in violation of UMC 771.19 and UMC 817.52. Final assessment was 22 points and $240.00. No abatement was required.

28. Issued by DOGM March 6,1987,NOV No. N86-9-11-1 "Failure to prevent to extent possible additional contributions of sediment to stream flow or to runoff outside of the permit area", in violation of UMC 817.45. Final assessment was 23 points and $260.00. Abatement was completed March 10, 1987.

29. Issued by DOGM on April 9, 1987, NOV No. N87-26-1-1. "Failure to prevent to extent possible, sediment contribution to Whisky Creek or to runoff outside the permit area," in violation of UMC 817.45 (i), UCA 40-10-18 (2) (i) (ii). Final assessment was 22 points and no fine. Abatement was complete April 16, 1987.

30. Issued by DOGM on October 21, 1987 NOV No. N87-9-12-1. "Failure to conduct water monitoring in a manner approved by the Division", in violation of 817.52 (a) (1) and (b)

(1). Final assessment was 31 points and $420.00. No abatement was required.

31. Issued by DOGM on November 5, 1987, NOV No. 87-9-14-1. "Failure to maintain road culverts in such a manner which prevents plugging, collapse, or erosion at inlets and outlets." In violation of UMC 817.153 (c) (1) (ii). Final assessment was 5 points and $50.00. Abatement was completed November 11, 1987.

32. Issued by OSM on June 23, 1988, NOV No. 88-2-116-2. 1 of 2 "Failure to provide a registered professional engineer's certification for the construction of the dams and embankments associated with ponds 001A, 002A, 003A, and 004A, in violation of UCA 40-10-1; UMC 817.49 (b). 2 of 2 "Failure to provide a registered professional engineers certification for the construction of the Class I roads at the Belina Mine Complex," in violation of UCA 40-10-1; UMC 817.150 (d) (i). Final assessment was 9 points each and no fine. Abatement was completed August 8,1988.

33. Issued by DOGM July 7, 1988, NOV No. 88-28-4-1. "Failure to notify the Division that a NPDES permit effluent limitation noncompliance has occured," in violation of UMC 817.52 (b) (1) (ii) and UMC 817.41 (c). Final assessment was 30 points and $400.00 fine. No abatement was required.

34. Issued by DOGM on October 20, 1988, NOV No. 88-28-9-1. "Failure to meet effluent limits during discharge of mine water," in violation of UMC 817.41(c). Final assessment was 1 point and no fine. Abatement was completed January 9, 1989.

35. Issued by DOGM on March 16, 1989 NOV No. 89-28-4-2.

R614-301-114. Right-of-Entry.

R614-301-114.100. thru 301-114.300.

Valley Camp of Utah, Inc., has title to and interest in the subject coal lands by way of warranty deeds, bills of sale, assignments, leases and easements.

There are no surface or subsurface rights in the Mine Permit Area which are subject to any pending litigation.

United States Coal Leases.

The assignments pertaining to the United States Coal Leases are listed below:

Lease No.	Associated Acreage	Issued To	Date of Issuance
U-020305	1,439.4	Emmett K. Olson	3/1/62
U-017354	1,028.5	Independent Coal & Coke Co.	1/1/62
U-044076	2,367.8	Armeda N. McKinnon	9/1/65
U-067498	501.7	Independent Coal & Coke Co.	1/1/62

These lease number and property locations can be found on the Coal Ownership Map,(R614-301-112.500). The properties are described as follows:

Lease No. U-020305 1,439.4 Acres

T13S, R6E SLB&M

Sec. 13: Lot 7 (SW 1/4 SW 1/4)
Sec. 14: SE 1/4 SE 1/4
Sec. 23: E 1/2 E 1/2
Sec. 24: W 1/2 NW 1/4, SE 1/4 NW 1/4, S 1/2
Sec. 25: All Lots 1 thru 4, S 1/2 N 1/2, S 1/2
Sec. 26: E 1/2 E 1/2

Lease No. U-017354 1,028.5 Acres

T13S, R6E SLB&M

Sec. 36: Lots 1 thru 4, N 1/2 S 1/2, N 1/2

T13S, R7E SLB&M

Sec. 31: N 1/2 SW 1/4

T14S, R6E SLB&M

Sec. 1: E 1/2 NE 1/4, NE 1/4 SE 1/4

T14S, R7E SLB&M

Sec. 6: NW 1/4

Lease No. 044076 2,367.8 Acres

T13S, R6E SLB&M

Sec. 26: W 1/2 E 1/2, W 1/2
Sec. 27: Lots 1 thru 4, E 1/2, E 1/2 W 1/2 (excluding Lawrence Reservoir)
Sec. 34: Lots 1 thru 8, S 1/2
Sec. 35: Lots 1 thru 7, NE 1/4, E 1/2 NW 1/4, NE 1/4 SW 1/4, N 1/2 SE 1/4

Lease No. 067498 501.7 Acres

T14S, R7E SLB&M

Sec. 6: Lots 2, 6, 7, SW 1/4 NE 1/4, W 1/2 SE 1/4, E 1/2 SW 1/4
Sec. 7: Lots 1, 2, 4, E 1/2 NW 1/4

Carbon County Coal Leases

The assignments pertaining to the lease from Carbon County, Utah, are as follows:

County Lease	Associated Acreage	Issued to	Date of issuance
Carbon Co.	361.2	North American Coal Corp.	5/1/69

The property is described as follows:

County Lease 361.2 Acres

T13S, R6E SLB&M

Sec. 24: W 1/2 NE 1/4, SE 1/4 NE 1/4

T13S, R7E SLB&M

Sec. 19: SW 1/4 SW 1/4
Sec. 30: W 1/2 W 1/2
Sec. 31: NW 1/4 NW 1/4

Private Coal Leases

The assignments pertaining to private coal leases are as follows:

Private Lease	Associated Acreage	Issued to	Date of Issuance
Kanawha & Hocking Coal & Coke Co.	480	Valley Camp of Utah, Inc.	8/1/74
Kanawha & Hocking Coal & Coke Co.	80	Valley Camp of Utah, Inc.	1/8/78

Private Lease	Associated Acreage	Issued to	Date of Issuance
Kanawha & Hocking Coal & Coke Co.	80	Valley Camp of Utah, Inc.	1/1/81

These properties are described as follows:

Private Lease 480 Acres

T13S, R7E SLB&M

Sec. 8: E 1/2 E 1/2
Sec. 9: W 1/2 SW 1/4
Sec. 16: NW 1/4 NE 1/4, NE 1/4 NW 1/4, W 1/2 NW 1/4, NW 1/4 SW 1/4
Sec. 17: NE 1/4 NE 1/4

Private Lease 80 Acres

T13S, R7E SLB&M

Sec. 30: SE 1/4 SW 1/4
Sec. 31: SW 1/4 NW 1/4

Private Lease 80 Acres

T13S, R7E SLB&M

Sec. 31: S 1/2 SW 1/4

The following is a general summary of the chains of title with respect to the coal leases held by Valley Camp of Utah, Inc., within the mine permit area.

U.S. Lease U-020305

A coal prospecting permit was issued to Emmett K. Olson effective March 1, 1958, on the lands covered by this lease. On December 8, 1959, an extension of the permit was requested and the permit was extended for two years through March 1, 1962. Emmett K. Olson was issued a Preference Right Coal Lease on March 7, 1962, effective March 1, 1962. An Assignment from Emmett K. Olson to Malcolm N. McKinnon dated April 24, 1962, was filed on May 1, 1962, effective August 1, 1962.

On October 29, 1975, a Sublease was entered into between Frank Armstrong and Zions First National Bank, executors of the estate of Malcolm N. McKinnon, deceased, and Armeda N. McKinnon with Routt County Development, Ltd.

Pursuant to an Exchange Agreement dated September 15, 1975, Routt County Development, Ltd., entered into a Sublease of the portion of land within the mine permit area to Energy Fuels Corporation. This Sublease was then assigned to Valley Camp Of Utah, Inc. Subsequent to that Assignment the Sublease was assigned to Kanawha and Hocking Coal and Coke Company and a subsequent Sublease was entered into between Kanawha and Hocking Coal and Coke Company and Valley Camp of Utah, Inc. All of the documents necessary to accomplish these transfers are of record and have been approved by the Bureau of Land Management.

U.S. Lease U-017354

This lease was originally issued to Independent Coal and Coke Company effective September 1, 1956. A modified Coal Lease was issued January 1, 1962, effective September 1, 1956. This modified Coal Lease added lands applied for under Serial No. U-067374 to the above-captioned lease. By Assignment of January 2, 1968, approved effective April 1, 1968, the lease

was transfered by Independent Coal and Coke Company to the North American Coal Corporation. North American then assigned this lease to Kanawha and Hocking Coal and Coke Company on June 27, 1973. A Sublease of United States Coal Lease U-017354, U-067374 was entered into between Kanawha and Hocking Coal and Coke Company and Valley Camp of Utah, Inc. An Amendment to Sublease was entered into June 12, 1978, between Kanawha and Hocking Coal and Coke Company and Valley Camp of Utah, Inc. All of the documents necessary to accomplish these transfers are of record and have been approved by the Bureau of Land Management.

U.S. Lease U-044076

A Coal Prospecting Permit was issued to Armeda N. McKinnon on November 1, 1960. This permit was extended for two years from November 2, 1962. On November 2, 1964, Armeda N. McKinnon filed an application for Preference Right Coal Lease and a lease was issued to her on September 1, 1965.

On October 29, 1975, a Sublease was entered into between Frank Armstrong and Zions First National Bank, executors of the estate of Malcolm N. McKinnon, deceased, and Armeda N. McKinnon with Routt County Development, Ltd.

Pursuant to an Exchange Agreement dated September 15, 1975, Routt County Development, Ltd. entered into a Sublease of the portion of land within the mine plan area to Energy Fuels Corporation. This Sublease was then assigned to Valley Camp of Utah, Inc. Subsequent to that assignment the Sublease was assigned to Kanawha and Hocking Coal and Coke Company and a subsequent Sublease was entered into between Kanawha and Hocking Coal and Coke Company and Valley Camp of Utah, Inc. All of the documents necessary to accomplish these transfers are of record and have been approved by the Bureau of Land Management.

U.S. Lease U-067498

This lease was originally issued to Independent Coal & Coke Company effective January 1, 1962. An Assignment to the North American Coal Corporation was made January 2, 1968, effective April 1, 1968. North American Coal Corporation assigned the lease to Kanawha and Hocking Coal and Coke Company on June 27, 1973. Kanawha and Hocking Coal and Coke Company is a sister corporation to Valley Camp of Utah, Inc. and the necessary leases will be entered into prior to the conduct of any mining operations on this lease. All of the documents necessary to accomplish these transfers are of record and have been approved by the Bureau of Land Management.

Carbon County Lease

This lease was originally entered into on May 1, 1969, between Carbon County, Utah, and the North American Coal Corporation. On June 27, 1973, the lease was assigned from the North American Coal Corporation to Kanawha and Hocking Coal and Coke Company. A renewal of this lease in favor of Kanawha and Hocking Coal and Coke Company was issued May 1, 1974, for a period of 10 years. A Sublease was entered into January 1, 1978, between Kanawha and Hocking and Valley Camp of Utah, Inc. A renewal of this lease in favor of Kanawha Coal and Coke Company was issued May 1,1984, for five years and issued May 1,1989, for five years from Carbon County.

The right to enter federal coal leaseholds conveyed by the United States Government is conferred to the lessees by the Mineral Leasing Act of 1920 and the leases themselves. The right of entry for private and county leases is provided through the individual leases.

The right to construct, operate and maintain access roads, and the right to operate and maintain coal storage and loadout facilites near the mouth of Green Canyon, together with all other uses in connection with ongoing operations of the lessee are conferred by the following:

1. A surface lease dated January 1, 1979, and entered into between and by Della L. Madsen and Robert G. and Hilda M. Hammond and Kanawha and Hocking Coal and Coke Company allows use, possession and occupancy of the subject lands for uses in connection with the performance of general business procedures by the lessee.

T13S, R7E SLB&M

Sec. 19: E 1/2 SE 1/4, SW 1/4 SE 1/4, SE 1/4 SW 1/4
Sec. 20: W 1/2 SW 1/4
Sec. 29: NW 1/4 NW 1/4
Sec. 30: E 1/2, NE 1/4 NW 1/4

By a sublease effective January 1, 1981, Kanawha and Hocking Coal and Coke Company granted Valley Camp of Utah, Inc., the right to construct, operate and maintain access roads and conveyor systems over and across said lands.

2. A surface lease and right-of-way agreement dated August 14, 1975, and entered into and by Milton A. and Bessie G. Oman and Kanawha and Hocking Coal and Coke Company allows the construction, use and maintenance and other related activities of an access road, electric transmission line and communication lines with poles and appurtenances, all lying within portions of Sections 17, 18, 19, 20, and 30, T13S, R7E SLB&M.
Said lease also provides to the lessee, a 40 acre tract lying within portions of Sections 19, and 30, T13S, R7E, SLB&M , for the purpose of conducting underground coal mining operations and related activities, including, without limitation, the construction of portals, buildings, and facilities useful to such operations. The rights under this instrument were subleased in their entirety to Valley Camp of Utah, Inc., by a sublease effective January 1, 1981.

3. A surface lease and easement agreement dated August 6, 1976, and entered into and by Helen, Nick and Koula Marakis, and Kanawha and Hocking Coal and Coke Company allows the exclusive use and possession of the surface of the subject lands for access to and egress from all other properties together with all activities related to access roads and conveyor systems required for coal transportation over, in, under, across, and along leased acreage.

T13S, R7E SLB&M

Sec. 8: E 1/2 E 1/2 less 2 acres, and less highway right-of-way.
Sec. 9: W 1/2 SW 1/4, less Carbon County Railway right-of-way and less Utah Power & Light

Company right-of-way.
Sec. 16: W 1/2 less 0.18 acres for channel change easement.
Sec. 16: W 1/2 E 1/2
Sec. 17: E 1/2 NE 1/4, NE 1/4 SE 1/4 less 8.99 acres highway right-of-way, less LDS church property of 16.75 acres, less 1.52 acres channel change easement.
Sec. 17: That portion of S 1/2 SE 1/4 and SE 1/4 SW 1/4 lying North of Eccles Canyon Creek.
Sec. 20: NE 1/4 NE 1/4, less 1.29 acres to Milton E. and Calvin K. Jacob.
Sec. 21: That portion of N 1/2 NW 1/4 and N 1/2 NE 1/4 lying North of the centerline of Broads Canyon Creek.

By a letter of agreement dated September 13, 1976, Kanawha and Hocking Coal and Coke Company transferred to Valley Camp of Utah, Inc., the rights necessary to conduct its proposed operations within the mine plan area.

4. An easement effective January 1, 1981, between Kanawha and Hocking Coal and Coke Company, and Valley Camp, grants Valley Camp the right to construct, operate, and maintain access roads, conveyor systems and an office building with related facilities on, over and within the following described lands:

T13S, R7E, SLB&M

Sec. 17: NW 1/4 NE 1/4, SW 1/4 NE 1/4, less and excluding the Kosec property containing approximately 2 acres. NW 1/4 SE 1/4
Sec. 19: NE 1/4 SW 1/4

5. An easement effective January 1, 1981, between Kanawha and Hocking Coal and Coke Company and Valley Camp of Utah, Inc., grants the right to construct, operate and maintain access roads, conveyor systems and railroad trackage with related facilities over and across portions of the following described lands:

T13S, R7E, SLB&M

Sec. 17: S 1/2 SE 1/4

R614-301-115. Status of Unsuitability Claims.

R614-301-115.100.

The Mine Permit Area is not within an area designated unsuitable for underground coal mining and reclamation activities nor is it under study for designation in an administrative proceeding.

R614-301-115.200.

** R614-301-100. **

N/A

R614-301-115.300.

No mining will be conducted within 100 feet of the right-of-way of any public road or within 300 feet of an occupied dwelling, public building, school, church, community, institutional building or public park, or within 100 feet of a cementary. Reclamation at the Valcam Loadout Facility paralleling State Road 96 and where the Belina Haul Road is adjacent to, and intersects State Road 264, is within the 100 feet stipulation. There are no cultural or historical resources eligible for or listed on the National Register of Historic Places.

There are seven archeological or historic sites within or adjacent to the Mine Permit Area.

Valley Camp of Utah, Inc. does not anticipate any significant disturbance of these sites. If such disturbance is necessary documentation will be made and monitoring procedures will be implemented.

The western portion of the Mine Permit Area is situated within the Manti-LaSal National Forest, U.S. Forest Service, U.S. Department of Agriculture.

R614-301-116. Permit Term.

R614-301-116.100.

The applicant is requesting a five (5) year Mine Permit Renewal and the following information is supplied.

Mining activities have occured primarily in the southern portion of the mine permit area.

The mine operation has or will operate in both seams in the Mine Permit Area.

	Belina No. 1	Belina No. 2
First Coal Produced	1976	1981
Horizontal Extent of Mine.	540 acres	338 acres
Vertical Extent of Mine.	0' to 1000'	0' to 1050'

Life of Mines

Belina No. 1	Belina No. 2

** R614-301-100. **

First Coal Produced	Permitted (stand-by)	Permitted
Termination of Mining	20-25 Years	20-25 Years
Horizontal Extent of Workings	2494 Acres	2600 Acres
Vertical Extent of	0' to 1127'	0' to 1200'

The approximate total of surface land acres to be affected during the life of all mining activities is 79 acres, which includes the Valcam Loadout Facility, General Office Area, Belina Haul Road, and Belina Mine Site.

R614-301-117. Insurance, Proof of Publication and Facilities or Structures Used in Common.

R614-301-117.100.

Valley Camp of Utah, Inc., is insured for liability through policies (General Liability No. GL 99 48 43, Auto Liability No. BA996190, Workmens Compensation & Employers Liability No. WCK985101) issued by The Home Indemnity Company, et. al. The Utah Division of Oil, Gas & Mining is the certificate holder of record.

R614-301-117.200.

Valley Camp of Utah, Inc., will advertise the filing of this Mine Permit Renewal Application in the Price Sun-Advocate and Emery County Progress on dates determined by UDOGM. Proof of publication will be submitted as an addendum to this application. A copy of the advertisement which was submitted for publication is as follows:

Proposed Public Notice
For Filing Underground Mining Permit Renewal Application

Valley Camp of Utah, Inc., wishes to advise the public that it has filed an Underground Mine Permit Renewal Application with the State of Utah Department of Natural Resources, Division of Oil, Gas, and Mining, and the Office of Surface Mining Reclamation and Enforcement, United States Department of Interior. Valley Camp of Utah, Inc. further advises the public of the following:

1. The full name and business address of the applicant is:

Valley Camp of Utah, Inc.
Scofield Route
Helper, Utah 84526

2. The Valley Camp of Utah, Inc. Mine Permit Area is located in Carbon and Emery Counties, Utah, approximately 2 miles south of Scofield, Utah; 20 miles (50 miles by road) northwest of Price, Utah, and 110 miles southeast of Salt Lake City, Utah. Scofield is situated in Pleasant Valley and is

accessible by an all-weather road, State Highway 96. This highway connects with U.S. Highway 6 at Colton Junction, approximately 15 miles northeast of Scofield, Utah. From Colton Junction, U.S. Highway 6 extends to the northwest to Interstate 15 at Spanish Fork, Utah. From Colton Junction U.S. Highway 6 extends to the southeast to Price, Utah.

The Valley Camp of Utah, Inc., property extends from Green Canyon on the north to Cox Canyon on the south.

3. The land contained within the Mine Permit Area is described as follows:

T14S R7E SLB&M
Section 7 NW 1/4, and NW 1/4 of NE 1/4
Section 6 W 1/2, and W 1/2 of E 1/2

T14S R6E SLB&M
Section 1 E 1/2 NE 1/4, and NE 1/4 of SE 1/4

T13S R7E SLB&M
Section 31 SW 1/4, and W 1/2 of NW 1/4
Section 30 W 1/2 W 1/2, SE 1/4 SW 1/4, and NE 1/4 NW 1/4
Section 21 Parts of NW 1/4 NW 1/4
Section 20 Parts of NE 1/4 NE 1/4
Section 19 S 1/2 SW 1/4, NE 1/4 SW 1/4, and parts of W 1/2 E 1/2, E 1/2 NW 1/4, and NE 1/4 NE 1/4
Section 17 NE 1/4 excluding parts of SW 1/4 NE 1/4 and NE 1/4 NE 1/4, N 1/2 SE 1/4
Section 16 W 1/2 W 1/2, NE 1/4 NW 1/4, NW 1/4 NE 1/4
Section 9 W 1/2 SW 1/4
Section 8 E 1/2 SE 1/4, and a part of SW 1/4 SE 1/4

T13S R6E SLB&M
Section 36 All
Section 35 Parts of E 1/2 E 1/2, and SW 1/4 of SE 1/4
Section 25 E 1/2, and parts of W 1/2
Section 24 SE 1/4 and parts of S 1/2 NE 1/4, NW 1/4 NE 1/4, and E 1/2 SW 1/4

4. A copy of the Mine Permit Renewal Application is available for public inspection at the Carbon and Emery County Recorders' Offices and the Utah Division of Oil, Gas and Mining, 3 Triad Center, Suite 350, S.L.C., Utah 84180-1203 (801)538-5430.

5. Written comments, objections or request for an informal conference concerning the Mine Permit Renewal Application may be submitted to:

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Western Field Operations
Office of Surface Mining
Reclamation & Enforcement
Brooks Tower Second Floor
1020 15th Street
Denver, Colorado 80202

The railroad tracks overlap the Mine permit Area of Valley Camp of Utah, Inc. and Utah Fuel Co.

R614-301-118. Filing Fee.

N/A

R614-301-120. Permit Application and Contents.

R614-301-123. Notorized Signature Verification.

Verification of Application by Responsible Official of Applicant

STATE OF UTAH)
: ss.
COUNTY OF CARBON)

I, Walter L. Wright, President & Chief Operating Officer of Applicant, having been duly sworn, depose and state that I am authorized to complete and file this Application on behalf of Applicant and that all of the information contained in this Application is true and correct to the best of my information and belief.

Walter L Wright

Walter L. Wright

Subscribed and sworn to before me this 28th day of Sept, 1989

Valone A. Young

NOTARY PUBLIC
Residing at:

My Commission Expires:

Valone A. Young
Carbon County, Utah
My Commission Expires August 12, 1990

R614-301-117.300.

The railroad tracks overlap the Mine Permit Area of Valley Camp of Utah, Inc. and Utah Fuel Co.

R614-301-118. Filing Fee.

N/A

R614-301-120. Permit Application and Contents.

R614-301-123. Notorized Signature Verification.

Verification of Application by Responsible Official of Applicant

STATE OF UTAH)
: ss.
COUNTY OF CARBON)

I, Walter L. Wright, President & Chief Operating Officer of Applicant, having been duly sworn, depose and state that I am authorized to complete and file this Application on behalf of the Applicant and that all of the information contained in this Application is true and correct to the best of my information and belief.

_____

Walter L. Wright

Subscribed and sworn to before me this_____ day of_____, 19___

_____
NOTARY PUBLIC
Residing at:

My Commission Expires:

_____

R614-301-130. Reporting of Technical Data.

R614-301-131.

In addition to Valley Camp of Utah, Inc., personnel, the following assisted or were consulted in the preparation of the application:

1. United States Department of the Interior, Office of Surface Mining, Reclamation and Enforcement, Western Field Operations, Brooks Towers, 1020 15th Street, Denver, Colorado 80202
(303) 837-3773

2. State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining, 3 Triad Center, Suite 350, Salt Lake City, Utah 84180-1203
(801) 538-5340

3. United States Geological Survey, Utah Region, Salt Lake City, Utah 84115 (801) 524-4585

4. Department of the Interior, Bureau of Land Management, District and Regional Office, Salt Lake City, Utah 84116
(801) 524-5348

5. United States Department of Agriculture, Soil Conservation Service, Salt Lake City, Utah 84116
(801) 524-5068

6. State of Utah, Department of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah 84116 (801) 533-9333

7. Golder Associates, Inc., Chief Consultants, 4671 Bayard Park Drive, Evansville, Indiana 47715
(812) 473-2097

8. Vaughn Hansen Associates, Consultant-Hydrology, Geology, Ground Water, Surface Water, and Climatology.
Waterbury Plaza, Suite A, 5620 South 1475 East, Salt Lake City, Utah 84121
(801) 272-5263
DBA Hansen Allen & Luce Inc., 6771 South 900 East, PO Box 21146, Salt Lake City, Utah, 84121-0146
(801) 566-5599

9. Dr. Richard Hauck, Consultant-Archeological Resource Inventory, 588 West 800 South, Bountiful, Utah 84010
(801) 292-7061

10. Cedar Creek Associates, Inc., 916 Willshire Ave. P.O. Box 9957 Fort Collins, Colorado 80525 (303) 493-4394

11. Dr. Joseph Murdock, Brigham Young University, Consultant-Vegetation and Soils, 110 B-49, Provo, Utah 84602 (801) 378-2583

12. Dr. Clyde Pritchett, Brigham Young University, Consultant-Wildlife, 340 MLBM, Provo, Utah, 84602 (801) 378-2419

13. Dr. Stanley Welsh, Consultant-Endangered Plant Species, 129 North 1000 East, Orem, Utah 84057 (801) 378-2289

14. Dr. Clayton White, Brigham Young University, Consultant-Raptors and Ornithology, 161 WIDB, Provo, Utah 84602 (801) 378-2263

15. Dr. Robert Winget, Brigham Young University, Consultant-Aquatic Ecology, 115 Page Building, Provo, Utah 84602 (801) 378-4372

16. Dr. Patrick D. Collins, Mt. Nebo Scientific Research & Consulting, P.O. Box 337, Springville, Utah 84663 (801) 489-6937

R614-301-132.

All technical analyses have been completed under the direction of qualified registered professionals.

R614-301-140. Maps & Plans.

Are submitted as required.

R614-301-150. Completeness.

This Mine Permit Renewal Application is submitted as complete.

TABLE OF CONTENTS

SOILS R614-301-200

R614-301-200. SOILS.

The Reclamation Plan (See R614-301-540.), is divided into four areas: the Valcam Loadout Facility; General Office Area; Belina Haul Road; and the Belina Mine Site.

R614-301-220. Environmental Description.

R614-301-221. Prime Farmland Investigation.

The Mine Permit Area soils do not meet the requirements as: "The growing season is too short and without irrigation water the moisture requirement for prime farmland cannot be met." As per May 28,1982 letter by Mr. George D.McMillan, State Conservationist, USDA Soil Conservation Service, P.O. Box 11350, Salt Lake City, Ut. 84147. See Appendix R614-301-221. (PFI)

R614-301-222. thru 301-223. Soil Survey.

Valley Camp of Utah, Inc. lease area soils are developed in vegetation types and topographic features similar in all major respects to the adjacent Skyline lease area soils. Based on previous extensive studies of the adjacent Skyline Lease Area, data for those studies were collected as follows:

Soils Analysis (methods)--At each vegetation site a soil pit was excavated to the parent material, or to a depth of 60 inches, whichever occurred first. The exposed soil profile provided information for classification of the soils into taxonomic units. Samples were taken from each of the horizons exposed in each pit and were analyzed for major chemical properties.

Soils were classified to family unit according to the system utilized for classification of soils by the Soil Conservation Service (Johnson 1975). Use of this method has allowed for correlation of these soils to series level with the new Carbon/Emery County soils mapping effort recently completed by the Soil Conservation Service and Forest Service.

Chemical analyses for micro-nutrients were made by testing a soil extract with DTPA solution and were measured by use of an atomic absorption analyzer. Ammonium acetate was used to extract sodium, magnesium, and calcium for atomic absorption analysis. The Kjeldahl method was used for determination of percent organic matter. All analyses were conducted in the Agronomy Laboratory at Brigham Young University.

Soil texture was determined by using a Bouyoucus hydrometer method, with sodium hexametaphosphate dispersing agent. Soil reaction was determined on a 1:1 soil/water mixture which was tested in a Corning pH meter Model 10. Salinity was analyzed by use of a Wheatstone conductivity cell on an extract of each soil

sample. Carbonate content was estimated from observations of effervescence following application of a 10 percent solution of hydrochloric acid. The scale of effervescence follows the rating system suggested by the Soil Conservation Service (USDA Soil Survey Manual, 1937). Soil color was obtained by comparing a moist and a dry sample with the standard Munsel soil color charts. Observations of soil structural units also follow the Soil Conservation Service suggested designation as outlined in the Soil Survey Manual.

Local climatic data suggest cryic and frigid temperature regimes. The cryic regime is typically conifer-aspen related, and includes some high meadows. These areas are too cold for cultivation of crop plants by ordinary means. Frigid designation is given to soils typical of sagebrush types; some crops can be grown on these soils. Most of the soils are in the ustic (moisture arriving in summer) regimes.

All soils have textures ranging from sandy loams to clay loams, and are considered neither unusual for the area in general or for the vegetation types these soils support. A comparison of spruce-fir and aspen soils, which as broad categories make up more than 80 percent of the lease area soils, shows that the pH and salinity measurements are probably normal for this climatic regime with the pH range from mildly acidic to neutral. There is a slight difference in soil reaction between spruce-fir (ph 5.0) and aspen (pH 6.0) soils. It is characteristic that the evergreen conifer types are more acidic than the deciduous forest of aspen.

Even the most saline soil measured in the lease area, with an EC x 10 measurement of 1.88, is considered extremely low when compared to agricultural soils. A slight difference between soils is noted when depths are compared. The solum of aspen extends to an average depth of 20 inches at nine locations and to 18 inches at seven locations of the spruce-fir type. This corresponds to the average depths of measurements in aspen of 19.9 inches and of 18.1 inches in spruce-fir soils. It is also apparent that soils in aspen communities are more fertile in the commonly applied fertilizer elements nitrogen, phosphorus, and potassium, and also in most micro-nutrients. The levels of iron, magnesium, and manganese are considered to be adequate for growth of native vegetation, even though somewhat below amounts reported for average soils in the Western United States (Shacklette, et al. 1971). Moderate amounts of zinc, calcium, and potassium indicate that adequate quantities of these minerals are present, except in sagebrush soils.

High amounts of calcium, especially in the B-horizon of spruce-fir soils are not considered a problem in immobilization of phosphorus due to the acid pH of these soils. Concentrations of calcium in sagebrush and aspen soils could become a problem in phosphorus relations if soils are altered to become more basic. Nitrate nitrogen is low in quantity, as was expected for these soil types. Average amounts of nitrate nitrogen are inadequate in all soils of the region, and in all horizons. All areas would respond to addition of nitrogen.

** R614-301-200. **

In summary, the most important fertilizer to be applied in reclamation is nitrogen. The addition of nitrogen should be timed with suitable moisture content in the soils, which usually occurs in the fall and spring.

The Soils Map (R614-301-223.100) of the area indicates soils mapping units of the lease area. These units are designated by upper case letter A through E and are mapped at an Order Three intensity. Adjacent soils are designated by lower case letters a through v and are mapped at an Order Two intensity. A dashed line is used to enclose these mapping units. Taxonomic classification of the soil sample is summarized as follows:

Map Unit	Taxonomic Classification	Sample Site
A	Loamy-skeletal, mixed Mollic Cryoboralfs	3
B	Fine loamy, mixed Argic Pachic Cryoborolls	11
C	Loamy-skeletal, mixed Argic Cryoborolls	12
D	A complex of units B and C	
E	A complex of units A, B, and C	
a	Loamy-skeletal, mixed Mollic Cryoboralfs	
b	Fine loamy, mixed Argic Pachic Cryoborolls	11
f	Similar to B with 30% of the soils having a slope greater than 60% and as much as 50% rock fragments less than 12 inches.	11
g	Coarse loamy, mixed Pachic Cryoborolls	10
h	Rock outcrops	
i	Loamy-skeletal, mixed Typic Cryoborolls	8
k	Course-loamy, mixed Cumulic Cryoborolls	6
l	Loamy-skeletal, mixed Typic Cryoborolls	5

Map Unit	Taxonomic Classification	Sample Site
m	Loamy-skeletal, mixed Typic Cryoboralfs	4
p	Coarse-loamy, mixed Mollic Cryofluvent	2
q	Coarse-loamy, mixed Cumulic Cryoborolls	1
r	Coarse-loamy, mixed frigid Typic Argiborolls	15
s	Complex of 10% r, 45% t, and 35% u	
t	Coarse-loamy, mixed frigid Mollic with 15% u and 5% q	17
u	Coarse-loamy, mixed frigid Typic Haploborolls with 5% r	18
v	Loamy-Skeletal, mixed Lithic Cryocrepts	7

Map Units A and a

These units consist of deep well drained soils that have formed in colluvium and residuum. They are on steep north-facing slopes ranging from 35 to 60 percent. Included is 5 percent rock outcrop and 5 percent similar soils.

The surface texture is loam or very fine sandy loam. Thickness of the mollic epipedon ranges from 2 to 4 inches. The A2 horizon ranges from striping of ped faces to a leached horizon 4 inches thick. Depth of the argillic horizon is 12 to 15 inches. Depth of the C horizon is 18 to 22 inches. Percent of rock fragment by volume in the upper 20 inches ranges from 5 to 15 percent. The lower portion ranges from 35 to 55 percent.

Erosion hazard is slight, but severe if disturbed due to surface textures and steep slopes.

The potential rating for borrow soil is poor due to thin surface layers, rock fragments content, and steep slopes.

Table 1. Soil Analysis Data, Profile Description, Sample Site 3 Mapping Unit:A,a

Vegetative Type: Spruce/Fir

Location: Permit Area

Horz.	Depth	Color Dry	Color Moist	Texture Sand	Silt	Clay	Class	Structure	Percent Rock Fgts.	Percent Org. Mat.
O*	2-0									
A1	0-3	10YR 5/2	10YR 3/2	33	55	12	sl	1mkpl 2mgr	5gr	6.99
A2	3-7	10YR 7/2	7.5YR 5/4	48	37	15	l	2m sbk	5gr	0.44
B21	7-14	10YR 7/2	10YR 5/4	48	39	13	l	2m&f sbk	5gr	t
B22**	14-20	10YR 7/3	10YR 6/4	49	39	12	l	2m sbk	10gr, 5k	t
C	20-52+	10YR 8/4	10YR 6/6	43	39	16	l	m	5s	t

Horizon	pH	Effervescence	EC x 1000	Solubility ppm Ca	Mg	Na	SAR	Percent Moist. Satur.
O*								
A1	6.3	eo	0.67	86.9	10.4	10.7	0.14	61
A2	5.6	eo	0.31	44.8	4.8	9.9	0.19	26
B21	5.6	eo	0.29	41.8	4.6	11.8	0.23	24
B22**	5.4	eo	0.26	35.0	5.8	15.0	0.31	21
C	5.6	eo	0.31	27.8	4.2	20.8	0.48	21

Taxonomic Classification: Loamy-skeletal, mixed, mollic cryoboralfs.
*Decomposing spruce/fir needles and twigs
**20% 10YR 7/2 and 15% 10YR 6/8 weathering stains

Map Units B, b, and f

These units consist of deep well drained soils that have formed in residuum and colluvium. They are on steep mountain slopes and benches with slopes of 35 to 50 percent. Included is 4 percent moderately deep similar soils.

Surface texture ranges from loam to a fine sandy loam. The argillic horizon texture ranges from a loam to a clay loam. The texture of the C horizon is variable due to location of weathered sandstone fragments ranging from clay to loam to a sandy clay. There is 5 to 10 percent by volume of rock fragments throughout the profiles. Thickness of surface horizons ranges from 8 to 14 inches. Depth of the argillic horizon ranges from 12 to 18 inches. Depth of the C horizon ranges from 26 to 30 inches, and depth to bedrock ranges from 48 to over 60 inches.

Erosion hazard is moderate. Soil creep is evident. If disturbed, erosion hazard is severe due to steep slopes and a past history of down-slope movement.

Potential rating for borrow topsoil is poor due to steep slopes. Otherwise, this is a good source. Predominant vegetation is aspen.

Table 2. Soil Analysis Data, Profile Description, Sample Site 11 Mapping Unit: B,b,& f

Vegetative Type: Aspen

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A11	0-3		7.5YR 3/2	50	28	22	scl	2mgr		6.98
A12	3-9		7.5YR 3/2	53	27	20	scl	1f sbk		4.78
B1	9-14		7.5YR 3/2	53	25	22	scl	2c sbk		1.81
B2+	14-24		10YR 3/3	51	28	21	scl	3mpr	2gr	1.44
B3	24-48		10YR 4/3	50	28	22	scl	2c sbk	7gr	0.77
C	28-50		10YR 5/4	41	24	25	l	m	5gr 10k	0.41

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A11	6.9	eo	0.20	63.5	10.9	9.6	0.15		49
A12	7.0	eo	0.43	42.6	5.6	11.8	0.23		36
B1	7.1	eo	0.38	34.6	4.0	22.1	0.47		28
B2+	7.0	eo	0.33	27.8	3.0	17.8	0.43		25
B3	6.9	eo	0.32	27.5	2.7	19.8	0.48		25
C	6.7	eo	0.37	35.5	4.0	23.7	0.50		27
R*									

Taxonomic Classification: Fine loamy, mixed Argic Pachic Cryoborolls
*Sandstone

Map Unit C

This unit consists of moderately deep, well drained soils that have formed in residuum and colluvium. They are on steep mountain slopes of 35 to 50 percent. Included in this unit are 5 percent similar shallow soils, 5 percent rock outcrop, and 3 percent similar deep soils.

Surface texture is silt loam to clay loam. Thickness of the surface ranges from 7 to 11 inches. Depth to the argillic ranges from 15 to 20 inches. Depth to sandstone bedrock ranges from 30 to 40 inches. There is 0 to 5 percent rock fragment by volume in the upper 30 inches. The C horizon ranges from 35 to 55 percent rock fragment by volume.

Erosion hazard is moderate at present and severe if disturbed due to steep slopes.

Potential rating for borrow topsoil is poor due to steep slopes. The dark surface soil averages 20 inches in depth.

Present vegetation is predominantly a grass and forb mixture with a few snowberry and elderberry bushes.

Table 3. Soil Analysis Data, Profile Description, Sample Site 12 Mapping Unit: C
Vegetative Type:Grass/Forb/Elderberry

Location: Permit Area

Horz.	Depth	Color Dry	Color Moist	Texture Sand	Silt	Clay	Class	Structure	Percent Rock Fgts.	Percent Org. Mat.
A11	0-4	10YR 3/2	10YR 3/2	22	45	33	cl	2m gr	2gr	5.31
A12	4-8		7.5YR 3/2	32	38	30	cl	1m sbk 2fgr	2gr	4.19
B21	8-19		10YR 4/2	34	35	31	cl	2c sbk	4gr	2.52
B22+	19-29		10YR 4/2	34	36	30	cl	2m pr	5gr	2.23
C	29-33		10YR 5/5	39	34	27	l	m	10gr 15k	0.83
R*	33+									

Horizon	pH	Effervescence	EC x 1000	Solubility ppm Ca	Mg	Na	SAR	Percent Moist. Satur.
A11	6.7	eo	1.28	26.1	24.8	15.7	0.26	44
A12	6.5	eo	0.44	47.7	5.4	14.7	0.27	39
B21	6.8	eo	0.33	34.1	2.9	16.8	0.37	35
B22+	6.8	eo	0.32	31.5	3.2	18.4	0.42	34
C	6.7	eo	0.35	36.8	4.0	17.6	0.37	29
R*								

Taxonomic Classification: Loamy-skeletal, mixed Argic Cryoborolls *Sandstone

Map Unit g

This unit consists of moderately deep, well drained soils that have formed in colluvium. They are on steep mountain sides with slopes of 35 to 50 percent. Included in this unit is 6 percent of Map Unit k, Cumulic Cryoborolls, and 2 percent rock outcrop.

Surface texture ranges from a loam to a fine sandy loam. C horizon texture ranges from a loamy very fine sand to a fine sand. Percent rock fragment by volume ranges from 10 to 15 at the surface and 35 to 70 in the C horizon. Depth to sandstone bedrock ranges from 25 to 38 inches.

Erosion hazard is moderate at present and severe if disturbed due to surface texture and steepness of slopes.

The potential rating for borrow topsoil is poor due to slope steepness. Present predominant vegetation is aspen.

Table 4. Soil Analysis Data, Profile Description, Sample Site 10 Mapping Unit: g

Vegetative Type: Aspen

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-6	10YR 4/2	10YR 3/2	63	21	16	sl	3f gr	10gr	7.83
AC	6-20	10YR 5/2	10YR 3/2	64	22	14	sl	2f sbk 2mgr	10gr 5k	2.81
C	20-31	10YR 6/3	10YR 5/4	64	22	14	sl	1m sbk	20gr 30k	0.58
R*	31+								20s	

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A1	6.6	eo	0.67	97.1	13.8	6.9	0.09	41	
AC	6.7	eo	0.47	65.6	6.6	9.4	0.15	30	
C	6.4	eo	0.35	49.1	4.5	10.7	0.20	23	
R*									

Taxonomic Classification: Coarse loamy, mixed Pachic Cryborolls *Sandstone

Map Unit h

This unit consists of rock outcrops with less than 5 percent soil associated within the area. The soils dispersed among the rocky areas are similar to those described in Table 14. Because of the similarities no chart of soils features has been prepared for this mapping unit.

Table 14. Soil Analysis Data, Profile Description, Sample Site 7 Mapping Unit: v

Vegetative Type: Sagebrush

Location: Permit Area

Horz.	Depth	Color Dry	Color Moist	Texture Sand	Silt	Clay	Class	Structure	Percent Rock	Percent Fgts.	Percent Org. Mat.
A1	0-5	10YR 4/2	7.5YR 3/2	51	31	18	l	2f gr	15gr	15k 10s	5.25
B2	5-16	10YR 5/3	10YR 4/3	50	33	17	vfsl	2f sbk	5gr	30k 15s	1.32
R*											

Horizon	pH	Effervescence	EC x 1000	Solubility ppm Ca	Mg	Na	SAR	Percent Moist.	Satur.
A1	7.1	eo	0.83	133.4	16.8	12.5	0.14	41	
B2	7.1	eo	0.54	84.5	11.7	12.0	0.16	31	

Taxonomic Classification: Loamy-skeletal, mixed lithic Cryocrepts *Sandstone

Map Unit i

This unit consists of deep, well drained soils that have formed in residuum. They are on moderately steep mountain slopes of 15 to 35 percent. Included in this unit is 8 percent of similar soil with 4 to 8 inches of mollic epipedon and 3 percent of a similar soil with 16 to 26 inches of mollic epipedon.

Textures in the surface are loam to very fine sandy loam. Textures in the C horizon are very fine sandy loam to loamy fine sand. Thickness of the surface horizon ranges from 8 to 14 inches. Depth to the C horizon ranges from 20 to 40 inches. Rock fragment content by volume is 5 to 15 percent in the surface horizon, 15 to 30 percent in the B horizon and 35 to 50 percent in the C horizon.

Erosion hazard rating for the topsoil is fair due to the percent rock fragment and slope steepness. In some places where the surface layer is less than 20 inches the rating is poor.

At present the dominant vegetation is aspen and grass.

Table 5. Soil Analysis Data, Profile Description, Sample Site 8 Mapping Unit: I

Vegetative Type: Aspen

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
O*	1-2									
A11	0-2	10YR 4/2	7.5YR 3/2	59	26	14	sl	1mkpl 2fgr	5gr	6.53
A12	2-10	10YR 5/3	7.5YR 3/2	58	25	17	sl	2fobk 2mgr	10gr 5k	3.51
B2	10-23	10YR 6/3	7.5YR 4/4	59	26	15	sl	2m sbk	20gr 10k	1.58
C	23-48	2.5YR 7/4	10YR 5/4	47	29	24	l	m	15gr 20k	t
CR**	48-60+								k100	

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist. Satur.
O*								
A11	6.9	eo	0.96	121.4	17.4	9.47	0.11	67
A12	6.8	eo	0.49	55.4	6.1	10.2	0.17	29
B2	6.7	eo	0.33	40.3	2.9	15.2	0.31	22
C	6.3	eo	0.31	35.0	3.4	18.6	0.40	30
C	5.6	eo	0.31	27.8	4.2	20.8	0.48	21

Taxonomic Classification: Loamy-skeletal, mixed typic Cryoborolla.
*Decomposing leaves and twigs **Weathering conglomerate

Map Unit k

This unit consists of very deep, well drained soils that have formed in alluvium and colluvium. They are on toe slopes of steep and very steep mountain sides. Slopes range from 15 to 35 percent. Included is 3 percent of a similar soil with 15 to 25 percent cobbles throughout the profile.

Surface horizon textures are silt loam, loam, or very fine sandy loam. The C horizon textures are very fine sandy loam to loamy fine sand and begin at 30 to 36 inches depth. Rock fragment by volume ranges from 0 to 15 percent at the surface and 15 to 35 percent in the lower horizons.

Erosion hazard is moderate at present and will be moderate if disturbed due to the location of the fans.

The potential rating for topsoil is good. There is a thick surface and there are few rock fragments in the top 40 inches.

Prodominant vegetation at present is aspen, snowberry, and elderberry.

Table 6. Soil Analysis Data, Profile Description, Sample Site 6 Mapping Unit: k

Vegetative Type: Aspen

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A11	0-4	10YR 4/2	7.5YR 3/2	59	25	16	sl	3f gr	10gr	6.16
A12	4-14	10YR 5/3	5.5YR 3/2	48	34	18	1	2 f&m sbk	10gr 5k	1.07
AC	14-32	10YR 6/3	10YR 3/3	49	33	18	1	2m sbk	10gr 10k	2.72
C	32-48+	10YR 6/3	7.5YR 4/4	52	31	17	1	1 m&c sbk	10gr 15k	t

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A11	7.3	eo	0.84	111.8	18.6	14.1	0.16		45
A12	7.2	eo	0.33	40.0	4.6	14.1	0.28		29
AC	7.2	eo	0.32	41.0	4.8	14.6	0.29		27
C	7.4	eo	0.31	38.7	4.5	14.2	0.29		26

Taxonomic Classification: Coarse-loamy, mixed cumulic Cryoborolls.

Map Unit 1

This unit consists of moderately deep, excessively drained soils that have formed in residuum and colluvium. They are on very steep south facing mountain slopes of 60 percent and more. There is 30 percent rock outcrop and 10 percent shallow soils.

Surface texture is loam to very fine sandy loam. The mollic epipedon ranges from 7 to 11 inches in thickness. Depth to sandstone bedrock ranges from 24 to 40 inches. Percent rock fragment by volume ranges from 15 to 30 percent in the surface horizons and 35 to 65 percent in the lower horizons.

Erosion hazard is moderate at present and severe if disturbed due to the steep slopes and sparse ground cover.

The potential rating for topsoil is poor due to the thin surface layers, large percentage of rock fragments, and very steep slopes.

Predominant vegetation is sagebrush and grass.

Table 7. Soil Analysis Data, Profile Description, Sample Site 5 Mapping Unit: 1

Vegetative Type: Sagebrush

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A11	0-3	10YR 4/2	10YR 3/2	30	54	16	sl	2f gr	10gr 5k	2.66
A12	3-8	10YR 5/2	10YR 3/2	54	27	19	sl	1f sbk	10gr 10k	1.86
B	8-24	10YR 7/3	10YR 5/4	56	30	14	sl	2f sbk	10gr 30k 10s	t
C	24-31	2.5YR 7/4	10YR 5/5	52	25	28	scl	1m sbk	5gr 25k 15s	t
R	31+ *									

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist. Satur.
A11	7.3	eo	0.72	112.5	17.6	12.0	0.14	34
A12	7.3	eo	0.54	72.4	11.2	12.5	0.18	30
B	7.4	eo	0.37	52.3	8.3	11.2	0.19	25
C	7.4	eo	0.40	49.0	8.5	17.6	0.30	34
R								

Taxonomic Classification: Loamy-skeletal, mixed typic cryoboralfs. * Sandstone

Map Unit m

This unit consists of deep, well drained soils that have formed in colluvium and residuum. They are on steep slopes that range from 35 to 60 percent. There is 8 percent similar soils included in this unit and 3 percent rock outcrop.

The surface texture is loam or clay loam. The surface is 6 to 10 inches thick. The C horizon begins at 18 to 20 inches. The percent of rock fragment by volume ranges from 5 to 10 in the upper 20 inches and 35 to 75 below 20 inches.

Erosion hazard is moderate at present and severe if disturbed due to steepness of slopes.

The potential rating for borrow topsoil is poor. There is a large rock fragment content, the surface layer is stony and the slopes are steep.

Present vegetation is mostly big sagebrush, snowberry, and an understory of grass.

Table 8. Soil Analysis Data, Profile Description, Sample Site 4 Mapping Unit: m

Vegetative Type: Sagebrush

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-8	10YR 5/2	10YR 4/2	32	14	54	cl	3f gr	5gr	4.21
B2	8-19	2.5YR 7/2	2.5YR 6/4	22	37	14	cl	3f abk	5gr	t
C1	19-28	2.5YR 7/5	10YR 5/8	38	28	34	cl	2m sbk	15gr 25k	t
C2	28-36	2.5YR 7/2	10YR 6/3**	71	11	18	sl	m	5gr 20k 50s	t

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A1	7.3	eo	0.88	156.5	8.6	14.4	0.15		56
B2	7.6	eo	0.38	62.2	2.7	11.8	0.20		41
C1	7.7	eo	0.47	81.4	4.3	12.5	0.18		35
C2	7.8	eo	0.44	74.2	2.9	8.8	0.14		28

Taxonomic Classification: Loamy-skeletal,mixed typic cryoboralf.
* 20% 10YR 6/8 weathering stains **10% 10YR 6/8 weathering stains

Map Unit p

This unit consists of deep, somewhat poorly drained soils that have formed in recent stream alluvium. These soils are on stream floodplains. Slopes range from 0 to 3 percent. There is 8 percent inclusion of soil with gravel layers at a depth of 40 inches and 2 percent inclusion of soils that are better drained.

The ground water table is high during spring runoff at 8 to 10 inches. Texture throughout the profile ranges from silt loam to loamy fine sand. Thickness of lenses ranges between 2 and 8 inches. There is an area of .5 acres where there is a gravel layer at 2 to 4 inches depth. This is believed to have been hauled into a corral area.

There is a rating of good potential for borrow topsoil where the water table is below 12 inches. Otherwise, wetness is restrictive.

At present, the predominant vegetation is a grass and forb mixture.

Table 9. Soil Analysis Data, Profile Description, Sample Site 2 Mapping Unit: p

Vegetative Type: Disturbed

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-5	10YR 4/2	10YR 2/2	46	34	20	l	3f gr		6.67
AC	5-12	10YR 5/2	10YR 5/2*	32	41	27	l	2m sbk		5.77
C1**	12-25	10YR 5/2	10YR 4/3	47	33	20	sl	m		4.31
C2	25-57	10YR 6/2	10YR 4/1	59	26	15	sl	m	65 gr	1.96
C3	57-67+	10YR 6/2	10YR 5/2	72	15	13	sl	m	65 gr	2.25

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist. Satur.
A1	6.2	eo	3.22	745.0	71.7	15.0	0.07	47
AC	7.2	eo	2.20	455.7	46.1	14.2	0.08	44
C1	7.0	eo	2.31	499.2	66.6	16.0	0.09	42
C2	7.2	eo	1.66	348.2	45.1	20.6	0.14	35
C3	6.8	eo	2.26	499.2	61.4	24.2	0.14	33

Taxonomic Classification: Coarse-loamy, mixed, mollic Cryofluvent *Mottles begin at 8 inches
**C horizons are stratified layers of sands and silts that vary in thickness and in texture.

Map Unit q

This unit is moderately deep to gravel, and moderately well drained. These soils have formed in recent alluvium, and areas on stream terraces. Slopes range from 0 to 3 percent. There is 10 percent inclusion of similar soils in this unit.

The ground water is high during spring runoff at 18 to 24 inches. The surface texture is silt loam to loam. The C horizon texture is loam to loamy very fine sand. Depth to the gravel ranges from 28 to 36 inches.

Erosion hazard is slight at present and will remain slight if disturbed.

There is a rating of fair potential for borrow topsoil. The course texture in some lenses may be too sandy and the increase of coarse fragments below 40 inches depth makes reclamation potential of the borrow area fair.

The present predominant vegetation is a mixture of sagebrush, grasses, and forbs.

Table 10 Soil Analysis Data, Profile Description, Sample Site 1 Mapping Unit: q

Vegetative Type: Sagebrush

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A11	0-5	10YR 4/2	10YR 2/2	45	31	24	l	3f gr		6.02
A12	5-14	10YR 4/2	10YR 2/2	73	4	23	scl	3f gr		3.06
AC	14-24	10YR 5/2	7.5YR 3/2	45	36	19	l	1m sbk/2f sbk		1.27
C1	24-31	10YR 5/2	10YR 3/2	48	31	21	l	2c gr		1.36
C2	31-42+	10YR 5/3	10YR 3/3	59	21	20	sl	1fsbk	60 gr 4k	1.01

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A11	6.9	eo	2.92	422.4	47.4	13.8	0.08		44
A12	7.3	eo	1.20	235.5	30.4	14.2	0.14		35
AC	7.1	eo	0.97	151.7	32.5	19.4	0.19		30
C1	7.2	eo	0.89	151.8	32.8	26.6	0.25		32
C2	7.3	eo	1.10	204.8	37.3	16.6	0.14		28

Taxonomic Classification: Coarse-loamy, mixed, cumulic cryoborolls.

Map Unit r

This type consists of well drained soils that have formed in colluvium and residuum. Slope ranges from 8 to 15 percent. Elevations range from 8000 to 8100 feet. Present vegetation is predominately stinging nettle.

Erosion is slight at present and erosion will be slight if disturbed.

Suitability rating for topsoil is fair due to depth to bedrock.

Range of characteristics include a surface layer 3 to 5 inches thick with 5 to 15 percent rock fragments by volume. The topsoil is 6 to 10 inches thick with 10 to 20 percent rock fragments by volume. Texture of the subsoil is loam or sandy clay loam. The substratum is moderately deep to bedrock at a depth of 30 to 36 inches. There is 35 to 55 percent rock fragment by volume and a texture of loam or sandy loam in the substratum.

Included in this unit are 10 percent of the soils described in Unit p and 5 percent of a deep similar soil.

Table 11 Soil Analysis Data, Profile Description, Sample Site 15 Mapping Unit: r

Vegetative Type: Stinging nettle

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-4	10YR 3/2	10YR2.5/1	33	47	20	Loam	2f gr	10 gr	7.04
B2+	4-12	10YR 5/3	7.5YR 3/2	31	44	25	Loam	2m pr	15 gr	1.40
C1	12-23	10YR 7/3	10YR 4/4	36	44	20	Loam	massive	30 gr 15 cob t	
C2	23-34	10YR 6/4	10YR 4/4	37	41	41	Loam	massive	25 gr 15 cob t	
R	33								5 stone	

				Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A1	7.28	eo	0.43	146.0	28.5	17.9	0.18	66	
B2+	7.46	eo	0.27	36.2	5.9	6.9	0.14	34	
C1	7.61	eo	0.20	20.2	4.4	9.4	0.25	28	
C2	7.48	eo	0.26	22.9	4.5	13.9	0.35	26	

Taxonomic Classification: Typic argiborolls, coarse-loamy, mixed, frigid

Map Unit s

This is a complex consisting of 45 percent of the soil described in Unit t, 35 percent of the soil described in Unit u, and 10 percent of the soil described in Unit r.

Map Unit t

This unit consists of well drained soils that have formed in residuum. Slopes range from 8 to 15 percent. Elevation ranges from 8000 to 9100 feet. Present vegetation is predominately Douglas Fir and Engelmann Spruce.

Erosion is slight to moderate at present and the erosion hazard will be moderate if disturbed.

Suitability rating for topsoil is fair due to depth to bedrock. Range of characteristics include a surface layer 1 to 4 inches thick with 0 to 5 percent rock fragments by volume. The subsoil is 15 to 20 inches thick with 0 to 5 percent rock fragments by volume. The texture of the subsoil is sandy loam or loam. The substratum is moderately deep to bedrock at a depth of 30 to 36 inches. There are 20 to 35 percent rock fragment by volume and a texture of loam to sandy clay loam in the substratum.

Included in this unit are 15 percent of the soil described in Unit u to 5 percent of the soil described in Unit q.

Table 12 Soil Analysis Data, Profile Description, Sample Site 17 Mapping Unit: t

Vegetative: Spruce/Fir

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-2	10YR 3/2	10YR 2/2	35	44	21	Loam	3f gr	0	7.82
B21	2-11	10YR 4/2	10YR 3/3	35	41	24	Loam	2f sbk	5 gr	3.09
B22+	11-20	10YR 5/2	7.5YR 3/3	32	44	24	Loam	1f sbk	3 gr	1.35
C	20-33	10YR 6/3.5	10YR 4/4	35	40	25	Loam	massive	20 gr 5 cob	0.27
R	33									

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist. Satur.
A1	7.20	eo	0.68	104.0	17.7	4.96	0.06	75
B21	7.36	eo	0.32	50.7	8.5	5.60	0.10	41
B22+	7.48	eo	0.21	31.4	4.4	6.24	0.14	36
C	7.31	eo	0.19	29.3	4.8	7.68	0.17	30

Taxonomic Classification: Mollic eutroboralfs coarse-loamy, mixed, frigid with 15% u and 5% q

Map Unit u

This unit consists of well drained soils that have formed in residuum. Slopes range from 2 to 8 percent. Elevations range from 8000 to 8900 feet. Present vegetation is predominately aspen.

Erosion is slight at present and the erosion hazard will be slight when disturbed.

Suitability rating for topsoil is fair due to depth to bedrock.

Range of characteristics include a surface layer 8 to 12 inches thick with 0 to 5 percent rock fragment by volume. The substratum is moderately deep to bedrock at a depth of 35 to 40 inches. Texture is clay loam or sandy clay loam. Rock fragments by volume range from 10 to 20 percent.

Included in this unit are 10 percent of a similar deep soil and 5 percent of the soil described in Unit t.

Table 13. Soil Analysis Data, Profile Description, Sample Site 18 Mapping Unit: u

Vegetative Type: Aspen

Location:Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A11	0-3	10YR 3/2	10YR 2.5/2	33	41	26	Loam	3m gr	3 gr	7.15
A12	3-9	10YR 4/2	10YR 2.5/1	37	37	26	Loam	3m sbk	0	2.76
B21	9-15	10YR 5/3	7.5YR 3/2	35	41	24	Loam	2c sbk	0	0.61
B22	15-23	10YR 6/3	10YR 3/3	35	40	25	Loam	2m pr	5gr 10cob	t
C1	23-32	10YR 6/4	10YR 4/4	35	37	28	Clay Loam	1f sbk	15gr	t
C2	32-37	10YR 6/4	10YR 4/4	31	36	28	Clay Loam	massive	15gr	t
R	37									

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A11	7.23	eo	0.80	134.0	19.30	4.96	0.05	57	
A12	7.33	eo	0.41	61.9	9.14	6.72	0.11	39	
B21	7.41	eo	0.28	36.5	5.49	7.52	0.15	32	
B22	7.45	eo	0.21	27.7	4.46	6.88	0.16	27	
C1	7.26	eo	0.23	32.5	6.03	10.20	0.21	27	
C2	7.16	eo	0.30	21.3	3.98	16.80	0.44	33	

Taxonomic Classification: Typic haploborolls

Map Unit v

This type consists of shallow, excessively drained soils that have formed in colluvium and residuum. They are on steep to very steep mountain sides. Slopes are 35 to 60 percent. Included is 3 percent of a moderately deep similar soil and 8 percent rock outcrop. Textures range from loam to loamy very fine sand. Depth to fractured bedrock is 14 to 20 inches. Rock fragments range from 35 to 55 percent.

Erosion is moderate at present and the erosion hazard will be severe if disturbed due to sparse vegetation and steep slopes.

The potential rating for borrow topsoil is poor due to steep slopes, thin surface layers and the amount of rock fragments.

Predominant vegetation is sagebrush with a grass understory.

(Welch,et.al.,Endangered Plant Studies, Inc.,1980)

Table 14. Soil Analysis Data, Profile Description, Sample Site 7 Mapping Unit: v

Vegetative Type: Sagebrush

Location: Permit Area

		Color		Texture					Percent	Percent
Horz.	Depth	Dry	Moist	Sand	Silt	Clay	Class	Structure	Rock Fgts.	Org. Mat.
A1	0-5	10YR 4/2	7.5YR 3/2	51	31	18	l	2f gr	15gr 15k 10s	5.25
B2	5-16	10YR 5/3	10YR 4/3	50	33	17	vfsl	2f sbk	5gr 30k 15s	1.32
R*										

			Solubility ppm				Percent	
Horizon	pH	Effervescence	EC x 1000	Ca	Mg	Na	SAR	Moist.	Satur.
A1	7.1	eo	0.83	133.4	16.8	12.5	0.14	41	
B2	7.1	eo	0.54	84.5	11.7	12.0	0.16	31	

Taxonomic Classification: Loamy-skeletal, mixed lithic Cryocrepts *Sandstone

R614-301-224. Subsitute Topsoil.

Refer to R614-301-231.200 thru 301-231.300.

R614-301-230. Operation Plan.

R614-301-231. General Requirements.

R614-301-231.100.

The Valcam Loadout Facility was established prior to the topsoil requirement; however, some "substitute topsoil" was harvested, analyzed, and approved. This material is stored at the Belina Mine Site.

In 1988, materials excavated from the 001A sediment pond were stockpiled west of the D&RGW railroad tracks northwest of the Valcam Shop. This material is a conglomerate of sediment which migrated from the east side of the railroad tracks. This material was tested for suitability as a potential Vegetation-Supporting Material and found to be acceptable by James Leatherwood, Reclamation Soils Specialist, UDOGM for a field site trial in the Fan Portal 1 area. The material received a fair to poor rating based on low saturation percentage (16.5%) and high silt content (50%), respectively.

Prior to placement of this material, the backslope will be scarified to the extent possible mechanically, to allow blending with the proposed VMS when placement occurs. The Fan Portal 1 area will be seeded with the Valcam Loadout Facility Permanent Seed Mix. The potential of this material will be evaluated through the proposed onsite field trial. Monitoring could be accomplished at the same time as the Reclamation Test Plots

The stockpiled material has been protected with strawbales and seeded with a temporary seed mix, Yellow Sweetclover (Melilotus officinalis) PLS, Alfalfa (medicago staiva)PLS and Cereal Oats recommended by Lynn Kunzler, Reclamation Biologist, UDOGM.

The General Office Area and the Belina Haul Road were constructed pre-law.

The majority of the topsoil, at the Belina Mine Site, was moved prior to the topsoil requirements, however; the remaining topsoil salvaged has since been used for reclamation around the Belina Mine Site. The material has been stabilized with vegetation and erosion control measures.

The stockpile contains approximately 975 cu. yds. of "substitute topsoil", which came from the enlargement of the 002A sediment pond, near the truckscale at the Valcam Loadout Facility. The

excavated material met the criteria of and was approved by the Division.

R614-301-231.200.

There are no plans at this time to obtain topsoil from an off-site source. A Vegetation-Supporting Material (VMS) derived from the site will be utilized. The major sources of this Vegetation-Supporting Material have been identified as:

The pad immediately above 004A Sediment Pond;

Selected areas in the Valcam Loadout Facility.

The estimated quantity of VMS available at the Belina Mine Site is 36,000 cubic yards, and 20,000 cubic yards at the Valcam Loadout Facility.

Reclamation personnel from Morrison-Knudsen Company reviewed the analyses of the proposed Vegetation-Supporting Material and found no indication that the materials are unsuitable for use as a Vegetation-Supporting Material. The physical and chemical properties of the materials are generally acceptable in comparison to the topsoil salvaged at surface mines in the western states. The suitability criteria are those used by the Wyoming Department of Environmental Quality, Land Quality Division.

Selected samples show high clay content, but these zones are within 4 feet, vertically, of zones containing coarser textured material, high clay zones would be blended during the recontouring process. The "high clay zones" should not present any real problems as only minimal cutting of the interpad slope will be necessary as dipicted on the reclamation drawings.

A low pH (5.5) value occurs in one of the samples. This should not present a problem as the same sample shows a positive acid-base potential of 10.3 tons of calcium carbonate per 1000 tons of soil. The low pH may have resulted from the high iron content of the material causing an iron oxide coating on the undisturbed calcium carbonate nodules. This would temporarily reduce the rate of reaction, allowing a low pH in the presence of excess carbonate.

Toxic constituents are not present at critical levels. Boron levels are less than 0.5 ppm. Molybdenum and selenium concentrations are below 0.2 ppm. Conductivity and SAR are also relatively low.

All acid-base potentials are positive. Soil acidity should not be a problem. Plant nutrients are present at moderate levels. The soil materials will be tested after final placement and fertilizer applied if it is determined to be necessary.

Soil samples were taken from these areas and analyzed to determine acceptability. September 16, 1986, James S. Leatherwood, Reclamation Soils Specialist, determined these soils met suitability rating as per his memo to the Divisions Technical File. For these soil sample analysis used for determination of acceptability for See Soils Appendix R614-301-200.

R614-301-231.300.

See R614-301-321.200., Mt. Nebo Scientfic and Cedar Creek data.

R614-301-231.400.

The topsoil storage area at the Belina Mine Site is closely surrounded by dense forest exhibiting a medium amount of deadfall and heavy ground cover. This provides excellent protection against wind erosion as well as rapid snow melt in the spring.

Drainage control ditches encompass the storage area to direct any migration of material toward the bermed basin at the east end of the stockpile. The bermed basin also denies vehicle access on to the stockpile.

Straw bales are utilized on the north facing side of the stockpile to assist in containment, should a slope failure occur. The stockpile has been vegetated with the approved temporary seed mix.

R614-301-232. Topsoil and Subsoil Removal.

R614-301-232.100. thru 301-232.720.

No additional disturbance is planned for the Mine Permit Area, however, should new disturbance become necessary, the Vegetation-Supporting Materials involved will be handled in accordance with UDOGM Regulations.

R614-301-233. Topsoil Substitutes and Supplements.

R614-301-233.100. thru 301-233.400.

Refer to R614-301-231.200.

R614-301-234. Topsoil Storage.

** R614-301-200. **

R614-301-234.100. thru 301-234.320.

Refer to R614-301-231.100.

Reclamation of each disturbed area will take place during the first appropriate season following the time when that area becomes available for such activities. Certain affected areas, such as cut and fill slopes on roads, operation pads, and outside slopes of sediment ponds, which required disturbance early in the operational life of the mines, are stabilized and revegetated. Other affected areas occupied by support facilities will not be reclaimed until the conclusion of mining activities.

R614-301-242. Soil Redistribution.

R614-301-242.100.

After demolition, cleanup, and the loose coal placement has occured, slopes which require recontouring will be scalped of Vegetation-Supporting Material (VSM) with the aid of paddlewheel scrapers, dozers, and or backhoes. This material will be stockpiled on the lower pad area near the truck loop while recontouring takes place. The qualifing materials harvested during construction of the Whisky Creek Channel will placed upon the newly configured slopes.

Once an area has been prepared (maximizing roughness) for Vegetation-Supporting Material, redistribution of the VSM will be spread as uniformly as possible over the area. All VSM, whether stored or reharvested during reclamation, will be disc or broken up prior to placement. Spreading of VSM will not occur unless planting and mulching can follow immediately.

VSM redistribution will begin as soon as ground conditions allow in the spring, followed immediately by seedbed preparation, fertilization if required, (See R614-301-300. SOILS), planting and mulching, Test plots have been implemented to demonstrate the suitability of in-situ materials and the necessary depth of cover needed. See Test Plot Program (Ref. R614-301-341.300).

Results from these test plots will be utilized at least in part as well as the Division Guidelines to determine actual specifications for revegation of the disturbed areas.

R614-301-242.110. thru 301-242.130.

Refer to R614-301-340. Reclamation Plan. (Methology)

R614-301-242.200. thru 301-242.320.

** R614-301-200. **

The regraded land will be treated if necessary to reduce potential slippage of the material and to promote root penetration. Refer to R614-301-232. Topsoil and Subsoil Removal for Topsoil Replacement.

R614-301-243. Soil Nutrients and Amendments.

Nitrate nitrogen is low in quantity for soil types in the Mine Permit Area. The most important fertilizer to add is nitrogen, (Welsh, 1980). Prior to revegetation, soil tests in accordance with UDOGM will be taken in all areas to be revegetated and will be fertilized, if necessary as per the Division's recommended treatment values determined by the soil testing and the test plot data.

R614-301-244.100. thru 301-244.200.

Refer R614-301-340. Reclamation Plan.

R614-301-244.300. thru 301-244.320. Rills and Gullies.

All rills or gullies over nine inches deep which occur, will be filled with straw, graded and reseeded, or otherwise stabilized. All slopes will be monitored for such failures and corrected immediately when detected.

R614-301-250. Performance Standards.

R614-301-251. thru 301-252.

All topsoil and Vegetation-Supporting Materials, will be stockpiled, maintained, and redistributed according to R614-301-230. thru 301-240.

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BIOLOGY R614-301-300

R614-301-300. BIOLOGY

R614-301-320. Environmental Description.

The Valley Camp of Utah, Inc. Mine Permit Area consists of about six and one-half square miles of land situated in the Wasatach Plateau of Utah astride the Carbon-Emery county line. The property straddles the divide between the headwaters of Huntington Creek on the west and Pleasant Valley on the east. Elevations vary from a low of about 8000 feet in the Pleasant Valley drainage to a high of near 9800 feet on the divide crests. Canyon slopes are steep with rounded summits, and are vegetated.

R614-301-321. Vegetation Information.

The Valley Camp of Utah, Inc., properties and adjacent areas occur within the aspen-spruce-fir phase of the boreal forest biome, with representatives of cool desert shrub, riparian, and, to a lesser extent, mountain brush community types present as significant though minor components. The vegetation map is refered to as Vegetation Map (R614-301-323.100.)

The spruce-fir community, a type mainly on north-facing slopes is dominated by Engelmann spruce and subalpine fir, with variants supporting admixtures of aspen and wet meadow subtypes characterized by species of sedges and grasses. Often broad transitional zones occur between the dense spruce-fir forest and adjacent aspen communities. Occasionally stands of the spruce-fir type are almost entirely single species dominants due to past logging or other successional influence. In greater abundance are stands containing all age classes of both spruce and fir species. The spruce-fir type, including areas transitional into aspen, constitutes some 40 percent of the Mine Permit Area.

Figure R614-301-321a

Table 1. Plant communities of the Valley Camp Lease Area by percent of area covered.

Vegetation Type	Map Designation	Percent
Spruce-Fir	SF	37.8
Aspen	A	21.0
Grass-Forb-Elderberry	GFE	12.8
Sagebrush	SB	21.9
Fringed Sage	FS	0.4
Disturbed	D	6.1
Total		100%

R614-301-321.100.

The forest floor is frequently subjected to dense shade promoting a near-complete lack of understory foliage. Grasses and sedges are most commonly represented by Agropyron Caninum, Stipa spp., Bromus Carinatus, and Carex Hoodii. Principal forbs in the spruce-fir community include Arnica Cordifolia, Lathyrus Lanzwertii, Osmorhiza Depauperata, and Fragaria Virginiana. Common understory shrubs are Rosa Woosdii, Sheperdia Canadensis, and Symphoricarpos Oreophilus.

Figure R614-301-321.100a

Table 2. Species list by plant community types for:

Vaughn Hansen Assoc. - Valley Camp Project; Riparian (R), Spruce-fir (SF), Aspen (A), Grass-Forb-Elderberry (GFE), Snowberry-Sagebrush (SS), Sagebrush (SB), Fringed sagebrush (FS), Disturbed (D), Seeded on pipeline (1), and Seeded on pipeline and roads (2).

	R	SF	A	GFE	SS	SB	FS	D
Abies lasiocarpa		X	X					X
Achillea millefolium	X	X	X	X	X	X		X
Actaea rubra		X						X
Agastache urticifolia			X	X				X
Agoseris aurantiaca			X	X				
Agropyron caninum	X	X	X	X	X	X		X
cristatum							1	
dasystachyum			X					X
intermedium			2	2				2
spicatum			X			X	X	
smithii			X			X		X
Agrostis scabra			X					
stolonifera	X		X					X
variabilis	X		X					X
Alopecurus pratensis			1			1		1
Amaranthus sp.								X
Androsace septentrionalis					X			
Anemone multifida		X	X					X
Antennaria microphylla			X			X	X	
rosea		X	X					X
Aquilegia coerulea	X	X						X
Arabis drummondii			X	X		X		
Arctostaphylos patula		X	X					
Arenaria sp.		X						
Arnica chamissonis	X							
cordifolia		X						X
Arrhenatherum elatius			1					1
Artemisia cana	X					X		X
cana var. bolanderi	X			X				
dracunculus				X				X
frigida							X	
tridentata			X			X		X
Aster chilensis			X	X		X		X
engelmannii		X						X
occidentalis	X							

	R	SF	A	GFE	SS	SB	FS	D
Astragalus argophyllus				X				
convallarius						X		
Barbarea orthoceras	X	X						
Bromus anamolus			X			X		X
carinatus		X	X	X	X	X		X
ciliatus		X						X
inermis			2	2		2		2
tectorum						X		X
Calamagrostis neglecta	X							
Caltha leptosepala	X							
Capsella bursa-pastoris		X	X					
Cardamine cordifolia	X	X						
Cardaria draba								X
Carex			X					X
spp.		X						X
aquatilis	X							
egglestonii				X				
geyeri		X	X			X		X
hoodii			X	X	X	X		X
kellogii	X							
lanuginosa	X							
praegracilis	X							
microptera	X							
nebraskensis	X							
rossii			X			X		
rostrata	X							
vallicola					X			
Castilleja leonardii						X		
linariifolia			X			X		
miniata		X						X
Catabrosa aquatica	X							
Cerastium sp.	X							
Chaenactis douglasii			X					X
Chenopodium fremontii			X	X	X	X	X	X
Chorispora tenella				X				
Chrysothamnus nauseosus					X	X		
viscidiflorus				X	X	X	X	X
Cirsium scariosum (foliosum)	X	X	X	X	X	X		X
vulgare								X
Clematis hirsutissima						X		
Cleome serrulata				X				
Claytonia lanceolata		X		X				
Collinsia parviflora		X	X	X		X		X
Collomia linearis			X	X	X			X
Comandra umbellata						X		
Corallorhiza sp.			X					
maculata		X						X
Crepis acuminata					X			
Cryptantha sp.						X		X
crassisepala		X	X	X				X
gracilis			X					X
Cynoglossum officinale			X					X
Dactylis glomerata	X		2			2		2
Delphinium menziesii			X	X				
occidentale	X		X	X				X
Deschampsia caespitosa	X							

	R	SF	A	GFE	SS	SB	FS	D
Descurainia californica	X		X	X		X		X
pinnata			X	X				
Disporum trachycarpum		X						X
Draba sp.			X					
Eleocharis sp.	X							
Elymus glaucus		X	X					X
Epilobium alpinum	X	X						
paniculatum			X			X		
angustifolium		X						X
Equisetum arvense	X							
Erigeron engelmannii		X						X
lonchopyllus	X							
speciosus				X				
subtrinervis				X				
superbus		X						X
Eriogonum umbellatum						X		
Erysimum asperum			X	X	X	X		X
Fragaris virginiana	X	X	X					X
Frasera speciosa		X				X		X
Fritillaria atropurpurea				X				
Galium sp.			X					X
bifolium		X						X
boreale		X						X
trifidum			X	X				
Gayophytum nuttallii			X	X	X	X		
ramosissimum		X	X			X		X
Gentianella amarella	X							
Geranium fremontii		X	X			X		X
richardsonii	X		X					X
Geum macrophyllum	X							
Gilia sp. (annual)						X		
aggregata						X		
Glaux maritima	X							
Glyceria striata	X							
Goodyera repens		X						X
Habenaria sparsiflora	X							
Hackelia floribunda		X	X	X	X	X		X
patens						X		
Helenium hoopesii	X	X	X	X	X	X	X	X
Heliomeris multiflora			X			X		X
Heracleum lanatum	X	X						
Hieracium scouleri			X					
Hordeum brachyantherum	X			X				
jubatum		X	X	X				X
Hydrophyllum capitatum		X		X				
Iva axillaris	X							
Juncus arcticus	X							
ensifolius	X							
longistylis	X							
Juniperus communis			X					X
osteosperma						X		
Koeleria nitida				X				
Lactuca serriola			X					
Lappula occidentalis			X	X	X	X		X
Lathyrus lanzwertii		X	X	X	X	X	X	X
pauciflorus		X	X					X
Lepidium densiflorum				X				
Ligusticum porteri						X		X

	R	SF	A	GFE	SS	SB	FS	D
Linanthus harknessii				X				
Lithnophragma bulbifera			X					
Lonicera involucrata	X	X						
utahensis	X	X						X
Lupinus sp.		X						X
Lupinus argenteus	X							
sericeus						X		
Luzula parviflora	X							
Machaeranthera bigelovii		X	X			X		X
canescens				X				
Madia glomerata				X				
Mahonia repens		X	X			X		X
Medicago sativa			X	X		X		X
Melica bulbosa			X	X		X		
Mertensia ciliata	X	X	X	X				X
Mimulus guttatus	X							
Mitella sp.		X						X
stenopetala	X							
Moneses uniflora		X						
Monolepis nuttallianus						X		X
Muhlenbergia filiformis	X							
richardsonis						X		X
Nemophila breviflora			X					X
Orthocarpus tolmei						X		
Osmorhiza chilensis		X						
depauperata		X	X					X
occidentalis		X	X	X				
Pachystima myrsinites	X	X						X
Penstemon humilus						X		
procerus	X					X		
subglaber			X			X		
watsonii		X	X	X	X	X	X	X
whippleanus		X	X					
Phacelia hastata			X	X	X	X		X
heterophylla			X		X	X		X
sericea						X		X
Phleum alpinum	X							
pratense	X							2
Phlox caespitosus						X		
Physocarpus malvaceous		X						
Picea engelmannii		X						
pungens	X	X	X					X
Pinus flexilis							X	
Plagiobothrys scouleri	X							
Poa sp.		X						X
bulbosa								X
canbyi			X					
fendleriana			X			X	X	X
interior			X					
nervosa				X				
Poa palustris			X					X
pratensis	X	X	X	X		X		X
reflexa	X	X	X	X				X
sandbergii						X		
Polemonium foliosissimum	X	X	X			X		X
pulcherrimum	X				X			

	R	SF	A	GFE	SS	SB	FS	D
Polygonum aviculare						X		X
bistortoides			X	X				
douglasii	X				X			X
kelloggii						X		X
sawatchense			X	X		X		X
Populus tremuloides		X	X					X
Potentilla anserina	X							
fruticosa	X					X		
glandulosa				X				
gracilis	X		X	X		X		X
Prunus virginiana			X			X		X
Pseudotsuga menziesii		X			X			
Pyrola secunda		X						X
Ranunculus alismaefolius	X							
inamoenus		X						X
testiculatus			X					
Ribes cereum		X	X		X	X		X
hudsonianum			X					
inerme						X		
montigenum	X	X		X				
viscosissimum	X							
Rorippa curvipes	X							
Rosa woodsii		X				X		X
Rubus idaeus	X							
parviflorus		X						X
Rudbeckia occidentalis			X		X	X		X
Rumex acetosella								X
crispus								X
salicifolius	X			X		X		X
Salix geyeri	X							
lutea		X						X
rigida	X							
Sambucus coerulea		X	X					X
racemosa	X	X	X	X	X	X		X
Saxifraga odontoloma	X							
Scrophularia lanceolata			X			X		X
Senecio eremophilus		X						X
integerrimus	X		X	X		X		X
multilobatus			X			X		X
serra			X	X		X		X
Shepherdia canadensis	X	X						X
Sitanion hystrix							X	
Silene antirrhina					X			
menziesii		X	X			X		X
Smilacina stellata		X	X			X		X
Solidago missouriensis		X						X
parryi		X						X
Stellaria jamesiana		X	X	X		X		X
Stipa columbiana	X	X	X	X	X	X		X
comata		X						X
lettermannii		X	X	X	X	X	X	X
Symphoricarpos oreophilus		X	X	X	X	X	X	X
Taraxacum officinale	X	X	X	X				X
Tetradymia canescens							X	
Thalictrum fendleri		X	X	X	X	X		X
Thermopsis montana			X					
Thlaspi montanum		X						

	R	SF	A	GFE	SS	SB	FS	D
Tragopogon dubius	X		X			X		
Trifolium kingii			X					
repens	X							
Trisetum spicatum		X		X				
wolfii	X							
Urtica dioica	X	X	X	X		X		X
Vaccinium membranaceum		X						X
Valeriana edulis		X	X	X				
Veratrum californicum	X	X	X	X				
Verbascum thapsus			X			X		X
Veronica serpyllifolia	X							
Vicia americana		X	X	X		X		X
Viguiera multiflora			X			X		X
Viola adunca		X						X
canadensis		X						
praemorsa			X	X				

The aspen community is a forest type with Populus Tremuloides as the principle tree species. About 21 percent of the lease area is dominated by aspen alone. South-facing slopes and ridges are the main localities of this community. Rather large open areas are interspersed among the aspen stands and are dominated by grasses, forbs, and elderberry. These grass-forb-elderberry communities occupy about 13 percent of the lease area. Species diversity in the aspen community is great, with 20 species reported present. The main ground layer species are much the same as those of the grass-forb-elderberry community, with which the aspen community is considered transitional. The combined aspen and grass-forb-elderberry community is very large, constituting about 34 percent of the general lease area.

The sagebrush and fringed sagebrush vegetative types occupy 22 percent of the Mine Permit Area, and occur mainly on shallow soils. Collectively, these types are remarkably diverse, with some 110 species of vascular plants reported. Snowberry is ofter a major component in the sagebrush community. Fringed sagebrush is dominant only on rocky semi-barrens of ridge crests at high elevations.

The riparian community type consists of continuous narrow strips of wetland vegetation along the major drainages, as in the valley bottoms of Eccles Canyon, and along minor tributaries. Total areal extent of the riparian type is very small. Dominant species on these wetlands are redtop grass, silver sagebrush, sedge species, grasses, and numerous forbs.

Disturbed areas, constituting 6 percent of the lands studied, are present in the Mine Permit Area, some of which have been treated to reclamation procedures. Both introduced and native species were observed growing along pipeline corridors, roadways, and drill pads.

R614-301-321.200.

Species lists and vegetative and soils data summaries are based in part on extensive adjacent Skyline Project lease area studies. The plant communities and soils occupy the same topographic positions and in all major respects are similar to the Valley Camp of Utah, Inc. area. Sites representative of major vegetative types occuring in the Mine Permit Area were selected for intensive analysis. In each vegetative type permanent transects, each 100 meters in length were established at validation sites along the roads and at vegetatively comparable reference sites. The transects in the reference areas are permanently marked with steel rebar stakes. These will serve as points for future reference. Vegetative analysis of the disturbed portal area was not conducted. Reference areas adjacent to the disturbed areas and representative of the original communities were selected and analyzed.

Stratified random sampling was employed, in which locations of transect lines and plots within homogeneous portions of the vegetative types were randomly determined. From twenty to forty 2 by 5 dm rectangular plots were placed along each transect. Randomness was insured by using a table of random numbers to select three plots within each ten-meter section of the transect. At each reference and validation site in the aspen, grass-forb-elderberry, and spruce-fir communities the sampling procedures followed those outlined by Daubenmire (1957) for the canopy coverage method. For each species of forb, grass, or shrub the canopy was projected as cover of the ground, and such cover was estimated in six cover classes. Total cover, frequency percent, and composition percent were computed for the species along each transect. Spruce-fir and aspen sites were studied further by application of the quarter method of Curtis (1956), which gives relative cover and relative density values. Tree species dynamics were studied by selecting trees in each size class encountered in the quarter method for diameter, height, and age measurements. Ages of trees were determined by counting core sample rings extracted from the tree with a Swedish increment borer. Average increments of growth in diameter per year were measured.

Productivity measurements of grass and forb species were made using 0.96 square foot plots with weight estimates made on each species as outlined in the Range Analysis Handbook (USDA, 1970). The weight estimate of each species in 10 randomly selected plots allows for determination of the total pounds of productivity available for grazing in each forb community. These studies were omitted in the spruce-fir community due to a lack of meaningful ground cover.

In order to evaluate adequacy of sample size, the following formula (Harper, 1980) was utilized:

$$N(min.)=(1.64s/.01x)^2$$

where:

x = the total understory canopy cover per quadrant

With a sample size of N(min.) a 10 percent change in vegetative cover can be detected with a 90 percent confidence level. For details see Snedecor & Cochran, 1967, page 58. Reference areas have been evaluated for similarity to validation sites using the following similarity index formula (Bonham, et al, 1980; Krebs, 1972; Harper, 1967):

$$S = 2w/(a+b)$$

where:

S=similarity between the potential reference area and the inventory unit.
a=total number of species in the reference area
b=total number of species in the inventory unit
w=number of species in common between a and b

This method requires a subjective decision concerning level of similarity required to accept a reference area.

Vegetation Summary for the Mine Permit Area

The Valcam Loadout Facility and General Office areas are disturbed to the extent that little if any natural communities are fully represented. The immediate environs of the Valcam Loadout Facility area had supported before disturbance a sagebrush-grass type similar to the sagebrush communities studied along the Eccles Canyon portion of the permit area, where 34 species contributed to a total cover of 130 percent. Shrub species, with Artemisia tridentata dominant, contributed a composition percentage of 61; Agropyron spicatum and other grasses contributed 31 percent. See Figure R614-301-321.200a thru 321.200dd (Tables 3-32) for transect data summaries. Figure R614-301-321.200ee (Table 33) summarizes tree growth data.

Figure R614-301-321.200a

Table 3. Plant Community Characteristics
SITE 1a. VEGETATION

Validation Spruce-fir

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Stripa columbiana	20.4	55	38
Carex sp.	9.0	50	17
Stipa lettermanii	6.2	10	12
Agropyron caninum	6.1	30	11
Poa pratensis	2.9	20	6
Bromus anomalus	1.1	20	2
Poa sp.	.1	5	T
Total Grass	45.8		86
FORBS			
Helenium hoopesii	3.2	10	6
Collinsia parviflora	.9	10	2
Galium boreale	.8	5	2
Silene menziesii	.8	5	2
Machaeranthera bigelovii	.2	10	T
Viola adunca	.2	10	T
Gayophytum ramosissimum	.1	5	T
Epilobium angustifolium	.1	5	T
Penstemon watsonii	.1	5	T
Taraxacum officinale	.1	5	T
Cryptantha crassisepala	.1	5	T
Total Forbs	6.6		12
BROWSE			
Mahonia repens	.9	10	2
Total Browse	.9		2
Totals	53.3		100

Figure R614-301-321.200b

Table 4. Tree Productivity

SITE 1a. VEGETATION

Validation Spruce-Fir

Taxa	Mean Distance	Relative Frequency	Density per Acre
Picea pungens	11.6 ft.	40%	129.5
Populus tremuloides		60%	194.3

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Picea pungens		2	5	4	2	3
Populus tremuloides		3	13	6		

Figure R614-301-321.200c

Table 5. Plant Community Characteristics

SITE 1b. VEGETATION

Reference Taxa	% Cover	% Freq.	Spruce-fir % Comp.
GRASSES			
Stipa columbiana	19.6	55	53
Agropyron caninum	5.8	15	16
Carex sp.	5.0	30	14
Bromus carinatus	.8	5	2
Poa pratensis	.8	5	2
Stripa lettermannii	.8	5	2
Total Grass	32.8		89
FORBS			
Silene menziesii	2.6	10	7
Lathyrus lanzwertii	.9	5	2
Stellaria jamesiana	.2	10	1
Viola adunca	.2	15	1
Galium boreale	.1	5	T
Hackelia floribunda	.1	5	T
Helenium hoopesii	.1	5	T
Total Forbs	4.2		11
Totals	37.0		100

Figure R614-301-321.200d

Table 6. Tree Productivity

SITE 1b.

VEGETATION
Spruce-fir

Reference

Taxa	Mean Distance	Relative Frequency	Density per Acre
Picea pungens		52%	162.9
Populus tremuloides	11.8 ft.	48%	150.4

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Picea pungens			4	3	5	2	7
Populus tremuloides			1	12	6		

Figure R614-301-321.200e

Table 7. Plant Community Characteristics

SITE 2a.

VEGETATION
Aspen Opening
(Stinging nettles)

Validation Opening

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Poa pratensis	24.5	80	16
Stipa lettermannii	7.8	25	5
Stipa columbiana	7.6	20	5
Agropyron caninum	5.0	10	3
Carex geyeri	4.4	10	3
Bromus carinatus	1.9	5	1
Agropyron smithii	.8	5	T
Muhlenbergia richardsonis	.8	5	T
Total Grass	52.8		33
FORBS			
Urtica dioica	53.4	95	34
Collinsia parviflora	19.1	45	12
Lappula occidentalis	10.0	60	6
Gayophytum ramosissimum	8.2	45	6
Helenium hoopesii	8.0	15	5
Cryptantha sp.	4.8	25	3
Cirsium foliosum	1.6	15	1
Total Forbs	105.1		67
Totals	157.9		100

Figure R614-301-321.200f

Table 8. Plant Community Characteristics

SITE 2b.

Validation Opening

VEGETATION
Aspen opening
(Stinging nettles)

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Poa pratensis	42.1	90	26
Stipa lettermannii	4.9	25	3
Muhlenbergia richardsonis	3.1	5	2
Koeleria cristata	1.9	5	1
Agropyron caninum	1.6	15	1
Total Grass	53.6		33
FORBS			
Helenium hoopesii	39.5	80	24
Urtica dioica	31.6	50	19
Gayophytum ramosissimum	14.8	65	9
Lappula occidentalis	6.2	55	4
Cirsium foliosum	6.0	40	4
Collinsia parviflora	4.0	35	3
Polygonum kelloggii	2.6	10	2
Polygonum sawatchense	1.8	20	1
Cryptantha sp.	1.2	25	1
Achillea millefolium	.1	5	T
Phacelia heterophylla	.1	5	T
Polygonum aviculare	.1	5	T
Total Forbs	108.0		67
BROWSE			
Artemisia cana	.8	5	T
Total Browse	.8		0
Totals	162.4		100

Figure R614-301-321.200g

Table 9. Plant Community Characteristics

SITE 3a. VEGETATION Aspen

Validation

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Poa pratensis	32.2	40	24
Stipa columbiana	21.9	65	17
Stipa lettermannii	11.8	45	9
Carex sp.	10.9	35	8
Agropyron caninum	7.1	25	6
Agrophyron dasystachyum	5.8	15	4
Muhlenbergia richardsonis	.8	5	1
Total Grass	90.5		69
FORBS			
Helenium hoopesii	16.9	55	13
Cirsium foliosum	12.1	50	9
Gayophytum ramosissimum	3.9	10	3
Cryptantha crassisepala	.9	10	1
Penstemon watsonii	.9	10	1
Polygonum sawatchense	.9	10	1
Vicia americana	.8	30	1
Arabis sp.	.1	5	T
Fragaria virginiana	.1	5	T
Stellaria jamesiana	.1	5	T
Total Forbs	36.7		29
BROWSE			
Populus tremuloides	.9	10	1
Symphoricarpos oreophilus	.8	5	1
Total Browse	1.7		2
Totals	128.9		100

Figure R614-301-321.200h

Table 10. Tree Productivity

SITE 3a. VEGETATION Aspen

Validation

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides	8.3 ft.	100	633.1

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides				28	12		

Figure R614-301-321.200i

Table 11. Plant Community Characteristics

SITE 3b. VEGETATION Aspen

Reference

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Stipa lettermannii	25.0	65	27
Stipa columbiana	20.9	55	22
Poa pratensis	19.0	45	20
Agropyron caninum	10.1	25	10
Carex sp.	7.8	45	8
Bromus carinatus	3.9	10	4
Bromus anomalus	1.9	5	2
Koeleria cristata	.8	5	T
Stipa comata	.8	5	T
Total Grass	90.2		93
FORBS			
Helenium hoopesii	2.6	10	3
Cirsium foliosum	.9	20	1
Gayophytum ramosissimum	.8	5	1
Vicia americana	.5	20	T
Taraxacum officinale	.2	5	T
Achillea millefolium	.1	5	T
Silene menziesii	.1	5	T
Total Forbs	5.2		5
BROWSE			
Mahonia repens	.8	5	1
Symphoricarpos oreophilus	.8	5	1
Total Browse	1.6		2
Totals	97.0		100

Figure R614-301-321.200j

Table 12. Grazing Productivity

SITE 3b. VEGETATION Aspen

Reference
PLOT SIZE: 0.96 sq. ft.

Taxa	Dry Wt. Prod.	% Comp.
GRASSES		
Stipa lettermannii	7.6	20
Poa pratensis	6.8	18
Agropyron caninum	1.4	T
Carex sp.	.9	2
Stipa columbiana	.4	1
Muhlenbergia richardsonis	T	T
Total Grasses	17.1	44
FORBS		
Cirsium foliosum	11.7	30
Helenium hoopesii	9.5	25
Gayophytum ramosissimum	T	T
Polygonum sawatchense	T	T
Total Forbs	21.2	55
BROWSE		
Populus tremuloides	.6	1
Total Browse	.6	1
Totals	38.9	100

Est. Potential Prod. for site 389 lbs/ac.

Figure R614-301-321.200k

Table 13. Tree Productivity
SITE 3b. VEGETATION Aspen

Reference
LOCATION

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides	9.4 ft.	100%	496 ft.

Taxa	<1" Diameter		>1" Diameter			
	>3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides				16	24		

Figure R614-301-321.2001

Table 14. Plant Community Characteristics

SITE 4a. VEGETATION Sagebrush

Validation

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Poa ampla	7.7	20	7
Poa fendleriana	7.0	27	7
Agropyron spicatum	6.1	67	6
Carex sp.	3.8	13	4
Bromus carinatus	1.3	7	1
Poa secunda	1.3	3	1
Stipa viridula	1.3	3	1
Bromus reflexa	.5	3	T
Stipa comata	.5	3	T
Bromus tectorum	.1	3	T
Total Grass	29.6		27
FORBS			
Geranium richardsonii	2.7	13	3
Penstemon sp.	2.2	10	2
Aster sp.	1.5	10	1
Stellaria jamesiana	1.5	10	1
Cirsium sp.	1.3	10	1
Viola sp.	.3	10	T
Brickellia sp.	.1	3	T
Delphinium sp.	.1	3	T
Oenothera sp.	.1	3	T
Total Forbs	9.8		8
BROWSE			
Symphoricarpos oreophilus	25.7	67	25
Artemisia tridentata	21.2	47	21
Amelanchier alnifolia	6.3	13	6
Rosa woodsii	6.3	3	6
Purshia tridentata	5.4	10	5
Prunus virginiana	2.2	7	2
Chrysothamnus viscidiflorus	.5	3	T
Total Browse	67.6		65
Totals	107.0		100

Figure R614-301-321.200m

Table 15. Grazing Productivity
SITE 4a. VEGETATION Sagebrush

Validation

PLOT SIZE: 0.96 sq. ft.

Taxa	Dry Wt. Prod.	% Comp.
GRASSES		
Agropyron spicatum	7.2	8
Poa ampla	4.8	5
Arrhenatherum elatius	4.5	5
Poa fendleriana	1.2	1
Carex sp.	1.0	1
Total Grasses	18.7	20
FORBS		
Penstemon sp.	2.5	3
Aster sp.	.8	1
Senecio sp.	.8	1
Polemonium	.2	T
Gilia sp.	T	T
Total Forbs	4.3	5
BROWSE		
Artemisia tridentata	40.6	44
Symphoricarpos oreophilus	12.6	13
Purshia tridentata	10.0	11
Chrysothamnus viscidiflorus	3.2	3
Rosa woodsii	2.8	3
Pachystima myrsinites	.9	1
Total Browse	70.1	75
Totals	93.1	100

Est. Potential Prod. for Site 932.0 lbs/ac.

Figure R614-301-321.200n

Table 16. Plant Community Characteristics
SITE 4b. Reference

Taxa	% Cover	% Freq.	VEGETATION Sagebrush % Comp.
GRASSES			
Agropyron spicatum	26.0	76	21
Poa ampla	6.0	25	5
Poa fendleriana	3.3	20	2
Stipa lettermanii	1.7	3	1
Carex sp.	1.3	7	1
Bromus anomalus	.1	3	1
Stipa comata	T	2	T
Poa pratensis	T	2	T
Total Grass	37.4		31
FORBS			
Penstemon watsonii	4.8	15	4
Lupinus argenteus	2.4	6	2
Aster sp.	1.1	3	1
Brickellia sp.	1.0	2	1
Castilleja linearis	.5	5	T
Cirsium foliosum	.4	6	T
Collinsia parviflora	.2	5	T
Erigeron speciosus	.2	7	T
Gayophytum nuttallii	.2	6	T
Cryptantha crassisepala	.1	3	T
Aster sp.	T	2	T
Chaenactis sp.	T	2	T
Epilobium sp.	T	2	T
Comandra umbellata	T	2	T
Grindelia sp.	T	2	T
Eriogonum umbellatum	T	2	T
Sisymbrium sp.	T	2	T
Total Forbs	10.9		8

Figure R614-301-321.200o

Table 17. Plant Community Characteristics

SITE 4b. (Ref. Cont.)

Taxa	% Cover	% Freq.	VEGETATION Sagebrush % Comp.
BROWSE			
Artemisia tridentata	34.2	62	26
Purshia tridentata	19.1	40	15
Symphoricarpos oreophilus	17.6	45	14
Amelanchier alnifolia	5.2	20	4
Chrysothamnus viscidiflorus	2.3	5	2
Rosa woodsii	.7	10	T
Artemisia sp.	.6	2	T
Mahonia repens	.5	5	T
Cercocarpus montanus	T	T	T
Total Browse	81.2		61
Totals (Cont.)	129.5		100

Figure R614-301-321.200p

Table 18. Grazing Productivity

SITE 4b. VEGETATION
Sagebrush

Reference

PLOT SIZE: 0.96 sq. ft.

Taxa	Dry Wt. Prod.	% Comp.
GRASSES		
Poa ampla	20.7	16
Agropyron spicatum	17.4	13
Poa fendleriana	2.0	1
Carex sp.	.2	T
Total Grasses	40.3	30
FORBS		
Penstemon sp.	3.0	2
Lupinus sp.	1.5	1
Aster sp.	.5	T
Senecio sp.	.2	T
Total Forbs	5.2	3
BROWSE		
Artemisia tridentata	51.5	39
Purshia tridentata	30.4	22
Symphoricarpos oreophilus	4.9	3
Chrysothamnus viscidiflorus	4.8	3
Amelanchier alnifolia	.4	T
Total Browse	92.0	67
Totals	137.5	100

Est. Potential Prod. for Site 1375.0 lbs./ac.

Figure R614-301-321.200q

Table 19. Plant Community Characteristics

SITE 5a.

Whisky Canyon
Validation

VEGETATION
Aspen

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Agropyron caninum	36.8	90	23
Poa pratensis	16.5	65	10
Bromus carinatus	13.6	45	8
Carex geyeri	8.2	25	5
Elymus glaucus	6.2	10	4
Stipa lettermanii	2.6	10	2
Stipa columbiana	1.7	50	1
Total Grass	85.6		53
FORBS			
Lathyrus lanzwertii	7.9	60	5
Achillea millefolium	7.5	60	5
Helenium hoopesii	6.5	25	4
Silene menziesii	5.8	40	4
Smilacina stellata	4.0	35	3
Penstemon watsonii	3.2	10	2
Senecio serra	2.6	10	2
Geranium fremontii	2.1	35	1
Potentilla gracilis	1.9	5	1
Heliomerus multiflora	1.6	15	1
Fragaria virginiana	1.1	20	1
Hackelia floribunda	1.0	15	T
Erysimum asperum	.8	30	T
Polygonum sawatchense	.4	15	T
Stellaria jamesiana	.4	15	T
Thalictrum fendleri	.4	15	T
Polemonium foliosissimum	.1	5	T
Collinsia parviflora	.1	10	T
Total Forbs	47.4		29
BROWSE			
Symphoricarpos oreophilus	22.4	65	14
Abies lasiocarpa	6.1	10	4
Populus tremuloides	.8	5	T
Total Browse	29.3		18
Totals	162.3		100

Figure R614-301-321.200r

Table 20. Grazing Productivity

SITE 5a.

VEGETATION
Aspen

Whisky Canyon
Validation

PLOT SIZE: 0.96 sq. ft.

Taxa	Dry Wt. Prod.	% Comp.
GRASSES		
Agropyron caninum	4.9	8
Stipa lettermannii	2.4	4
Poa pratensis	2.2	4
Carex sp.	1.5	3
Bromus carinatus	1.4	2
Total Grasses	12.4	21
FORBS		
Geranium fremontii	2.5	4
Hackelia floribunda	1.9	3
Achillea millefolium	1.0	2
Lathyrus lanzwertii	.5	1
Silene menziesii	.5	1
Polemonium sp.	.4	1
Heliomeris multiflora	.2	T
Penstemon watsonii	.2	T
Chenopodium fremontii	T	T
Collinsia parviflora	T	T
Erysimum asperum	T	T
Fragaria virginiana	T	T
Galium sp.	T	T
Osmorhiza depauperata	T	T
Stellaria jamesiana	T	T
Taraxacum officinale	T	T
Thalictrum fendleri	T	T
Polygonum sawatchense	T	T
Total Forbs	7.2	12
BROWSE		
Symphoricarpos oreophilus	39.6	66
Abies lasiocarpa	.3	1
Total Browse	39.9	67
Totals	59.5	100

Est. Potential Prod. for site 595 lbs/ac.

Figure R614-301-321.200s

Table 21. Tree Productivity
SITE 5a. (Whisky Canyon / Validation)

VEGETATION
Aspen

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides	16.9 ft.	88	134.1
Abies concolor		12	18.3

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides			3	18	13		
Abies concolor			2		2		1

Figure R614-301-321.200t

Table 22. Plant Community Characteristics

SITE 5b. (Reference)

VEGETATION
Aspen

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Agropyron caninum	36.1	90	23
Bromus carinatus	23.0	70	15
Poa pratensis	16.2	65	10
Stipa columbiana	11.1	40	7
Stipa lettermanii	3.9	15	2
Bromus ciliatus	1.9	5	1
Elymus glaucus	.8	5	T
Carex sp.	.8	5	T
Total Grass	93.8		58
FORBS			
Lathyrus lanzwertii	15.6	70	9
Smilacina stellata	13.5	40	8
Geranium fremontii	5.6	30	3
Mertensia ciliata	4.5	15	3
Achillea millefolium	3.4	30	2
Fragaria virginiana	3.1	30	2
Aster chilensis	3.0	20	2
Senecio serra	2.2	15	1
Hackelia floribunda	1.1	20	1
Helenium hoopesii	.8	5	T
Thalictrum fendleri	.8	5	T
Heliomeris multiflora	.4	15	T
Stellaria jamesiana	.2	10	T
Descurainia californica	.1	5	T
Erysimum asperum	.1	5	T
Total Forbs	54.4		31
BROWSE			
Symphoricarpos oreophilus	14.1	40	9
Populus tremuloides	2.8	15	2
Total Browse	16.9		11
Totals	165.2		100

Figure R614-301-321.200u

Table 23. Tree Productivity
SITE 5b.

VEGETATION
Aspen

Whisky Canyon
Reference

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides	11.04 ft.	95%	339.3
Abies Concolor		5%	17.9

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides				21	17		
Abies concolor		2					

Figure R614-301-321.200v

Table 24. Plant Community Characteristics

SITE 6

VEGETATION
Spruce-fir

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Stipa columbiana	3.9	10	7
Agropyron caninum	1.1	20	2
Bromus carinatus	1.0	15	2
Poa pratensis	1.0	15	2
Carex sp.	.1	5	T
Total Grass	7.1		13
FORBS			
Lathyrus lanzwertii	10.8	30	19
Arnica cordifolia	5.4	40	10
Pyrola secunda	2.0	10	4
Aquilegia coerulea	1.5	10	3
Fragaria virginiana	1.5	35	3
Helenium hoopesii	1.5	10	3
Thalictrum fendleri	1.0	15	2
Viola adunca	1.0	20	2
Osmorhiza depauperata	.9	10	2
Aster engelmannii	.8	5	1
Castilleja miniata	.8	5	1
Smilacina stellata	.8	5	1
Achillea millefolium	.6	25	1
Mitella sp.	.4	15	T
Geranium fremontii	.2	10	T
Hackelia floribunda	.2	10	T
Erigeron superbus	.1	5	T
Stellaria jamesiana	.1	5	T
Total Forbs	29.6		52
BROWSE			
Shepherdia canadensis	6.9	15	12
Abies lasiocarpa	6.6	25	12
Symphoricarpos oreophilus	.2	10	11
Pachystima myrsinites	.2	10	T
Populus tremuloides	.2	10	T
Total Browse	20.1		35
Totals	56.8		100

Figure R614-301-321.200w

Table 25. Tree Productivity
SITE 6. (Whisky Canyon / Validation) VEGETATION Spruce-fir

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides		40%	173.4
Picea pungens	10.0 ft.	50%	216.8
Abies lasiocarpa		2%	8.7
Pseudotsuga menziesii		8%	34.7

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides			1	10	5		
Picea pungens			3	10	4		3
Abies concolor					1		
Pseudotuga menziesii					2	1	

Figure R614-301-321.200x

Table 26. Plant Community Characteristics
SITE 6b. (Whisky Canyon / Reference) VEGETATION Spruce-fir

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Bromus ciliatus	1.0	15	3
Total Grass	1.0		3
FORBS			
Arnica cordifolia	5.6	35	20
Fragaria virginiana	5.6	30	20
Aquilegia coerulea	1.5	10	5
Osmorhiza depauperata	1.5	35	5
Thalictrum fendleri	.8	5	3
Pyrola secunda	.5	20	2
Mitella sp.	.4	15	1
Silene menziesii	.2	10	1
Viola adunca	.2	5	1
Erigeron superbus	.1	5	T
Geranium fremontii	.1	5	T
Helenium hoopesii	.1	5	T
Total Forbs	16.6		58
BROWSE			
Mahonia repens	3.1	5	11
Rosa woodsii	2.2	15	8
Lonicera utahensis	1.9	5	6
Vaccinimum membranaceum	1.5	10	5
Symphoricarpos oreophilus	.9	5	3
Populus tremuloides	.8	5	3
Abies lasiocarpa	.5	20	2
Pachystima myrsinites	.2	10	1
Total Browse	11.1		39
Totals	28.7		100

Figure R614-301-321.200y

Table 27. Tree Productivity
SITE 6b.

VEGETATION
Spruce-fir

Whisky Canyon

Reference

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides		25%	110.8
Picea pungens		52%	230.6
Abies lasiocarpa	9.9 ft.	15%	66.5
Pseudotsuga menziesii		8%	35.5

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Populus tremuloides				8	2		
Picea pungens			4	5	7	2	3
Abies concolor			1		2	2	1
Pseudotsuga menziesii				1	2		

Figure R614-301-321.200z

Table 28. Plant Community Characteristics
SITE 7. (Portal Yard Ref.)

VEGETATION
Spruce-fir

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Bromus ciliatus	3.5	20	10
Poa pratensis	1.1	20	3
Bromus carinatus	.8	5	2
Carex sp.	.4	15	1
Total Grass	5.8		16
FORBS			
Lupinus sp.	10.9	30	30
Viola adunca	3.4	35	10
Lathyrus lanzwertii	3.1	30	9
Arnica cordifolia	2.8	15	7
Osmorhiza depauperata	2.5	50	7
Achillea millefolium	2.4	25	6
Aquilegia coerulea	1.5	10	4
Fragaria virginiana	1.2	25	3
Erigeron superbus	.9	10	2
Silene menziesii	.9	5	2
Hackelia floribunda	.8	5	2
Helenium hoopesii	.8	5	2
Epilobium angustifolium	.1	5	T
Ranunculus inamoenus	.1	5	T
Taraxacum officinale	.1	5	T
Total Forbs	31.5		84
BROWSE			
Abies lasiocarpa	.1	5	T
Sambucus racemosa	.1	5	T
Total Browse	.2		0
Totals	37.5		100

Figure R614-301-321.200aa

Table 29. Tree Productivity
SITE 7.

VEGETATION
Spruce-fir

Taxa	Mean Distance	Relative Frequency	Density per Acre
Abies lasiocarpa	12.3 ft.	60%	173.1
Picea pungens		40%	115.4

	<1" Diameter		>1" Diameter			
Taxa	<3'tall	>3'tall	1"-3"d.	3"-6"d.	6"-12"d.	12"-15"d.	>15"d.
Abies concolor				2	8	7	6
Picea pungens			1	4	6	4	2

Figure R614-301-321.200bb

Table 30. Plant Community Characteristics

SITE 8. (Portal Yard Ref.)

VEGETATION
Aspen

Taxa	% Cover	% Freq.	% Comp.
GRASSES			
Bromus carinatus	33.5	75	31
Agropyron caninum	23.0	70	21
Poa pratensis	13.8	45	13
Stipa lettermannii	13.1	25	12
Poa reflexa	1.8	20	1
Stipa columbiana	1.1	35	1
Total Grass	86.3		79
FORBS			
Lathyrus lanzwertii	7.8	75	7
Galium bifolium	3.1	25	3
Delphinium barbeyi	2.8	15	3
Archillea millefolium	1.9	5	2
Gayophytum ramosissimum	.9	10	1
Helenium hoopesii	.9	10	1
Senecio serra	.9	10	1
Hackelia floribunda	.8	5	T
Polygonum sawatchense	.5	20	T
Osmorhiza occidentalis	.1	5	T
Chenopodium fremontii	.1	5	T
Cirsium foliosum	.1	5	T
Collinsia parviflora	.1	5	T
Descurainia californica	.1	5	T
Nemophila breviflora	.1	5	T
Total Forbs	20.2		18
BROWSE			
Sambucus racemosa	3.1	5	3
Total Browse	3.1		3
Totals	109.6		100

Figure R614-301-321.200cc

Table 31. Grazing Productivity
SITE 8.

VEGETATION
Aspen

PLOT SIZE: 0.96 sq. ft.

Taxa	Dry Wt. Prod.	% Comp.
GRASSES		
Bromus carinatus	9.5	13
Carex sp.	9.0	12
Stipa lettermannii	4.4	6
Agropyron caninum	3.9	5
Poa pratensis	1.5	2
Stipa columbiana	1.4	2
Total Grasses	29.7	40
FORBS		
Delphinium occidentale	12.6	18
Hackelia floribunda	8.1	11
Lathyrus lanzwertii	7.0	9
Helenium hoopesii	5.0	7
Senecio serra	2.2	3
Collinsia parviflora	T	T
Descurainia californica	T	T
Erysimum asperum	T	T
Galium sp.	T	T
Gayophytum ramosissimum	T	T
Nemophila breviflora	T	T
Polygonum sawatchense	T	T
Total Forbs	34.9	48
BROWSE		
Sambucus racemosa	7.5	10
Populus tremuloides	1.8	2
Total Browse	9.2	12
Totals	73.8	100

Est. Potential Prod. for Site 738.0 lbs/ac.

Figure R614-301-321.200dd

Table 32. Tree Productivity
SITE 8. (Portal Yard Ref.)

VEGETATION
Aspen

Taxa	Mean Distance	Relative Frequency	Density per Acre
Populus tremuloides	26.3 ft.	100%	63.1

Taxa	<1" Diameter <3'tall	<1" Diameter >3'tall	>1" Diameter 1"-3"d.	>1" Diameter 3"-6"d.	>1" Diameter 6"-12"d.	>1" Diameter 12"-15"d.	>1" Diameter >15"d.
Populus tremuloides			6	22	8	4	

Figure R614-301-321.200ee

Table 33 Summary of Tree Growth Data

Location	Species	Av. Diam., In.	Av. Ht., Ft.	Av. Age	Growth, Diam. /yr., mm.
Lower Canyon	Spruce	10.8	37	54	.38
Lower Canyon	Aspen	7.4	32	54*	.22*
Whisky Canyon	Spruce	13.1	51	74	.34
Whisky Canyon	Fir	6.2	48	79	.27
Whisky Canyon	Aspen	-	-	53	.24
Portal Area	Aspen	10.7	42	44	.50
Portal Area	Spruce	10.0	49	53	.38
Portal Area	Fir	14.0	64	65	.48

*Estimated due to partially rotted cores.

A total of 19 species occurred along the transect in the lower canyon spruce-fir understory with grasses and sedges providing the most cover at 46 percent. These species were low in frequency percentages and sparse enough to contribute little if any forage. Forb and grass productivity measurements were thus eliminated in this type. The overstory of spruce and fir provided a high (near 100%) canopy cover, and their average productivity (diameter increase) of 0.38 mm per year was approximately that of other spruce-fir types measured in the permit area. The composition of trees in this forest type was near equal with spruce having a relative frequency of 52 percent and 163 trees per acre while fir had a 48 percent frequency and 150 trees per acre. The stand was considered a dynamic stand as both species had representatives in all size classes studied Figure R614-301-321.200b and 321.200d (Table 4 and 6).

Aspen stands along the permit area comprised about 32 percent of the total permit area. In the aspen stands along the lower permit area total cover of understory species was 97 percent, with 90 percent of the total attributable to grass species. Usually the well developed aspen stands are the most productive for forage but this stand only contributed approximately 390 pounds per acre. Aspen tree growth was sparse in having 496 trees per acre with a diameter growth increment of only 0.32 mm per year. Further evidence of the unproductive nature of this stand was observed in the size class distribution study; no trees were found in the small or large size classes, all trees being either 3-6 or 6-12 inches in diameter. Rotten centers were found in 67 percent of the trees sampled and thus the stand could be considered decadent and not likely to become a dynamic and productive stand of aspen.

Openings along the aspen stands at one time were dominated by palatable species of grass, forbs, and elderberry. Due to excessive grazing, palatable species have been largely replaced by undesirable species such as stinging neetle, sneezeweed, stickseed, and thistle. These areas constituted about three percent of the total permit area route.

Where the permit area is parallel to the Skyline Project conveyor corridor the vegetation is mostly sagebrush with a mixture of grasses. Sagebrush and grasses contribute 72 percent cover, the palatable forbs contribute about 11 percent cover, and browse other than sagebrush contribute 46 percent cover. This sagebrush type is the most common of any type along the permit area and comprises 34 percent of the total. Transect data indicates a total cover of about 130 percent with 34 species contributing. Productivity value of the sagebrush type was greatest among the sites studied with 1375 pounds per acre Figure R614-301-321.200p (Table 18).

Along Whisky Canyon both aspen and spruce-fir communities were encountered. The aspen community was among the most diverse in species with a total of 28 species contributing to the understory cover of 162 percent. The species contributing most to forage production were grasses. Forage production of grasses and forbs combined provided 595 pounds per acre Figure R614-301-321.200r (Table 20). Aspen trees here were more productive, with the stands containing some mature trees greater than 15 inches in diameter as well as numerous intermediate sizes down to 1 inch in diameter. All core samples appeared healthy and little evidence of diseased trees was found. The average increment of growth was 0.24 mm per year.

Sample data in the Whisky Canyon spruce-fir community included four species of trees with spruce and aspen being most abundant. The stand could be considered successional with spruce being the potential climax. Intermediate size classes of aspen were most abundant, with few large trees and very few small replacement trees evident. Douglas fir was apparantly giving way to the spruce climax as there were only a few large trees, with little evidence of seedling replacement. Tree density for all species was 434 trees per acre with the growth rate for spruce and fir at 0.34 mm per year and 0.27 mm per year respectively. The understory species, limited by dense shade, comprised a total of 28 percent.

The reference area for the spruce-fir type was established adjacent and above the portal area; construction activities preclude the establishment of validation sites. The community was dominated by fir trees which constituted a density of 173 trees per acre. These trees were abundant in all size classes indicating a permanent and near-climax community of spruce and fir. Spruce trees, although less abundant (115 trees per acre), were also represented in all size classes. Growth rates for these trees was 0.38 mm per year for spruce and 0.48 mm per year for fir. The understory consists of 21 species, having a total cover percentage of only 38.

The portal aspen reference area studies were also taken adjacent to and above the disturbance areas, on the south-facing slope. Here there were 22 species with grasses contributing 86 percent of the total cover of 110 percent. Total forb productivity was 738 lbs per acre, which is somewhat more than that measured in the aspen stand along the Whisky Canyon corridor. Trees averaged a diameter increase of 0.50 mm per year, which is greatest for all trees sampled.

A summary of data for the permanent reference sites for the Mine Permit Area is as follows:

Transect Mapping No.	Location	Total Cover %	No. of Species	Prod lb/ Acre	Trees per Acre
1	Eccles Canyon Spruce-Fir	53	19	-	313
2	Aspen opening (nettle)	163	18	-	-
3	Eccles Canyon Aspen	97	18	389	633
4	Sagebrush	129	34	1375	-
5	Whisky Canyon Aspen	165	25	595	357
6	Whisky Canyon Spruce-Fir	57	2	-	433
7	Portal Spruce-Fir	38	21	-	288
8	Portal Aspen	110	22	738	63

Sample Adequacy. In preliminary studies prior to actual sampling it was determined that approximately twenty 2 x 5 plots would be inadequate; with this number of plots a 10 percent increase in the number of plots fails to yield to a 10 percent increase in number of species. Sample size is believed adequate to reveal diversity of species along the transect.

Results of adequacy of sample and site similarity calculations are summarized in Figure R614-301-321.200ff (Table 34). In stands where the understory cover was very spotty such as in the dense shade of spruce, quadrat cover data were extremely variable, resulting in a calculated requirement for a prohibitively large number of quadrats. It should be noted that overstory canopy data are not included in transect cover data; inclusion of such data would greatly diminish the variability of sample means as well as the projected required sample size.

Figure R614-301-321.200ff

Table 34 Adaquacy of Sample and Site Similarity for Cover Analysis

Transect Mapping No.	Location and Vegetative Type	No. of Quadrats	Projected Required Sample Size	Similarity Index
1.	Lower Canyon, Spruce-Fir			
	Validation	20	201	
	Reference	20	339	.56
2.	Aspen Opening(nettle)			
	Validation	20	18	
	Reference	20	23	.73
3.	Lower Canyon, Aspen			
	Validation	20	18	
	Reference	20	19	.57
4.	Sagebrush			
	Validation	30	37	
	Reference	60	57	.60
5.	Whisky Canyon, Aspen			
	Validation	20	49	
	Reference	20	12	.71
6.	Whisky Canyon, Spruce-Fir			
	Validation	20	202	
	Reference	20	200	.72
7.	Portal Yard, Spruce-Fir	20	206	
8.	Portal Yard, Aspen	20	36	

Threatened and Endangered Plant Species.

Passage of the Endangered Species Act of 1973 (Public Law 23-205) provided the legal basis for establishment of lists of endangered and threatened plant species. Such lists were prepared under direction of the Smithsonian Institution, and were published subsequently in the Federal Register (40:27824-27924, 1975; and 41:24524-24572, 1976). Work on endangered and threatened plants of Utah has been reviewed by Welsh, Atwood, and Reveal (1975), and re-evaluated by Welsh (1978). More recently an illustrated manual of endangered and threatened plants of Utah was written by Welsh and Thorne (1979).

The region under investigation was included in a report on threatened and endangered species of the Central Coal Lands of Utah (Welsh, 1976).

A survey of the literature has failed to indicate the presence of any of the proposed endangered or threatened plant species in the area. This lack of critical or unique species is supported by the field surveys of the lease areas during this investigation, and during investigation of adjacent and coincident lands of the Skyline Project lease. The region was searched by walking parallel transects on a quarter-section by quarter-section basis, with each community type within each quarter-section being traversed. None of the proposed threatened or endangered species were encountered in either the lease area or in the surrounding areas.

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R614-301-322. Fish and Wildlife Information.

R614-301-322.100 thru 301-322.230.

Fish and wildlife information obtained for this permit meets the requirements of the sections.

Resource information has been gathered for the area within the Mine Permit Area and for those portions of the adjacent areas where effects on the resource may be expected to occur.

The information presented is based on the regulatory authority's determination as to level of detail required and the area of study to be involved. It includes published data and site specific information gathered by the applicant and various consultants.

Fish. (Winget, 1980)

Figure R614-301-322.200a (Table 1) summarizes the status of the streams which could possibly be impacted by the Belina Project. The only streams of importance to the fisheries as reproductive habitat are Eccles Creek and James Canyon Creek. The other streams may have an importance as sources of food organisms for the fisheries downstream but not as spawning, nursery or maintenance habitat.

Figure R614-301-322.200a

Table 1 Aquatic Resource Status of Streams

Stream	Length (miles)	Status
Eccles Creek	1.5	P,F,R
Whisky Creek	1.0	I
Slaughterhouse Creek	1.0	I
Boardinghouse Canyon Creek	2.5	P/I
Finn Canyon Creek	2.4	I
Long Canyon Creek	2.5	I
Long Canyon Creek above Eccles	2.0	P/I
Mud Creek below Eccles	4.0	P,F,R
James Canyon Creek	1.5	P,F,R

P=perenial
I=intermittent
F=trout fishery
R=natural fish reproduction

James Canyon should not be impacted from this project, but its extreme upper reaches could be affected. If it becomes evident that James Canyon Creek will be impacted, this stream will at that time be inventoried and described as has been done for Eccles Creek.

The other streams mentioned in Figure R614-301-322.200a (Table 1) are of marginal fisheries value. Since these streams will receive no surface disturbance, no further study of these streams is recommended at this time.

Eccles Creek runs along the edge of the permit area and within the adjacent area. Eccles Creek provides habitat for naturally reproducing resident populations of cutthroat trout. Scofield Reservior receives cutthroat trout recruitment stock from small feeder tributaries including Eccles Creek.

Discharges in Eccles Creek frequently go as low as less than 1 cfs during late summer, fall and winter seasons, and yearly high flows seldom exceed 36 cfs, even at the mouth. Mud Creek flows are similar to Eccles Creek in the seasonal regime, but flows are higher.

Water temperatures fluctuate greatly in Eccles and Mud Creeks because the turbulence from the rough channel coupled with low flows allows the water temperature to quickly equilibrate with existing air temperatures. During November to March the water temperature remains fairly constant between 0 and 2 degrees Centigrade. In the warmer months it is not uncommon to have a daily fluctuation of 12 to 15 degrees Centigrade, but the daily high temperature seldom exceeds 20 degrees Centigrade. Water temperatures in Mud Creek are similar to those in Eccles Creek, except maximum temperatures are probably 2 to 5 degrees Centigrade higher. The aquatic organisms of Eccles and Mud Creeks have evolved with tolerances to these natural thermal fluctuations but most are susceptible to changes beyond their natural evolutionary exposure (Lowe and Heath, 1963; Welch and Wojtalik, 1968).

Eccles Creek intersects the Black Hawk Group and Castlegate Sandstone formations. These formations are primarily sandstone with some substone, shale, and coal. Through natural erosion during runoff periods, Eccles Creek becomes quite turbid, but due to steep channel gradients and high water velocities during these periods, the fine sediments are generally carried out of the canyon rather than being deposited on coarser substrate materials. Mud Creek has a lower gradient than Eccles Creek with an expected higher level of fine sediments.

The aquatic communities, fish and macroinvertebrates, of Eccles and Mud Creeks have adapted to natural stream sediment levels, but during recent history, man controlled activities, sheep and cattle grazing, unpaved roads, mining, fires, and recreation, have resulted in some watershed degradation and erosion. This has resulted in above natural sedimentation of these streams with occasional reduction in numbers of, or elimination of, aquatic macroinvertebrates and one or more age classes of fishes.

The macroinvertebrate communities of Eccles Creek have considerable species diversity. See Figures R614-301-322.200b Thru 322.200j (Tables 2-10).

Figure R614-301-322.200b

Table 2. Macroinvertebrate community data as mean number/m2 for the South Fork of Eccles Creek, station ECSF, Carbon County, Utah.

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Nematoda	8	258	73	108
Gastropoda	--	--	22	108
Pelecypoda	--	--	11	108
Planorbidae	--	22	--	108
Oligochaeta	38	116	269	108
Turbellaria	1,501	654	1,420	108
Hydracarina	619	482	118	108
Copepoda	51	129	8	108
Ostracoda	417	745	438	108
Collembola	--	--	78	108
Ephemeroptera				
Baetis	845	882	1,913	72
Cinygmula	958	3,796	3,548	21
Paraleptophlebia	35	43	91	24
Ephemerella	--	409	159	48
Ephemerella grandis	129	--	--	24
Ephemerella coloradensis	--	46	--	18
Ephemerella inermis	100	638	--	48
Plecoptera				
Prostoia besametsa	8	22	--	24
Zapada cinctipes	1,149	516	422	16
Taenionema	--	--	46	48
Megarcys signata	62	67	32	24
Capniidae	--	164	638	32
Skwala parallela	5	--	--	18
Chloroperlidae	30	55	59	24

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Trichoptera				
Rhyacophila	288	202	105	18
Arctopsyche	--	22	--	18
Hydropsyche	--	22	27	108
Parapsyche	16	--	32	6
Limnephilidae	--	--	19	108
Oligophlebodes	81	2,655	83	24
Neothremma	32	--	54	8
Dicosmoecous	--	3	8	24
Chyranda	3	--	--	18
Brachycentrus	5	--	8	24
Micrasema	8	--	--	24
Coleoptera				
Hydrophilidae	--	--	11	--
Elmidae	70	229	113	108
Diptera				
Tipulidae	8	--	--	72
Dicranota	27	22	35	24
Hexatoma	62	65	11	36
Holorusia grandis	24	11	11	72
Ptychopteridae	8	--	--	72
Pericoma	62	94	75	36
Simuliidae	13	51	30	108
Chironomidae	2,340	5,173	409	108
Ceratopogonidae	32	94	19	108
Euparyphus	91	92	32	108
Hemerodromia	196	--	27	108
Mean Number/m2	9,321	17,773	10,453	
Standard Dev.	7,243	10,150	4,180	
Coeff. of Var.	77.7	57.1	40.0	
Mean Dry Wt. gm/m2	2.1	1.5	1.5	
Number of Taxa	35	32	37	
H (Shannon-Weaver)	3.51	3.32	3.29	
CTQa	58	63	68	

Figure R614-301-322.200c

Table 3. Macroinvertebrate community data as mean number/m2 for Eccles Creek below South Fork Eccles, station EC03, Carbon County, Utah.

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Nematoda	19	--	22	108
Pelecypoda	--	43	3	108
Hirudinea	--	--	--	108
Oligochaeta	369	237	105	108
Turbellaria	616	118	325	108
Hydracarina	126	140	452	108
Copepoda	56	43	269	108
Ostracoda	91	11	156	108
Collembola	--	--	56	108

Taxa	40 11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Ephemeroptera				
Baetis	9,870	7,693	5,485	72
Cinygmula	1,310	8,005	4,732	21
Paraleptophlebia	97	86	210	24
Ephemerella	--	1,162	231	48
Ephemerella grandis	153	11	--	24
Ephemerella coloradensis	--	22	--	18
Ephemerella doddsi	--	11	43	4
Ephemerella inermis	--	204	202	48
Ephemerella margarita	--	--	--	24
Plecoptera				
Prostoia besametsa	43	118	--	24
Zapada cinctipes	807	775	320	16
Amphinemoura	--	11	--	6
Taenionema	56	97	--	48
Megarcys signata	24	75	48	24
Capniidae	--	2,012	1,501	32
Isoperla fulva	--	--	--	48
Diura knowltoni	--	97	--	24
Chloroperlidae	11	86	14	24
Hesperoperla pacifica	--	22	--	18
Trichoptera				
Rhyacophila	487	43	89	18
Parapsyche	--	3	5	6
Oligophlebodes	11	86	43	24
Neothremma	--	43	32	8
Micrasema	483	--	75	24
Coleoptera				
Dytiscidae	--	--	3	--
Elmidae	183	97	51	108
Diptera				
Dicranota	32	237	221	24
Hexatoma	--	22	--	36
Holorusia grandis	5	11	--	72
Tipula	--	--	3	36
Ptychopteridae	22	3	--	72
Pericoma	81	86	11	36
Simuliidae	--	32	24	108
Chironomidae	2,967	1,356	1,020	108
Ceratopogonidae	94	11	11	108
Euparyphus	30	108	19	108
Hemerodromia	51	--	19	108
Mean Number/m2	18,093	23,247	15,871	
Standard Dev.	8,455	10,395	11,841	
Coeff. of Var.	46.5	44.7	74.6	
Mean Dry Wt. gm/m2	4.2	3.1	1.4	
Number of Taxa	27	37	33	
H (Shannon-Weaver)	2.45	2.74	2.89	
CTQa	64	55	62	

Figure R614-301-322.200d

Table 4. Macroinvertebrate community data as mean number/m2 for Eccles Creek below South Fork Eccles, station EC03, Carbon County, Utah.

Taxa	14 Apr 1980	TQ
Nematoda	14	108
Pelecypoda	--	108
Hirudinea	29	108
Oligochaeta	29	108
Turbellaria	990	108
Hydracarina	29	108
Copepoda	--	108
Ostracoda	29	108
Collembola	--	108
Ephemeroptera		
Baetis	9,081	72
Cinygumla	2,654	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	--	24
Ephemerella coloradensis	--	18
Ephemerella doddsi	--	4
Ephemerella inermis	--	48
Ephemerella margarita	3,013	24
Plecoptera		
Prostoia besametsa	301	24
Zapada cinctipes	430	16
Amphinemoura	--	6
Taenionema	43	48
Megarcys signata	118	24
Capniidae	143	32
Isoperla fulva	--	48
Diura knowltoni	--	24
Chloroperlidae	100	24
Hesperoperla pacifica	--	18
Trichoptera		
Rhyacophila	114	18
Parapsyche	--	6
Oligophlebodes	--	24
Neothremma	--	8
Micrasema	--	24
Coleoptera		
Dytiscidae	--	--
Elmidae	43	108
Diptera		
Dicranota	--	24
Hexatoma	--	36
Holorusia grandis	--	72
Tipula	--	36
Ptychopteridae	--	72
Pericoma	--	36
Simuliidae	72	108
Chironomidae	8,838	108
Ceratopogonidae	43	108
Euparyphus	22	108
Hemerodromia	57	108

	42
Mean Number/m2	26,251
Standard Dev.	5,119
Coeff. of Var.	19.5
Mean Dry Wt. gm/m2	2.0
Number of Taxa	23
H (Shannon-Weaver)	2.41
CTQa	70

Figure R614-301-322.200e

Table 5. Macroinvertebrate community data as mean number/m2 for Eccles Creek below Whisky Creek, station ECO4, Carbon County, Utah.

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Nematoda	43	54	272	108
Gastropoda	8	--	--	108
Pelecypoda	--	11	11	108
Oligochaeta	1,364	646	503	108
Turbellaria	223	65	75	108
Hydracarina	207	506	272	108
Copepoda	11	--	43	108
Ostracoda	19	75	59	108
Collembola	16	--	16	108
Ephemeroptera				
Ameletus	8	--	--	48
Baetis	6,779	8,468	21,757	72
Cinygmula	369	3,605	2,674	21
Epeorus	16	--	--	21
Paraleptophlebia	13	--	145	24
Ephemerella	--	366	43	48
Ephemerella grandis	75	129	40	24
Ephemerella coloradensis	--	65	54	18
Ephemerella doddsi	--	22	--	4
Ephemerella inermis	22	151	38	48
Ephemerella margarita	--	--	--	24
Plecoptera				
Megarcys signata	22	--	--	24
Prostoia besametsa	301	516	54	24
Zapada cinctipes	223	990	1,943	16
Taenionema	46	291	966	48
Capniidae	--	473	2,383	32
Isoperla	--	--	8	48
Skwala parallela	--	--	5	18
Diura knowltoni	--	--	3	24
Chloroperlidae	19	--	13	24
Hesperoperla pacifica	--	22	--	18
Trichoptera				
Rhyacophila	417	420	161	18
Hydropsyche	--	108	108	108
Limnephilidae	--	43	--	108
Oligophlebodes	11	452	110	24
Neothremma	--	--	8	8
Lepidostoma	--	43	--	18
Brachycentrus	11	--	--	24
Micrasema	135	430	245	24

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Diptera				
Antocha monticola	11	22	32	24
Dicranota	19	108	105	24
Hexatoma	--	22	--	36
Holorusia grandis	3	3	11	72
Ptychopteridae	22	--	--	72
Pericoma	27	22	43	36
Simuliidae	--	52	--	108
Chironomidae	861	6,553	1,614	108
Ceratopogonidae	30	22	97	108
Euparyphus	19	161	99	108
Atherix pachypus	--	--	8	24
Hemerodromia	207	172	89	108
Limnophora	--	--	19	108
Mean Number/m2	11,634	25,273	34,233	
Standard Dev.	7,222	10,619	22,842	
Coeff. of Var.	62.1	42.0	66.7	
Mean Dry Wt. gm/m2	1.2	2.3	2.2	
Number of Taxa	35	35	39	
H (Shannon-Weaver)	2.45	3.06	2.23	
CTQa	62	63	60	

Figure R614-301-322.200f

Table 6. Macroinvertebrate community data as mean number/m2 for Eccles Creek below Whisky Creek, station EC04, Carbon County, Utah.

Taxa	14 Apr 1980	TQ
Nematoda	43	108
Gastropoda	--	108
Pelecypoda	--	108
Oligochaeta	441	108
Turbellaria	151	108
Hydracarina	140	108
Copepoda	--	108
Ostracoda	11	108
Collembola	--	108
Ephemeroptera		
Ameletus	--	48
Baetis	732	72
Cinygmula	11	21
Epeorus	54	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	22	24
Ephemerella coloradensis	--	18
Ephemerella doddsi	--	4
Ephemerella inermis	--	48
Ephemerella margarita	86	24

Taxa	14 Apr 1980	TQ
Plecoptera		
Megarcys signata	13	24
Prostoia besametsa	463	24
Zapada cinctipes	32	16
Taenionema	86	48
Capniidae	398	32
Isoperla	--	48
Skwala parallela	--	18
Diura knowltoni	--	24
Chloroperlidae	11	24
Hesperoperla pacifica	--	18
Trichoptera		
Rhyacophila	323	18
Hydropsyche	--	108
Limnephilidae	--	108
Oligophlebodes	43	24
Neothremma	--	8
Lepidostoma	--	18
Brachycentrus	97	24
Micrasema	--	24
Coleoptera		
Haliplidae	--	54
Elmidae	86	108
Diptera		
Antocha monticola	--	24
Dicranota	43	24
Hexatoma	--	36
Holorusia grandis	11	72
Ptychopteridae	--	72
Pericoma	--	36
Simuliidae	--	108
Chironomidae	2,249	108
Ceratopogonidae	11	108
Euparyphus	32	108
Atherix pachypus	--	24
Hemerodromia	22	108
Limnophora	11	108
Mean Number/m2	13,420	
Standard Dev.	11,040	
Coeff. of Var.	82.3	
Mean Dry Wt. gm/m2	2.2	
Number of Taxa	28	
H (Shannon-Weaver)	2.30	
CTQa	61	

Figure R614-301-322.200g

Table 7. Macroinvertebrate community data as mean number/m2 for Eccles Creek at Mouth, station ECO5, Carbon County, Utah.

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Nematoda	43	--	51	108
Pelecypoda	--	--	--	108
Oligochaeta	143	126	597	108
Turbellaria	--	--	16	108
Hydracarina	202	75	188	108
Ostracoda	--	--	16	108
Collembola	--	--	5	108
Ephemeroptera				
Baetis	5,942	51	656	72
Cinygmula	81	116	67	21
Epeorus	30	--	8	21
Paraleptophlebia	22	--	8	24
Ephemerella	--	--	11	48
Ephemerella grandis	43	--	24	24
Ephemerella inermis	51	--	--	48
Ephemerella margarita	--	--	--	24
Odonata				
Argia	--	--	5	108
Plecoptera				
Malenka	22	--	--	36
Prostoia besametsa	4,842	--	--	24
Zapada cinctipes	186	167	1,560	16
Taenionema	--	8	--	48
Megarcys signata	13	--	--	24
Capniidae	--	54	40	32
Isoperla	11	--	30	48
Skwala parallela	18	--	--	18
Chloroperlidae	19	24	22	24
Trichoptera				
Rhyacophila	291	30	183	18
Hydropsyche	67	62	673	108
Cheumatopsyche	--	--	--	108
Limnephilidae	--	8	35	108
Hesperophylax	8	--	--	108
Brachycentrus	148	--	352	24
Micrasema	--	--	11	24
Coleoptera				
Elmidae	11	11	67	108

Taxa	11 May 1979	23 Aug 1979	02 Oct 1979	TQ
Diptera				
Antocha monticola	--	--	27	24
Dicranota	56	--	8	24
Hexatoma	8	8	8	36
Holorusia grandis	13	--	8	72
Tipula	--	8	--	36
Eriocera	--	--	--	72
Pericoma	16	19	5	36
Simuliidae	--	--	56	108
Chironomidae	5,958	1,385	9,130	108
Ceratopogonidae	30	105	56	108
Stratiomyidae	--	--	--	108
Euparyphus	--	--	--	108
Hemerodromia	398	247	382	108
Mean Number/m2	18,661	2,526	14,308	
Standard Dev.	12,773	1,066	6,806	
Coeff. of Var.	68.4	42.2	47.6	
Mean Dry Wt. gm/m2	4.5	0.6	3.5	
Number of Taxa	28	18	32	
H (Shannon-Weaver)	2.28	2.59	2.15	
CTQa	57	67	65	

Figure R614-301-322.200h

Table 8. Macroinvertebrate community data as mean number/m2 for Eccles Creek at Mouth, station EC05, Carbon County, Utah.

Taxa	14 Apr 1980	TQ
Nematoda	22	108
Pelecypoda	3	108
Oligochaeta	420	108
Turbellaria	118	108
Hydracarina	420	108
Ostracoda	22	108
Collembola	--	108
Ephemeroptera		
Baetis	1,818	72
Cinygmula	22	21
Epeorus	--	21
Paraleptophlebia	--	24
Ephemerella	--	48
Ephemerella grandis	--	24
Ephemerella inermis	11	48
Ephemerella margarita	11	24
Odonata		
Argia	--	108

Taxa	14 Apr 1980	TQ
Plecoptera		
Malenka	--	36
Prostoia besametsa	3,110	24
Zapada cinctipes	--	16
Taenionema	--	48
Megarcys signata	3	24
Capniidae	--	32
Isoperla	--	48
Skwala parallela	--	18
Chloroperlidae	5	24
Trichoptera		
Rhyacophila	32	18
Hydropsyche	22	108
Cheumatopsyche	43	108
Limnephilidae	--	108
Hesperophylax	56	108
Brachycentrus	97	24
Micrasema	--	24
Coleoptera		
Elmidae	22	108
Diptera		
Antocha monticola	11	24
Dicranota	65	24
Hexatoma	--	36
Holorusia grandis	8	72
Tipula	--	36
Eriocera	43	72
Pericoma	--	36
Simuliidae	--	108
Chironomidae	5,757	108
Ceratopogonidae	11	108
Stratiomyidae	3	108
Euparyphus	22	108
Hemerodromia	387	108
Mean Number/m2	12,560	
Standard Dev.	3,906	
Coeff. of Var.	31.1	
Mean Dry Wt. gm/m2	3.7	
Number of Taxa	28	
H (Shannon-Weaver)	2.32	
CTQa	73	

Figure R614-301-322.200i

Table 9. Macroinvertebrate community description as mean number/m2 for Mud Creek 100 m above Eccles Creek, station MC02, Carbon County, Utah.

Taxa	11 May 1979	23 Aug 1979	TQ
Nematoda	--	22	108
Oligochaeta	215	140	108
Hydracarina	382	2,130	108
Copepoda	--	22	108
Ostracoda	54	54	108
Collembola	--	33	108
Ephemeroptera			
Baetis	1,837	15,247	72
Heptagenia	--	113	48
Paraleptophlebia	40	--	24
Ephemerella	--	54	48
Ephemerella grandis	19	124	24
Ephemerella inermis	1,033	22	48
Plecoptera			
Prostoia besametsa	11	--	24
Capniidae	--	16	32
Pteronarcella badia	8	5	24
Isoperla	--	43	48
Isoperla fulva	19	--	48
Trichoptera			
Rhyacophila	8	3	18
Hydropsyche	382	570	108
Arctopsyche	24	2,927	18
Stactobiella	--	32	108
Limnephilidae	--	167	72
Brachycentrus americanus	210	11	24
Coleoptera			
Elmidae	1,044	2,233	108
Diptera			
Tipulidae	--	527	72
Antocha monticola	83	--	24
Dicranota	124	22	24
Holorusia grandis	19	22	72
Eriocera	89	103	36
Simuliidae	11	301	108
Chironomidae	23,457	1,840	108
Ceratopogonidae	22	135	108
Stratiomyidae	11	27	108
Hemerodromia	78	75	108
Mean Number/m2	29,178	27,016	
Standard Dev.	14,485	4,546	
Coeff. of Var.	50	17	
Mean Dry Wt. gm/m2	8.29	6.46	
Number of Taxa	24	30	
H (Shannon-Weaver)	1.306	2.354	
CTQa	65	70	

Figure R614-301-322.200j

Table 10. Macroinvertebrate community description as mean number/m2 for Mud Creek 2 km below Eccles Creek, station MC01, Carbon County, Utah.

Taxa	11 May 1976	11 May 1979	23 Aug 1979	TQ
Nematoda	--	8	54	108
Oligochaeta	22	48	65	108
Hydracarina	323	30	751	108
Copepoda	--	--	22	108
Ostracoda	32	--	--	108
Collembola	151	8	--	108
Ephemeroptera				
Ameletus	11	--	--	48
Baetis	7,532	1,028	6,800	72
Cinygmula	2,733	30	108	21
Ephemerella grandis	--	24	32	24
Ephemerella doddsi	43	--	--	18
Ephemerella coloradensis	581	--	--	4
Ephemerella inermis	--	65	--	48
Plecoptera	43	--	--	--
Malenka	--	--	22	36
Prostoia besametsa	--	22	--	24
Zapada cinctipes	1,076	22	--	16
Capniidae	22	--	22	32
Pteronarcella badia	--	32	43	24
Perlodidae	11	--	22	48
Megarcys signata	11	--	--	24
Diura knowltoni	--	8	--	24
Chloroperlidae	65	22	43	24
Hemiptera				
Ambrysus mormon	11	--	--	72
Trichoptera				
Rhyacophila	129	8	3	18
Agapetus	11	--	--	32
Hydropsyche	11	38	818	108
Arctopsyche	--	--	65	18
Parapsyche	22	--	--	6
Dicosmoecous	--	--	3	24
Hesperophylax	11	8	--	108
Oligophlebodes	301	--	3	24
Brachycentrus americanus	11	13	43	24
Micrasema	--	8	--	24
Coleoptera				
Dytiscidae	--	--	3	72
Elmidae	--	204	204	108

Taxa	11 May 1976	11 May 1979	23 Aug 1979	TQ
Diptera				
Dicranota	--	--	22	24
Holorusia grandis	11	--	--	72
Eriocera	--	8	129	36
Bittacamorpha clavipes	--	3	--	72
Pericoma	151	--	--	36
Simuliidae	22	--	140	108
Chironomidae	3,572	678	872	108
Ceratopogonidae	22	16	43	108
Stratiomyidae	--	--	11	108
Hemerodromia	54	22	86	108
Muscidae	--	--	--	108
Mean Number/m2	16,995	2,176	10,416	
Standard Dev.	--	887	4,457	
Coeff. of Var.	--	41	43	
Mean Dry Wt. gm/m2	--	1.08	1.90	
Number of Taxa	29	23	28	
H (Shannon-Weaver)	2.461	2.406	2.103	
CTQa	58	62	68	

Representatives include all trophic levels: algal scrapers-Baetis and Cinygmula mayflies; shredders-Zapada, Capniidae and Taenionema stoneflies; collectors-Ephemerella gradis and E. inermis mayflies; filter feeders-Macrasema and Hydropsyche caddisflies and Simuliidae black flies; and predators-Megarcys, Isoperla and Chloroperlidae stone flies, and Rhyacophila caddisflies. The large number of Ephemeroptera, Plecoptera and Trichoptera taxa are evidence of the high quality of the water in Eccles Creek.

Water quality of Eccles Creek is excellent for most uses. Eccles Creek has adquate nitrate nitrogen for good algal growth most of the year, but phosphate levels are generally low. Scofield Reservior has periodic nuisance level algal blooms. Nutrient inputs form recreation, cattle and sheep, and domestic sources are frequently high enough to bring the total nutrient input of Scofield Reservior to excessive levels (Southeastern Utah Association of Governments, 1976). According to survey results, Eccles Creek to date has not had excessive nutrient levels, and thus contributes only slightly to the algal blooms in Scofield Reservior.

Macroinvertebrate Communities.

Eccles Creek-1979. The samples of macroinvertebrates from Eccles Creek during May, June, August, and October, 1979, contained numerous taxa Figures R614-301-322.200b, 322.200c, 322.200e, and 322.200g (Tables 2, 3, 5, and 7). Included in the communities were fragile forms found only in high quality waters-Cinygmula, Epeorus, and Paraleptophlebia mayflies; Zapada, Megarcys, Skwala, Diura, and Chloroperlid stoneflies; Rhyacophila, arctopsyche, Parapsyche, Neothremma, Oligophlebodes, Brachycentrus and Micrasema caddisflies; and Antocha, Dicranota, and Pericoma flies. The majority of taxa collected are tolerant to moderate sedimentation loads, typical of small streams in Utah that are subject to low flows, shale and sandstone formations and grazing impacts.

In 1979 several taxa exhibited an evident response to the land slough along the turn-off road to the Belina Mines. The result of the slough has been an increased sediment load in Eccles Creek below the slough. Most of the stream substrates had a visible covering of fine sediments in August, 1979, during the fish stocking surveys. Twenty-four taxa, through reduced number or absence from samples at Station EC05, as compared with upstream stations showed an impact from these sediments. Included were: copepod and ostracod zooplankton; turbellarian worms; Baetis, Cinygmula, Paraleptophlebia, Ephemerella grandis and E. coloradensis mayflies; Zapada, Taenionema, Prostoia, Megarcys and capniid stoneflies; Oligophlebodes and Micrasema caddisflies; elmid riffle beetles; and Dicranota, Holorusia, and simuliid and stratiomyid flies Figures R614-301-322.200c, 322.200e, and 322.200g (Tables 3, 5, and 7). Seven taxa at Station EC04 showed similar responses as at EC05 although the changes were not as severe. Aquatic macroinvertebrates are active drifters, being carried downstream by the stream currents. This helps account for the continued diversity at Station EC04 in 1979 Figure R614-301-322.200e (Table 5).

Samples taken from Station EC04 and EC05 in May, 1979, Figures R614-301-322.200e and 322.200g (Tables 5 and 7) were before the major emergence period when the macroinvertebrate larvae were nearly all late instar (large) larvae. The larger larvae can tolerate more sedimentation than smaller or earlier instar larvae. This helps explain the relatively small community change in May, 1979, below the land slough. By the August, 1979, the adult stage, mated, laid eggs and died. The small early instar larvae resulting from the hatch of eggs entered a harsh environment due to the presence of increased fine sediment levels. These small larvae, being unable to tolerate the levels of sediments, were eliminated resulting in the more drastic community change in August, 1979, compared to May, 1979 Figures R614-301-322.200e and 322.200g (Tables 5 and 7).

A new macroinvertebrate community evaluation tool (community tolerance quotient, CTQa) developed by Winget and Mangum, 1979, shows a change in species composition at Stations EC04 and EC05. The CTQa is the arithmetic mean of the tolerance quotients (TQ) of the actual taxa of macroinvertebrates sampled from the stream station on the given date. The tolerance quotient is a value assigned each taxon based upon its tolerance and selectivity for various substrate materials, stream gradients, levels of alkalinity and sulfate concentrations. TQ's range from 2 (very fragile, narrow tolerance limits) to 108 (wide tolerance limits for all 4 parameters).

In 1979 the macroinvertebrates of lower Eccles Creek, especially at Station EC05, showed a trend towards a more tolerant, less diverse macroinvertebrate community (CTQa increased to 67, number of taxa dropped to only 18 and number per square meter dropped to only 2,526). Stream substrates were covered with fine silts which probably caused the reduced fish spawn success and macroinvertebrate community condition. Stabilization of the hillside at Whisky Canyon and completion of the culverts and sedimentation pond upstream will eliminate future sedimentation from those sources.

Eccles Creek-1980. Eccles Creek stations were sampled 3 times in 1980. The results of the Spring set of samples are contained in this report Figures R614-301-322.200d, 322.200f, and 322.200h (Tables 4, 6, and 8). As in 1979 the sample data in 1980 from Station EC05, compared with 1979 EC05 data and 1979 and 1980 EC04 data, showed a degradation in community condition Figure R614-301-322.200e, 322.200f, 322.200g, and 322.200h (Tables 5-8): reduced numbers and weight per square meter and increased CTQa to 70 from 57-67 in 1979. Changes in community structure at EC05 were similar to those discussed for 1979, only more severe indicating suspected degradation trends appears a reality in the lower reaches of Eccles Creek.

Station EC04 in April, 1980, showed a reduction in number of taxa compared with May, 1979, Figures R614-301-322.100e and 322.200f (Tables 5-6) but the change did not show up in a change in community tolerance (CTQa). There may yet be a change in species composition occuring at Station EC04. The summer and fall, 1980, samples should help clear this up. Evidence indicates several important taxa are under stess and may perhaps be eliminated if the stress continues for a long period of time or increases in severity-reduction in number of Baetis, Cinygmula, E. grabis, Zapada, and Micrasema. Associated with the drop in density of the aforementioned taxa was an obvious increase in chironomid midges and capniid stoneflies (a burrowing, sediment tolerant taxom).

There appears to be a trend in the Eccles Creek macroinvertebrate communities towards a more tolerant assemblage of species.

Mud Creek, 1976 and 1979. Figure R614-301-322.200i (Table 9) gives a summary of the results of the 1979 macroinvertebrate samples taken from Station MC02, above the mouth on Eccles Creek. There was little change in actual community structure other than the natural seasonal changes due to emergence and egg hatch. The community is in fair condition, especially considering the periodic low flows occuring in Mud Creek above the confluence with Eccles Creek.

Figure R614-301-322.200j (Table 10) contains a data summary for samples taken from Station MC01, 2 Km below the confluence with Eccles Creek. In 1976 29 taxa were collected compared with only 23 in 1979. Population density in 1976 was 16,995 per square meter compared with only 2,176 in 1979. The CTQa was 58 in 1976 and 62 in 1979, a small change by itself but significant when compared with the other community descriptors. There appears to have been some significant impacts on the community between May, 1976, and May, 1979. Of special interest is the presence of Arctopsyche caddisflies above Eccles Creek and the obvious lack of them below. Arctopsyche is found only in high quality streams.

Substrate Composition

Eccles Creek-1979. Sediments of Eccles Creek at certain locations may at times not be suitable for trout spawning.

Figure R614-301-322.200k

Table 11. Sediment composition of potential gravel spawning beds as Percent by Weight for five size classes at five stations (1) EC02, Eccles Creek above South Fork; (2) EC04, Eccles Creek below Whisky Creek; (3) EC05, Eccles Creek at the mouth; (4) MC02, Mud Creek above Eccles Creek; and (5) MC01, Mud Creek below Eccles Creek. Samples taken 24 August 1979.

	Stations				
Particle Size	EC02	EC04	EC05	MC02	MC01
Gravel >4.75 mm	73.6	70.8	70.6	71.9	71.6
Coarse Sand 2.0-4.75 mm	8.7	8.5	9.2	7.3	9.0
Medium Sand 0.50-1.99 mm	5.5	5.2	6.1	7.6	5.8
Fine Sand 0.074-0.49 mm	12.0	15.3	13.9	12.9	13.2
Silt/Clay <0.074 mm	0.2	0.2	0.2	0.3	0.4
Fines <0.850 mm	13.5	16.9	15.8	15.7	15.2

There was more gravel and less fine sand in upper Eccles Creek, station EC02, than at either of the lower stations EC04 or EC05. The levels of silt and clay were the same at all stations. Fine sand is the first fraction of suspended sediments to settle as stream gradients are reduced. It is not surprising to see deposition of fine sands at stations below the Whisky Canyon hillside land slough since these stations have sections of reduced gradient with reduced water velocities.

During the fish shocking survey conducted August 20-21, 1979, numerous young-of-the-year (y-o-y) cutthroat trout were observed from Whisky Creek upstream to the forest boundary but y-o-y trout were not seen below Whisky Creek. They may have been present below Whisky Creek and just not observed, but the substrates below were covered with a heavier layer of fine sediments than was seen above. This may have caused a reduced cutthroat reproductive success below Whisky Creek.

Mud Creek-1979. Figure R614-301-322.2001 (Table 11) presents the analysis of one set of sediment samples taken on August 24, 1979, at two stations on Mud Creek. Sediment composition was nearly identical at both stations. The percent fines (less than 0.850 mm in diameter) was 15.7 and 15.2, above and below Eccles Creek, respectively. These values indicate gravels may be suitable for trout spawning but level of fines is close to the limiting level, using 15% as maximum acceptable level.

Figure R614-301-322.2001 (Table 12) contains a summary of stream substrate composition at three stations on Eccles Creek. Substrates are divided as percent stream bottom cover for six classes of materials. Determinations are occular estimates made on site.

Figure R614-301-322.2001

Table 12. Substrate composition of Eccles Creek listed as percent cover. Surveyed 11 June 1979. Station locations shown in Figure R614-301-322.200a (Table 1).

Substrate Type, Diameter	Station EC02	EC04	EC05
Boulder >31 cm	0	5	5
Lg. Rubble 15.1-31 cm	20	20	15
Sm. Rubble 7.7-15.0 cm	30	25	20
Lg. Gravel 2.6-7.6 cm	20	15	15
Sm. Gravel 0.5-2.54 cm	20	15	20
Sand/Silt <0.5 cm	10	20	25

Mud Creek-1980. Sedimentation impacts from Eccles Creek have appeared to be greater in 1980 than during previous years. Two sets of sediment samples have been taken from Mud Creek in 1980, one in August and one in September. The resultant data should help determine the cumulative affect from these sediments on the substrates of Mud Creek.

Stream Channel.

Eccles Creek. Channel gradient is listed as a decimal of the number of vertical feet drop per linear feet of stream length. Tortuosity is the actual stream length between two points divided by the shortest distance between the same two points. Figure R614-301-322.200i (Table 13) gives gradient and tortuosity value for 4 stream reaches.

Upper forks of Eccles Creek, from approximately the forest boundary upstream, are typically steep (over 10% gradient), narrow, low tortuosity streams (Figure R614-301-322c). The potential for supporting a trout fishery is almost nil due to summer/fall/winter low flows.

Figure R614-301-322.200m

Table 13.
Stream channel characteristics of Eccles Creek as measured June 11, 1979, at EC02 and EC05.

	EC02	EC05
Channel gradient	0.04	0.03
Channel tortuosity	1.22	1.40
Mean width at flow	2.8 ft. @ 3.5 cfs	3.6 ft. @ 6.3 cfs
Mean depth at flow	0.51 ft. @ 3.5 cfs	0.62 ft. @ 6.3 cfs
Tall bank mean width	37.0 ft.	26.2 ft.
Riffle: Pool ratio	3:2	3:2
Mean bank stability	90%	85%
Bank vegetation in order of dominance	grasses shrubs evergreens dec. trees	grasses evergreens shrubs dec. trees

From the forest boundary downstream the stream has lower gradients plus areas of increased tortousity. This allows formation of higher quality pools that are essential to fish survival during the low flow periods and unusually high runoffs. Channel width ranges from 20 to 55 feet with the watered width being limited to 2 to 5 feet most of the year. Water depths seldom exceed 1 foot except in infrequent deep pools which have maximum depths of 3 feet. Mean depth at EC02 was 0.51 feet and 3.5 cfs and at EC05 mean depth was 0.62 feet at 6.3 cfs. Yearly flows are considerably less than these which were measured June 11, 1979.

Stream banks are steep along most of the canyon. Except for localized problems, the banks are stable with established dense riparian vegetation. The stream channel, through bank erosion has lost some of its previous meanders in one canyon section between Whisky Creek and South Fork. Active beaver activity has resulted in some high beaver dam structures immediatley above Whisky Creek that have become silted in upstream and caused downstream vertical drops of up to 5 feet which is too high for fish passage upstream. This has isolated the fish above Whisky Creek by preventing upstream migration, indicating a self sustaining population of cutthroat trout in this short upper Eccles Creek reach.

Mud Creek. From the mouth of Eccles Creek downstream, Mud Creek is mostly a willow-lined meandering valley stream. Cattle grazing is common along the stream but stream banks are mostly stable with fairly good vegetative cover. There are isolated areas with exposed banks and sedimentation problems. The habitat at stations MC02, 100 meters above Eccles Creek, and MC01, 2 kilometers downstream, will be evaluated and described in September/October, 1980. It appears that Mud Creek is more water limited than habitat limited for a fisheries development.

Fisheries.

Eccles Creek. Eccles Creek is classified by Utah Division of Wildlife Resources as a Class III Stream with natural reproduction. It is categorized no higher than a Class III stream because of the small size and inability to support a quality fishery under moderate fishing pressures without stocking of additional fish. Fish surveys by Utah Division of Wildlife Resources in 1968, 1971, 1977, and 1979 all found cutthroat trout resulting from in-stream reproduction as there has been no stocking of trout in the stream since 1967. Fish are mostly small in size. The size distribution of fish measured at one station on August 25, 1971, was: 0-3.5", 21 fish; 3.5-4.5", 15 fish; 4.5-6.5", 18 fish; 6.5-8.5", 3 fish. Similar size distributions were observed during 1977 and 1979.

A summary of "Age-Growth of Cutthroat Trout Taken in Eccles Creek from Two Sections" appears in Figure R614-301-322.200n (Table 14)(UDWR field collections records, August 25, 1971). Eccles Creek habitat and fisheries resources as measured by UDWR personnel on August 25, 1971, are summarized in Figures R614-301-322.200o and 322.200p (Tables 15 and 16). On August 20-21, 1979, UDWR personnel surveyed Eccles Creek to determine: 1) number of cutthroat trout compared to previous surveys; 2) reproductive success; and 3) range of fish in the drainage.

Figure R614-301-322.200n

Table 14. Age-Growth of Cutthroat Trout taken in Eccles Creek from two Sections (UDWR Field Records, 8/25/71).

Age Class	Mean Size (mm)	Range (mm)	Mean Weight (gms)	Range (gms)	No.	%
0	56	45-67	7.5	5-10	2	3
1	118	78-175	27.3	10-60	68	79
2	198	180-228	95.0	75-125	15	17
3	257		170.0		1	1
					86	

Comments:

1. Possibly some 1+ are 2+ fish
2. 0+ age class were not recovered due to size
3. No non-game species were collected

Figure R614-301-322.200o

Table 15. Stream Survey of Eccles Creek 1 1/2 miles above confluence with Mud Creek, 25 August 1971.

UTAH STATE DIVISION OF FISH AND GAME

Date: August 25, 1971 Collection No: 1-2-1 Investigator: John Livesay
Catalog No. II.K.20.b(4) Stream: Eccles Creek
Tributary to: Mud Creek Drainage: Green River
Report no. 1 of 2 reports.
Location of station: 1-1/2 miles up from confluence of Mud Creek.
Length of Station: 528' Elevation of Station: 8100'

Temperature	Discharge	Bottom Type
Time: 2:00 P.M.	Velocity fps: 1.8	Boulders: 0%
Air: 62	Volume cfs: 3.6	Rubble 33%
Water: 54	Maximum: No record	Gravel 48%
Time:	Date:	Sand 0%
Air	Minimum	Silt 19%
Water	Date: No record	Other %

Average Channel: 6.6
Average width of stream: 5.8 ft. Area of station: 3062.4 sq. ft.
Pools: No. per 1/10 mile 10 Ave.(w) 6.9' Ave. (l) 8.3' Ave(d) 1.34
Bank cover composition: Willow (Ab) Grass (Ab) Sedge (c) Equisetum (S)
% bank stabilization: RB 88% LB 76% stream shaded: RB 34% LB 43%
Pollution (types, sources, amounts, etc.) None

		Aquatic	
Turbidity: None		Vegetation: Good	Bottom fauna: Good
pH 8.2		Absent:	Absent
Phenol Alk.		Sparse X	Common: X
D.O 8.0		Abundant	Abundant
C0.2 3.4		Major types:	Major types: Trichoptera (c)
		Fil Green Algae	Tendipedidae(s)
			Coleoptera(Sp)
			Ephemeroptera (c)

Remarks: Pools: Cover = 59%, Rating = B-. Pools are good in this area with sufficient cover. Spawning habitat and food are suitable. Volume of water is the only limiting factor.

Figure R614-301-322.200p

Table 16. Stream Survey of Eccles Creek 0.3 miles above confluence with Mud Creek, 25 August 1971.

UTAH STATE DIVISION OF FISH AND GAME

Date: August 25, 1971 Collection No: 1-1-2 Investigator: John Livesay
Catalog No. II.K.20.b(4) Stream: Eccles Creek
Tributary to: Mud Creek Drainage: Green River
Report no. 2 of 2 reports.
Location of station: 0.3 miles up from confluence of Mud Creek.
Length of Station: 528' Elevation of Station: 7900'

Temperature	Discharge	Bottom Type
Time: 3:30 P.M.	Velocity fps: 1.5	Boulders: 5%
Air: 65F	Volume cfs: 3.6	Rubble 39%
Water: 54F	Maximum: No record	Gravel 51%
Time:	Date:	Sand 0%
Air	Minimum: No record	Silt 5%
Water	Date:	Other %

Average Channel: 6.6 ft.
Average width of stream: 5.8 ft. Area of station: 3062.4 sq. ft.
Pools: No. per 1/10 mile 2 Ave.(w) 7.5' Ave.(l) 10' Ave.(d) 0.7'
Bank cover composition: Grass (Ab) Sedge (c)
% bank stabilization: RB 74% LB 80% stream shaded: RB 13% LB 16%
Pollution (types, sources, amounts, etc.) None

	Aquatic	
Turbidity: None	Vegetation: Good	Bottom fauna: Good
pH 8.2	Absent:	Absent
Phenol Alk.	Sparse X	Common:
D.O. 8.0	Abundant	Abundant X
C0.2 2.6	Major types:	Maj.types:Epheneroptera
(a)	Fil. Green Algae	Tendipedidae(s)
		Coleoptera(s)
		Trichoptera(c)
		Simuliidae(c)
		Plecop(s)

Remarks: Pools: Cover = 15%, Rating = C. Pools are lacking in this segment and the ones that are there do not appear very good. The area is good for spawning and excellent in food.

Cutthroat trout in August, 1979, were found at EC05 and EC03 in similar densities as during previous surveys. Size distributions were also similar indicating continuing reproductive success of cutthroat trout in Eccles Creek.

In the area of the coal handling facilities near the mouth of the canyon, cutthroat trout are present, are reproducing, and are dependent upon being able to traverse the stream channel upstream to spawn and downstream to gain access to Scofield Reservior. Mr. John Livesay, of the Price Office, UDWR reported (personal communication) that in Scofield Reservior, approximately 25% of the fish sampled in 1979 were cutthroat trout, although all fish plants since poisoning in 1977 have been rainbow trout. The likely source of cutthroat trout in Scofield Reservior would be the 3-6 small tributary streams, like Eccles Creek, that have naturally reproducing populations.

Mud Creek. Mud Creek, from Eccles Creek downstream, has been under agricultural use and coal handling impacts for many years. Stream banks are approximately 60% stable with riparian vegetation consisting mostly of willows. Substrates are mostly cleaned of fine materials each spring but by fall sediment build-up is apparent in low-gradient stream reaches.

Cutthroat trout apparently migrate from Scofield Reservior, up Mud Creek to Eccles Creek during the yearly spawning runs. It is not known if these trout spawn in Mud Creek, but the present opinion is that Mud Creek is more important as a migratory route and as a source of food for the reservior fishes than as spawning habitat.

Birds. (White, 1980)

Ornithological investigations have been accomplished over several time periods in the Scofield coal mining region. Specifically, these periods have been: December 1, April 7-8, April 25-26, May 17-18, June 13-14, and July 26-29. During these periods a record has been maintained on threatened or endangered species, raptors seen and nests located, occurrences of species of high Federal interest, and migratory birds in general. The obvious time period where observations are missing are during the major autumn migration periods, September through October. This may represent a critical block of time. For example, the peak of raptor migration, as seen along the Wasatch Front 60 miles north of Scofield, revealed a total of 308 migration raptors recorded between September 9 and October 4 with the peak around mid to late September (Mosher, et al, 1978). Prior to the drawing of any final conclusions, that autumn time period will be examined. The nature of the raptor fauna correlated with the earlier findings (Jones, 1979) on the Manti-LaSal National Forest to the south of the Scofield area.

Materials and Methods.

The survey method consisted entirely of visual observations. A one kilometer strip along Whisky Canyon and Eccles Canyon, mine portals and other disturbance areas were walked. All birds were noted and old nests were marked where appropriate on USGS topographic maps.

Raptor Surveys. No particularly unique nor innovative methods are used to survey for raptors except when examining cliffs for nests. There one must look at each specific ledge or pothole for the presence of fecal "whitewash" matter. The one kilometer area was systematically walked and likely nesting areas were thoroughly searched or otherwise examined with binoculars. Several hours were spent sitting quitely at selected locations listening for courtship or other calls of accipiter or buteo. Regions where several hours of careful observation and listening were spent were the confluences of Whisky and Eccles Canyon and around the mine portals.

Species of High Federal Interest. Any habitat peculiar to the three woodpeckers and one bluebird of high Federal interest was given special attention. Habitat characteristics of these species are generally lacking in the Valley Camp of Utah, Inc. area. The elevation is generally either too high or of a different floral type.

Results.

Raptors. In addition to the Bald Eagle that migrates near Scofield, but which we did not record, we found nine species of diurnal raptors and one owl. Two active nests were found in Eccles Canyon, one of the Goshawk and one of the Cooper's Hawk. The Cooper's Hawk is also a species of high Federal interest. These two species can generally tolerate considerable human impact (Hennessy, 1978). The Golden Eagle was seen on every survey period, but no active nest was found. It is also a species of high Federal interest.

Rare and Endangered Species. The Bald Eagle is seen in migration in the Scofield area, but none has been recorded within the one kilometer around the disturbed area. The Peregrine Falcon has been seen once during the winter of 1976 (L. Dalton, personal communication) but its occurrence there must be considered rare. It did not nest, as far as is known, within 25 miles of the Mine Permit Area.

Species of High Federal Interest. The three woodpecker species that have been identified for special attention, Williamson's Sapsucker, Lewis' Woodpecker, and Pileated Woodpecker, have not been observed within the mine permit area to date. These three species present special problems with regard to Eccles Canyon. The habitat within the canyon along the mine route is more typical of Yellow-bellied Sapsucker habitat than the coniferous forest type more typically used by Williamson's Sapsucker. Although Lewis' Woodpecker may occur in Eccles Canyon during migration, it normally breeds in riparian cottonwood or yellow pine stands or habitat not typical of Eccles Canyon. The Pileated Woodpecker usually occurs in mature hardwood or conifer stands and may occur anywhere in Utah although it is certainly of sporadic and rare occurrence (Behle and Perry, 1975).

The Western Bluebird is normally a species of yellow pine forests in Utah and may be common where it does occur. It appears, however, to have limited distribution and none have been identified to date in the Eccles Canyon area although it occurs further south.

The Prairie Falcon has not been seen in the immediate vicinity of the mining property nor are there records for this location (L. Dalton, personal communication).

Migratory Non-game Species. To date 49 species have been identified from our surveys. All are common species typical of the area. Twenty-five of the species were passerines and four were woodpeckers.

The information that follows concerning Amphibians, Reptiles, and Mammals has been obtained from the State of Utah, Division of Wildlife Resources, Southeastern Regional Office, Price, Utah.

Amphibians. Six species of amphibians, all of which are protected, are known to inhabit the area in which the Mine Permit Area is located. It is probable that all of these species inhabit the project area. Only the tiger salamander has been determined to be of high interest to the State of Utah.

The tiger salamander is a yearlong resident of the project area. The substantial value use area for the adult form is represented by any moist underground site or any similar habitat such as inside rotten logs, cellars, or animal burrows. Such sites can be found within any wildlife habitat extending from the cold desert through the submontane and into the montane ecological association. The larval form, often referred to as a mud-puppy, is a gilled animal that must remain in water within the above described ecological associations. It is interesting to note that the larva may fail to transform into an adult, even after the second season, and it can breed in the larva condition.

Once the larva is transformed into the adult form the animal is primarily terrestrial. Salamanders do migrate to water in the spring for breeding and may remain there during much of the summer. Such an intensive use area would be ranked as being of high-priority value to the animal. In September the newly transformed animals leave the water to find suitable places to spend the winter.

The tiger salamander breeds from March through June and is sexually mature after one year. The male deposits a small tent-shaped structure containing a myriad of sperm on the pool bottom. During courtship the female picks up this structure in her cloaca. The eggs are then fertilized internally before or just at the time they are laid. The eggs, singly or in small clusters, adhere to submerged vegetation. After 10 to 12 days the eggs hatch. A critical period for maintenance of the population is when breeding salamanders eggs, or larve are inhabiting a water.

Post-embryonic development of salamander larva progresses at a pace somewhat controlled by water temperature. In some cold waters the larva may not transform into an adult and drying up of a pool may hasten the transformation.

Migration to or from water usually occurs at night, during or just after a rain storm. When inhabiting terrestrial sites the tiger salamander is most active at night, particularly on rainy nights from March through September.

Larva, when small feed on aquatic invertebrates and become predacious to the point of cannibalism when they are larger. Food items for adults include insects, earthworms, and occasionally small vertebrates.

No amphibians have abundances that are so low as to have caused the animal to be federally listed as a threatened or endangered species.

Reptiles. Eighteen species of reptiles, all of which are protected, are known to inhabit the area in which the Mine Permit Area is located. It is probable that 16 of these species inhabit the project area. Only two species of the reptiles inhabiting the project area have been determined to be of high interest to the State of Utah.

The Utah Milk Snake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the cold deseret through the submontane and into the montane ecological associations. Although its use area spans a multitude of habitats, the animal is extremely secretive, mostly nocturnal and is often found inside or under rotten logs, stumps, boards, rocks, or within other hiding places. At night they can be found in the open where they hunt for small rodents, lizards, and other small snakes. Occasionally, the milk snake will take small birds or bird eggs.

The milk snake may live beyond 20 years and it becomes sexually mature during its third spring season. After mating, which occurs during spring or early summer when they are leaving the den, female milk snakes produce clutches which average 7 eggs. The eggs are secreted in a moist warm environment and then abandoned. Incubation last 65 to 85 days. The site where an individual snake has deposited its clutch of eggs is of critical value to maintenance of the species.

The Utah Mountain Kingsnake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the submontane into the montane ecological association. Little is known concerning this animal except that it frequents areas of dense vegetation and that it is often found near water. Its life history and food habits parallel that described for the Utah Milk Snake.

To date snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the project area. If a den is discovered it will be reported to UDWR.

No reptiles have relative abundances that are so low as to have caused the animal to be federally listed as a threatened or endangered species.

Mammals. Eighty-four species of mammals, of which 27% are protected, are known to inhabit the project area. It is probable that 54 of these species inhabit the project area. Nineteen species of the mammals inhabiting the project area have been determined to be of high interest to the State of Utah.

The dwarf shrew is a yearlong resident of the area in which the project is located. This animal's substantial valued use area is characterized as open grass covered areas of any wildlife habitat in the submontane and montane ecological associations. Since this shrew has a relative abundance determined to be limited, its use areas should be ranked as being of high-priority value to the animal.

The western big-eared bat is a yearlong resident of the area in which the project is located. This animal roosts and hibernates within caves, mine tunnels, or suitable buildings located in the pinion-juniper, shrubland and low elevation spruce-fir habitats of the submontane and montane ecological association. Such areas represent this bats substantial valued use area.

The snowshoe hare is a yearlong resident of the area in which the project is located. Its relative abundance has been determined to be limited, since its substantial valued use area is restricted to the spruce-fir and nearby aspen and riparian habitats of the montane ecological association. Such areas are ranked as being of high-priority value to the animal during its breeding season which spans the period between early April and mid-August.

The cottontail rabbit is a yearlong resident of the area in which the project is located. The entire project area represents a substantial valued use area for cottontails. Their young are born between April and July. This is a crucial period for maintenance of the cottontail population.

The northern flying squirrel is a yearlong resident of the area in which the project is located. Currently, its relative abundance is unknown. Its substantial valued use area is restricted to spruce-fir or other mixed conifer habitats of the montane ecological association. This specie is the only nocturnal squirrel in Utah. The flying squirrel may build its nest within an old woodpecker hole or it may build an outside nest of leaves, twigs, and bark. Mating occurs twice each year-February through March and June through July. Two to six young are born after a gestation period of 40 days. These periods are of crucial value to maintenance of their populations. Flying squirrels have been known to den together in groups of up to 20 during the winter.

Beaver are yearlong inhabitants of the area in which the project is located. Their substantial valued use area is restricted to riparian and adjacent aspen habitats located within 100 meters of the riparian zone. The ecological associations range from the cold deseret through the montane zones. These animals construct a conically shaped lodge in which a family group lives throughout the year. The lodge is of critical value to maintenance of the beaver population. One litter of kits is produced each year. They are born between late April and early July after a gestation period of 128 days. Kits and yearlings coinhabit the lodge with the adult pair. When they reach 2 years of age they are forced to leave. Females can breed at 2.5 years of age. Due to the animals dependance upon flowing water and the associated riparian vegetation, the riparian wildlife habitat is ranked as being of critical value to beaver populations.

The red fox is a yearlong inhabitant of the area in which the project is located. The substantial valued use area for the red fox would include all wildlife habitats form the cold desert through the montane ecological associations. Almost nothing is known of their population dynamics. Without doubt a crucial period for this specie is when they are caring for young in the den. Dens are a critical use area.

The gray wolf is a historic inhabitant of the area in which the project is located. Currently its relative abundance is so low that the animal is listed as endangered with extinction. The wolf's substantial valued use area would be represented by any remote habitat in any ecological association.

Black bears are inhabitants of the area in which the project is located. Their substantial valued use area is represented by all natural wildlife habitats extending from the submontane into the montane ecological associations. These animals go into semi-hibernation during winter. During this crucial period, which may last from December through March, the animal secrets itself in a den in order to conserve body energy. The young are born in the den during January or February. Dens represent a critical valued use area for bears.

Many of the members of the family mustelidae are known to inhabit the area in which the project is located. They are all protected and classified as furbearers. The include the short-tailed and long tailed weasels, mink, wolverine, black-footed ferret, marten, badger, striped and spotted skunks and the river otter. Additionally, raccoon and muskrat, although not furbearers, are also inhabitants of the area. All of these species are of high interest due to their value in the fur market.

The substantial valued use area for short-tailed and long-tailed weasels, mink, river otter, muskrat, and raccoons is the riparian habitat. Weasels, which are inhabitants of the project site, do make some use of other habitats that are proximate to riparian zones. Muskrats and raccoons are restricted to riparian habitats of the cold desert and submontane ecological associations. They are not found in the project area. The long-tailed weasel can be found from the cold desert into the montane ecological associations. The short-tailed weasel, river otter, and mink populations extend their use from the submontane into the montane ecological associations. The river otter is not known to inhabit the environs of the project area, but mink are present.

The substantial valued use area for marten and wolverine is the montane ecological association. Both species could be found in the project area.

The black-footed ferret is a species primarily dependant upon prairie dogs as a prey source. Currently, the ferret's relative abundance is so low that the animal is endangered with extinction. Utah lies on the western edge of the black-footed ferret's range. However, the project area does not provide habitat for prairie dogs so ferrets would also be absent.

The substantial valued use area for badgers and skunks span all wildlife habitats other than dense forests. Skunks show some affinity for habitats proximate to water. Skunks and badgers are dependant upon a suitable prey source.

A crucial period for maintenance of all furbearers, raccoons and muskrats is when they have young in a nest, den or lodge. Such sites are critical for reproductive success.

Bobcat, Canada lynx, and cougar are known to inhabit the project area. For all of these species a crucial period for maintenance of their population is when the female has her young secreted at a den site. Such sites are of critical value when being utilized. It is also crucial to their survival that a female accompanied by young not be killed or harassed.

The substantial valued use area for bobcats extends from the cold desert through the submontane and into the montane ecological associations. The bobcat is normally associated with precipitous terrain, but has been observed in every wildlife habitat within the above mentioned ecological associations. Their primary prey source is represented by small animals and birds. Occasionally bobcats kill the young of big game animals.

The substantial valued use area for the Canada lynx is restricted to the montane ecological association. Normally, this cat would only be expected to utilize riparian and forested wildlife habitats. The lynx is similar in predation habits to the bobcat.

The substantial valued use area for the cougar extends from the submontane into the montane ecological associations. Due to the dependancy of the cougar upon mule deer as a prey source, a ranking of the cougar's seasonal distribution parallels that of the deer.

Mule deer are inhabitants of the area in which the project is located. Their substantial valued use area spans all wildlife habitats extending from the cold desert through the montane ecological associations. In some situations deer show migrations in response to winter conditions. There are, however, habitats where deer reside yearlong.

Migration of mule deer from summer range to winter range is initiated during late October. The annual disturbance of the fall hunting season, coupled with changing weather conditions are the initial stimulants.

The project site only represents summer range for mule deer. Winter ranges are at least 9 miles from the project site.

Deer begin their migration back to summer range during mid-May and remain there throuhout October.

Mule deer fawn during the month of June. The continum of wildlife habitats extending from the pinion-juniper through the shrubland and into the aspen type probably represents the fawning area. All riparian areas are of critical value for fawning and maintenance of the deer population. To date no specific areas showing annual use for fawning are known. It is probable that such areas exist. They would be ranked as being of crucial value to deer.

Moose are inhabitants of the area in which the project is located. Their substantial valued use area spans all wildlife habitats in the montane ecological association except the Alpine zone. In some situations moose show migrations in response to winter conditions. All riparian habitats associated with the project have at one time or another supported moose.

Migration of moose from summer range to winter range is initiated during late November. Portions of the project area represents winter range for the Southeastern Utah moose herd, Scofield and Huntington drainages. To date, only riparian habitats on the project area have been identified as winter range. Winter ranges for moose that are characterized as riparian habitats are ranked as being of critical value, where as the remainder of the winter ranges are ranked as being of high-priority value to the animal. Winter ranges are usually inhabited by moose between December and May of each year. During winters with severe conditions the higher elevation portion of the winter range may become unavailable to moose due to snow depth.

Moose begin the migration back to summer range during mid-May and remain there throughout November. The entire project area represents summer range. Summer ranges on the project area support animals of the Scofield and Huntington drainages of the Southeastern Utah moose herd. Those summer ranges are ranked as being of high-priority value.

Moose calve during late May and June. Calving takes place in the riparian or adjacent forest habitats. To date no specific areas used for annual calving are known. It is probable that such areas exist.

Rocky Mountain elk are inhabitants of the area in which the project is located. Their substantial valued use area spans all wildlife habitats extending from the submontane through the montane ecological associations. Elk do not show as strong a migration as mule deer do in response to winter conditions, but they do migrate to wintering areas.

Migration of elk from summer range to winter range is initiated during late October. The project site represents only summer range for the Manti elk herd. Winter ranges for these elk are at least 8 miles from the project site. Migration back to summer ranges begin during mid-May.

Elk calve during June. The prefered calving areas are aspen forests with lush understory vegetation. All riparian areas on the summer range are of critical value for calving and maintenance of the elk population. No specific areas used for annual calving are known to exist in the project area.

Currently, there are no other known high interest wildlife species or their habitat use areas in or adjacent to the project area.

R614-301-323. Maps and Aerial Photographs.

Maps of vegetative types were made by using a mosaic of aerial photographs. Community types were outlined on the photomosaics. Accuracy was assured by correlation of actual communities as inspected on the ground to those discernible on the photographs.

R614-301-323.100. thru 301-323.400.

Refer to Vegetation Map (R614-301-323.100.)

R614-301-330. Operation Plan.

Aquatic Resource Monitoring Plan.

Eccles Creek. Available data on Eccles Creek include fish survey results (UDWR, 1968-1979); macroinvertebrate survey results (Winget, 1979); water quantity and quality survey results (Hansen Associates, 1979-1980); and stream habitat observations (Winget, 1979). Yearly monitoring of stations EC03, EC04 and EC05 will commence the spring of 1981. Macroinvertebrate samples and habitat measurements will be taken spring and fall, as required. Information on fish surveys will be obtained from UDWR. Regular water quality and quantity monitoring will be continued as required. Intensity and duration of sampling will be dependent upon success of sedimentation control measures.

Mud Creek. No surface disturbance of Mud Creek is anticipated. Sedimentation from upstream land use is one of the potential threats to Mud Creek. Sediment samples will be taken at a frequency and duration depending upon success of sediment control upstream. Aquatic macroinvertebrate samples will be taken in conjunction with the sediment samples in the spring, summer, and fall of each year as required by effects of surface disturbance activities.

James Canyon Creek. Cutthroat trout have been observed in high number in James Canyon Creek during the spring spawning time. James Canyon Creek is an important part of the fisheries resource of Electric Lake. The stream will probably not be impacted by the Belina Project. If the stream is impacted a monitoring and protection plan will be initiated.

Slaughterhouse, Boardinghouse, Finn, Whisky, Long, and Mud Creeks. These streams are all intermittent, at least during low precipitation years. As such they are not considered as important parts of the fishery resources of Mud Creek or Scofield Reservoir (personal communication, Mr. John Livesay, UDWR, Price Office, November 7, 1979). Since these streams will not be directly impacted by the Belina Project, a monitoring or protection plan will not be necessary.

Avifauna and Raptor Plan.

Ornithological investigations have been accomplished over several time periods in the Scofield, Skyline, and Valley Camp of Utah, Inc. coal mining areas. Specifically, these periods have been: December 1, April 7-8, April 25-26, May 17-18, June 13-14, and July 26-29. During these periods a record has been maintained on threatened or endangered species, raptors and raptor nests, occurrences of species of high Federal interest, and migratory birds. The obvious time period where observations are missing is during the major autumn migration period of September-October. This may represent a critical time. For example, the peak raptor migration along the Wasatch Front, 60 miles north of Scofield, revealed a total of 308 migration raptors recorded between September 9 and October 4 with the peak number around mid to late September (Mosher, et al. 1978). Observations will be made during the autumn period before making any final conclusions.

No part of the Mine Permit Area has shown evidence of being inhabited by the endangered Northern Bald Eagle which occurs in the Scofield area during the migration season between November 15 and March 15 each year. Currently no roost trees have been observed. Two active nests were found in Eccles Canyon, one of the Goshawk and the other of the Cooper's Hawk (White, 1980). The Cooper's Hawk is a species of high federal interest. These two species can generally tolerate considerable human impact. The Golden Eagle, also of high federal interest, has been seen in the Mine Permit Area, but no nests were found.

In order to minimize disturbance to the Bald Eagle and other endangered or important species all personnel associated with the mining operation will be made aware of the birds' annual presence and value to society. These people will also be instructed not to disturb Bald Eagles or other endangered or important raptors. If a roost tree is located it will be immediately reported to the Utah Division of Wildlife Resources and the U.S. Fish and Wildlife Service. Roost trees and a suitable buffer zone will be protected from human disturbance during the winter period.

Design and construction of all electric power lines and other transmission facilities will be in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" published by the USDI and USDA in 1970 and/or the REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

In 1982 Mr. Ron Joseph of the United States Department of the Interior, Fish and Wildlife Service, 1311 Federal Building, 125 South State Street, S.L.C., Utah, conducted a power distribution line survey of the permit area and found no threat to the Bald or Golden eagle. Mr. Joseph stated previous Fish and Wildlife Service (FWS) surveys have not shown a problem with powerlines in coniferous cover primarily because trees themselves offer much better perch sites than crossarms of power poles. Mr. Joseph also stated that, on close examination, the powerlines did not reveal any use by raptors. This may be verified in the Fish and Wildlife Service survey report to Mr. Cleon Feight, Director of the Utah Division of Oil, Gas and Mining, Dated November 10, 1982.

High Interest Wildlife and High Value Habitats.

Mule deer and elk inhabit high priority and crucial-critical winter ranges between November 1 and May 15 each year. These areas will be protected from exploration activities during the inhabited periods. Disturbances on high priority deer winter ranges will be kept to a minimum.

Big game on winter ranges are sensitive to disturbances. Therefore, all personnel associated with the mine will be instructed on the annual presence and value of this big game. Efforts will be made to avoid any unnecessary disturbance by man.

If the mining operation installs structures which present barriers to wildlife's daily movements, suitable passage structures will be installed.

Wildlife Protection Plan.

1. All roads under the applicant's control, and within the Mine Permit Area, will have posted speed limits.

2. The access road along Whisky Canyon will be posted with warning signs indicating possible animal crossing areas.
3. Design and construction of power transmission and distribution lines will be in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA [1970]) and REA Bulletin 61-10.
4. Consideration of possible restriction of animal movement will be incorporated into the design and installation of all structures within the Mine Permit Area.
5. All hazards associated with the mine will be fenced or covered to minimize danger to wildlife.
6. Disturbances to big game on high priority winter range will be kept to a minimum.
7. Wildlife habitat will be enhanced at the time of reclamation through restoration of habitat features and selection of reclamation materials that will improve the quality and or quanity of forage and or cover.
8. All riparian habitat disturbed by the applicant during mining will be reclaimed to pre-mining status.
9. The presence of any threatened or endangered plant or animal within the Mine Permit Area will be reported to the appropriate regulatory agency.
10. Adequate precautions will be taken to keep coal out of stream channels.
11. Personnel associated with the mine will be informed of the values of the wildlife resource associated with the Mine Permit Area and adjacent area.
12. All mine personnel will be instructed through annual training on the importance of fish and wildlife protection.

Smaller areas of riparian habitat are found in Whisky Canyon, South Fork of Eccles Canyon, and minor drainages associated with these canyons. These areas will not be disturbed by the applicant's operations. The portal site in Whisky Canyon was developed under the 211 Program and affected the riparian habitat in that area.

Stream disturbance related to surface activities should not occur within the Mine Permit Area and, as a result, impact on fish should be minimized. Mitigation measures will include a Surface Water Monitoring Program, as well as activities proposed by the applicant and approved by the proper authority.

The total area of the permit is considered summer range for elk, deer, and moose. There is no winter range use with the exception of the riparian habitat areas used by moose, as well as for spring calving.

R614-301-331.

Refer to R614-301-341.100 and 301-341.200

R614-301-332. Subsidence.

R614-301-333.0 thru 301-333.300.

A presubsidence survey within or adjacent to the Valley Camp of Utah, Inc. Mine Permit Area conducted by Valley Camp of Utah, Inc. has demonstrated that areas for agricultural or silvicultural production of food and fiber and grazing lands are of such low production that they can be classified as non-renewable resource lands.

Aquifers and areas for the recharge of aquifers and other underground waters will suffer minimal adverse impacts from the mining activities. Should subsidence occur the subsidence cracks will likely seal rapidly, preventing the deep percolation of water and subsequent loss of springs and other water sources (Hansen, 1980).

The Subsidence Base Map,(Forthcomming early in 1990) shows survey monument information, gas line locations, power lines and other information. The determination of the types of lands that exist within and adjacent to the Mine Permit Area were determined by use of Federal Government land use maps and private consultants. The productivity levels of this land are discussed in R614-301-200. and 301-300. Refer also to Soil Map (R614-301-222.100) and Vegetation Map (R614-301-322.100).

The only structures which could be damaged if subsidence occurs are gas pipelines. These structures will be protected by limiting extraction directly under the pipelines and within an area including a 35 degree angle of draw from the lowest coal seam to be mined.

The basis for the "non-renewable resource land" label was the vegetative work cited elsewhere, when the quality of the rangeland was evaluated. Such a label actually applied to the agricultural portion of the definition of a "Renewable Resource", and not to aquifers and areas for the recharge of aquifers or silvicultural production. Material damage or diminution of value of aquifers is discussed in the Vaughn Hansen Associates Report.

The forest land is classed as a renewable resource, and as such, will be afforded maximum subsidence protection in order to ensure future productivity.

Should material damage be incurred to the Mountain States Resources natural gas pipelines, despite the approved subsidence damage prevention measures, the applicant will repair the damage to the pipelines caused by subsidence from the applicant's mining activities or compensate the owner of the pipeline for such damage.

Any area roads which are materially damaged by subsidence will be repaired and re-graded to restore them to pre-subsidence usefullness. A buffer zone of at least 150 feet is left around natural gas wells in the Mine Permit Area. Subsidence should not cause damage to the wells.

Belina No. 1 Mine Map E1-0002 (R614-301-521.100.) and Belina No.2 Mine Map D2-0060, (R614-301-521.100.) indicate mining plan consideration of subsidence protection for surface structures. The plan calls for an angle-of-draw of 35 degrees. If the monitoring study indicates a

different angle-of-draw, the plans will be modified. Also included as part of the Subsidence Plan is approval from the MMS for using a 35 degree angle-of-draw for limited extraction. It is anticipated that the true draw angle will be determined when actual subsidence data become available.

In 1988 Valley Camp committed to performing an aerial survey each year to monitor subsidence. During 1988 both the aerial survey and the pedestrian survey were completed. The aerial survey may eliminate the pedestrian survey in following years.

R614-301-340. Reclamation Plan.

R614-301-341. thru 301.341.250 Revegetation.

SCOPE:

The Reclamation Plan is divided into four areas: the Valcam Loadout Facility, General Office Area, Belina Haul Road, and the Belina Mine Site. See Engineering R614-301-540., for the Reclamation Schedule R614-301-542.100.

The Valcam Loadout Facility will be reclaimed in a manner similar to the portal area reclamation. A minimum of regrading will be done to minimize additional adverse impact of the environment.

The General Office Area will be retained for educational and or recreational purposes.

The Reclamation Plan is to establish a permanent, effective and diverse vegetative cover, capable of self-regeneration and plant succession for use as rangeland and wildlife habitat. A prompt vegetative cover will be established which, through time, will allow vegetative cover, woody plant density and productivity to recover to levels equal to the cover, density, and productivity of reference areas.

The following procedures are designed to revegetate and control erosion. This should to a large degree, satisfy the committments made in the permit, while also satsifying OSM regulations as pertaining to wildlife concerns and final reclamation for those areas which will be utilized after mining operations are concluded. The areas in question are along and adjacent to the Belina Haul Road and the Belina Mine Site, and will be of a permanent nature.

The actual ground involved comprises approximately 16 acres of disturbed land, primarily road disturbance and deck areas. The actual procedures involve a four phase program; (1) earthwork: To prepare a site which will be stable enough for a period of time to allow vegetation to become established, (2) hydroseed the entire area to supplement revegetation and control run-off until stabilization is complete, (3) to plant seedlings to further stabilize the soil and to provide necessary wildlife, hydrological and aesthetic committments are detailed in the mine permit, and (4) to enhance and reestablish a riparian zone in conjunction to Whisky Creek.

METHODOLOGY:

Phase No. 1 Earth Moving:

The pad and associated cuts can be brought back to a reasonable configuration by implementation of heavy equipment. The areas where coal has been stacked or handled will be cleaned as much as possible by front end loaders and any recoverable coal will be transported to the preparation plant. The remaining material, estimated to be approximately one foot thick, will be loaded into haul trucks. This material will be placed by the barrier seals in the mine portals and in by the portal entrance. When disposal is complete, a second seal will be constructed out by the material. In this manner the material will be buried and sealed from contact with air and water.

The Belina portal entrance areas will then be graded, stabilized, and covered with topsoil. All fill shall be machine compacted. Terraced fill shall be in lifts and compacted to assure integrity and stability of embankment and prohibit failure.

Upon completion of grading, all downed trees, brush, etc., adjacent to the disturbed area shall be placed upon the recontoured surface. This material will form a near-natural appearance and enhance the microclimate on each site. All work done along the perimeter of the pad will take into consideration existing vegetation, and all effort will be made to minimize disturbance and utilize existing vegetation. When there is no alternative other than disturbance, an effort can be made to relocate earth and maintain existing vegetation in place, attempting to relocate the vegetation as clumps on the area to be reclaimed. When the desired contour of a mountain park with a meandering stream (approved channel design) is obtained, the parent material will be tested to determine its desirability as a growth media. In the event it can be supplemented with the addition of fertilizers, all efforts will be made to utilize existing-in-place materials (Vegetation-Supporting Materials). Upon completion of the recontouring and prior to revegetation, all areas to be revegetated will be ripped to a minimum depth of 14" and treated as deemed necessary by the soil testing. As mentioned in the Soils text, maximizing roughness of the surface will be paramount.

Phase No. 2 Hydroseeding and Mulching:

The entire area of disturbance will be hydroseeded then mulched during the late Fall following the complete abandonment and earth work. (October through November)

PERMANENT SEED MIXTURE

VALCAM LOADOUT FACILITY AREA

SPECIES	PLS LBS/AC
Grasses:	
Agropyron smithii - Western wheatgrass	4.0
Agropyron dasystachyum - Thickspike wheatgrass	4.0
Bromus marginatus - Mountain brome	5.0
Poa pratensis - Kentucky bluegrass	0.2
	14.2
Forbs:	
*linum lewisii - Blue flax	1.0
Melilotus officinalis - Yellow sweetclover	2.0
Medicago sativa - Ladak alfalfa	1.5
Penstemon strictus - `Bandera' Rocky Mountain penstemon	0.5
Artemisia ludoviciana - Prairie sage	0.1
	5.1
Shrubs and Trees:	
Artemisia tridentata vaseyana - Mountain big sagebrush	0.1
Chrysothamnus nauseosus - Rubber rabbitbrush	0.5
Rosa Woodsii - Woods rose	1.0
	1.6

NOTE: Seed application is calculated for a broadcast application.

Riparian areas within the Mine Permit Area (1.5 ac. max.) will have the following shrubs and trees supplemented to the regular mixtures:

SPECIES:	NO./ACRE
Shrub - Mahonia repens - Creeping Oregon grape	300
Shrub - Rubus idaeus sachalinenis - American red raspberry	300
Tree - Salix rigida - Willow (cuttings)	2,000
Symphoricarpos albus - Common snowberry	300
	2,900

PERMANENT SEED MIXTURE

(South-West Facing Aspects)

SPECIES	PLS LBS/AC
Grasses:	
Agropyron riparium - Streambank wheatgrass	3.0
Agropyron dasystachyum - Thickspike wheatgrass	3.0
Bromus marginatus - Mountain brome	4.0
Poa Canbyi - Canby bluegrass	0.5
Poa pratensis - Kentucky bluegrass	0.1
	11.6
Forbs:	
*linum lewisii - Blue flax	1.0
Achillia millefolium - Yarrow	0.2
Lupinus sericeus - Silky lupine	2.0
Melilotus officinalis - Yellow sweetclover	2.0
Penstemon strictus - `Bandera' Rocky Mountain penstemon	0.8
Artemisia ludoviciana - Prairie Sage	0.1
	6.1
Shrubs and trees:	
Amelanchier alnifolia - Serviceberry	2.0
Artemisia tridentata vaseyana - Mountain big sagebrush	0.2
Symphoricarpos oreophilus - Mountain snow-berry	2.0
Chrysothamnus nauseosus - Rubber rabbitbrush	0.4
Rosa woodsii - Woods rose	1.0
	5.6
HANDSETS (Plants per acre)	
Populus tremuloides - Quaking aspen (Aspen will be placed on 5' to 6' centers in 1/4 - 1/2 acre clumps)	400

PERMANENT SEED MIXTURE

(North-East Facing Aspects)

SPECIES	PLS LBS/AC
Grasses:	
Agropyron trachycaulm - Slender wheatgrass	3.0
Bromus marginatus - Mountain brome	5.0
Poa Pratensis - Kentucky bluegrass	.25
Agropyron Smithii - Western wheatgrass	4.0
Poa Canbyi - Canby bluegrass	.4
	12.65
Forbs:	
Archillia millefolium - Yarrow	0.2
Penstemon strictus - `Bandera' Rocky Mountain penstemon	0.5
Osmorhiza occidentalis - Sweet anise	1.0
Melilotus officinalis - Yellow sweetclover	2.0
Lupinus sericeus - Silky lupine	2.0
Hedysarum boreale - Northern sweetvetch	1.0
	6.7
Shrubs and trees:	
Prunus virginiana - Chokecherry	0.5
Symphoricarpos oreophilus - Mountain snow-berry	2.0
Sambucus coerulea - Blue elderberry	1.0
	3.5

HANDSETS (Plants per acre)

Abies Concolor - White fir	200
Picea englemanii - Engleman spruce	200
Picea pungens - Blue spurce	150
	550

Hydroseeding and mulching will be carried out in conjunction with the earth work of Phase One. Methodology for the hydroseeding and mulching operation is to apply the seed then mulching, using a wood fiber to all disturbed areas, at a minimum rate of 2000 lbs/ac. of wood fiber and using approximately 60 lbs. of tac per ton of mulch.

Phase No. 3 Planting:

The planting of seedlings will be done the spring following the seeding effort.

Planting Procedures.

Planting will be done by hand to a depth of 16 inches. The roots of the seedling will be arranged in as near natural position as possible paying special attention not to "J" the root tips.

The Belina Mine Portals. Some of the graded slopes in the portal area have been designed within the guidelines of geotechnical engineering practices by Golder Associates, and have been stabilized. To minimize additional impact on the environment, those northfacing slopes which meet the Division's criteria and approval will be enhanced with shrubs and trees.

In conjunction with the seeding effort, the entire area of disturbance will be fertilized and hydromulched. The rate of application of the mulch is:

2,000 to 3,000 lbs/acre

The following various types and approximate amounts of fertilizer will be applied after seeding and mulching. Fertilizer may be applied in either granular or liquid form:

30 lbs. N/acre
100 lbs. P20/acre
100 lbs. K20/acre

Soils analysis at the time of final reclamation will determine the actual rates to be applied.

Recommended revegetation practices for the Mine Permit Area are as follows:

Tillage practices on level ground and on slopes flatter than 10h:1v include leveling, disking, and harrowing. Slopes of 10h:1v up to 3h:1v will be mulched using straw or other inert organic material. Slopes steeper than 3h:1v will require a hydro-mulch and/or pinned hemp matting and will be treated to basin listing.

Plantings on slopes less than 10h:1v will be accomplished by broadcast methods. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and buried by raking or other acceptable methods. Mulch will be applied over the seed. It is elected to revegetate areas with slopes greater than 1.5h:1v without the topsoil. Such areas will be treated to handset plantings in basins filled with topsoil and with hydroseeding and mulch in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate. Hydroseeding may be substituted for the above methods of seeding where practical. In specific cases, other methods of revegetation may be suitable and could be used, if approved.

Nitrate nitrogen is low in quantity for soil types in the Mine Permit Area. The most important fertilizer to add is nitrogen (Welsh, 1980). Soil tests will be taken in areas to be revegetated and fertilizer added, as required.

Monitoring.

Upon completion, the reclaimed area will be monitored to determine when release parameters are achieved. If the monitoring indicates inadequacies, the area will be supplemented with additional efforts.

The monitoring procedures will use approved methodologies, and such applicable Division guidelines.

Success of revegetation and stabilization of road slopes will be evaluated during the middle of each growing season, when cover and composition studies are most feasible. Erosion pins will be placed on slopes at the time of reseeding operations. A table of random numbers will be used to determine location. Statistically acceptable techniques will be used to determine percent cover and composition of disturbed area. Pins and revegetation analyses will be conducted annually for at least the first five years. Where success is apparent, as represented by achievement of 90% of the original cover during the five-year period, subsequent analyses will be at five year intervals. Any areas not achieving 90% of the original cover in the first five years should be re-evaluated and another attempt made to successfully vegetate those areas. Transplant survival will be monitored for the first three years. Statistically adequate data will be collected for cover, productivity and woody plant density for both reclaimed areas and vegetation reference areas during the last two years of the liability period.

Inasmuch as construction had begun at the portal area prior to initiation of contemporary OSM regulations, no attempt was made to determine the volume of topsoil available for storage from the portal and truck loadout areas.

The majority of the topsoil, at the mine portal sites, was removed prior to the creation of topsoiling requirements. A limited amount, however, was later removed from around the Belina Mine Site and stored in a stockpile near the portal site. If the stockpiled topsoil is to stored the material will be stabilized with seed during the first normal period favorable for planting and erosion control measures implemented, which will protect the pile from environmental degradation.

R614-301-341.300. Test Plot Studies.

COVER AND PRODUCTIVITY ANALYSIS OF TEMPORARY REVEGETATION AT THE VALCAM LOADOUT FACILITY AND THE BELINA MINE SITE AREAS

PREPARED BY:
CEDAR CREEK ASSOCIATES, INC.
FT. COLLINS, COLORADO

AUGUST 1986

1. INTRODUCTION AND PROJECT HISTORY

The following report details the results of cover and productivity data collection and analysis completed of temporary revegetation sites at the Valcam Loadout Facility and Belina Mine Site. The temporary revegetation site evaluated at the Valcam disturbance was the west-facing slope below the operating truck dump. Field analysis took place on July 11, 1986. The three temporary revegetation sites analyzed at the Belina disturbance included the southeast-facing slope (Area A)

in front of the bathhouse between the upper and lower pads running from the shop to the gore area, the north-facing slope (Area B) above the 004A sediment pond, and the southeast-facing slope (Area G) in front of the Belina fan house between the upper and lower pads running from near the 005A filter pond to the Belina No. 1 belt conveyor. Field data were collected from all three Belina Mine site areas on July 12, 1986.

The impetus to conduct this study resulted from a stipulation associated with the permit issued for the Valcam Loadout Facility and Belina Mine Site. The stipulation required Valley Camp to construct revegetation test plots. The purpose of these plots would be to determine whether substitute topsoil material stockpiled at the disturbed sites is suitable plant growth media for final revegetation. This stockpiled substitute topsoil is necessary for use since the current disturbed area was affected prior to the effective date of present mining regulations. No soil had been salvaged on the Valcam Loadout Facility disturbances during pre-law years.

Following a June 6, 1986 meeting between Valley Camp, Cedar Creek Associates, Inc. (Cedar Creek), and UDOGM personnel, the UDOGM representatives contacted the OSM. The contact was made to determine whether the test plot stipulation could be waived on the basis of the condition of existing vegetation planted on stockpiled substitute topsoil material. The interim revegetation acreage was overlain with varying amounts of substitute topsoil and shows impressive plant cover. Mr. Dwight Kimsey of the OSM proposed that a properly conducted evaluation of interim revegetation acreage could result in a waiver of the test plot stipulation if the interim revegetation met unspecified cover and production levels. Subsequently, Valley Camp contracted with Cedar Creek to conduct the cover and production analyses on the temporarily reclaimed areas.

On July 11, 1986, representatives of Valley Camp, Cedar Creek, and UDOGM met to select temporarily revegetated areas from which cover and production data would be gathered. The objective was to select four areas, one at Valcam Loadout Facility and three at the Belina Mine Site which would accurately reflect final revegetation acreage, slope, and aspect considerations. It was also believed necessary to evaluate areas which has been revegetated using techniques that paralleled those proposed for final revegetation.

During this field survey, the slope below the truck dump was selected for analysis at the Valcam Loadout Facility disturbance. It is most representative of the proposed final graded slope and aspect and was planted over five years ago. A sediment pond slope was rejected since it was composed solely of topsoil material. One other site adjacent to the Valcam Loadout Facility entrance was rejected since it has been planted in 1985 and had not completed one growing season.

At the Belina Mine Site, three acceptable areas were selected. These sites accurately reflect what is believed to be the dominant aspects to which the presently disturbed area will be graded. The degree of slope for each site is within the range of proposed final graded slopes though they are somewhat steeper than the average of proposed slopes. Techniques used to revegetate these slopes essentially parallel proposed final revegetation techniques. Areas A and B on the Belina disturbance were planted in 1980. The fact that these areas have existed through over five growing seasons added to their suitability as evaluation sites. Area G, planted in 1985, was selected to represent a site where

planted species were nearing the end of one growing season. Locations of all sites analyzed are shown on Map R614-301-341.300. (Belina Temporary Revegetation Sites) and Map R614-301-341.300 (Valcam Temporary Revegetation Sites).

By concensus, it was agreed to limit evaluations on Area B to the upper 25% of the site. The lower 75% of the site apparently had been negatively affected by an overly heavy maintenance fertilizer application which "burned" significant areas of grass. It was felt that the inclusion of this burned area would not result in data representative of the growth potential of the substitute topsoil material.

Few other areas were considered for analysis at the Belina Mine Site. One area to the west of Area G was briefly considered. This area showed excellent plant cover, density, and diversity. It was rejected, however, due to the comparatively intense labor effort expended to complete the revegetation process.

At the conclusion of this field review, Cedar Creek began data collection on the selected site at the Valcam Loadout Facility disturbed site.

2.0 METHODOLOGY

2.1 Cover Data Collection.

The procedure for measuring cover on the Belina areas A, B, and G consisted of extending ten meter transects from randomly selected points (areas of recent dozer work were avoided). Along each transect a one-meter long ten-point optical frame (0.1 meter between points) was placed at one-meter intervals. Each point on the frame consisted of an optical scope with fine cross-hairs. The observer viewed the revegetated surface through each scope and recorded first hits, by cross-hairs on vegetation by species, rock, litter, and bare ground below the instrument. In this manner, 100 readings per transect were recorded. The hits were then tallied by category resulting in percentages recorded for total cover, total vegetative cover, percent cover by species, percent litter and percent bare ground exposure for each transect.

Each transect served as one sample for sample adequacy calculations. Sample adequacy was reached and exceeded for each temporarily reclaimed area analyzed by completing ten transects per area. Ten transects are the equivalent of 1,000 point-intercepts on the sampled area.

The method used for measuring cover at the Valcam Loadout Facility site was identical to that used for the Belina Mine Site areas with one exception. Transects at the Valcam Loadout Facility site were systematically, not randomly located. The temporarily revegetated area was of insufficient size to permit randomization. Therefore, transects were aligned from the near top to the near bottom of the slope at approximately two meter intervals. This spacing allowed for complete linear coverage along the north-south axis of the site.

2.2 Productivity Data Collection.

Productivity was measured by clipping all current year's plant growth

from randomly located 0.5 meter quadrats. Each quadrat served as one sample for sample adequacy calculations. Clipped plant material was bagged by life form (grasses vs. forbes vs. shrubs), transported to Fort Collins, Colorado, oven-dried at 100 degrees C for 24 hours, and then weighed to the nearest 0.1 gram. To determine sample adequacy in the field, "wet" weights were used to complete sample adequacy calculations. Sample adequacy was also calculated on oven-dry samples to ensure that adequate samples were taken. Field data sheets used to record data are on file at Valley Camp General Office.

Prior to clipping each temporarily reclaimed area, photos were taken of the area as a whole and of four randomly selected quadrats that depict site conditions. These photos are on file in the Valley Camp General Office.

2.3 Sample Adequacy Determination.

Sample adequacy was determined for both cover and production on all temporarily revegetated areas using the following equation:

$$nm = (t \times s\underline{2}) \ / \ (d \times \overline{X})\underline{2}$$

where:

nm = minimum number of samples needed,

$\overline{X}$ = estimated sample mean,

s = estimated sample standard deviation,

t = value from t-table for a given probability level (1.645 for 90% confidence), and

d = percent change in the sample mean desired to be detected (0.1 for 10%)

3.0 COVER

Percentages given in the following discussion are averages for the ten transects completed at each sampled site unless otherwise noted. Cover percentages for individual species are given as a percent of total floral cover.

3.1 Valcam Loadout Facility Disturbance.

Seven species were encountered along the ten transects completed for this temporary revegetation area. The dominant specie was Poa pratensis at 47.7% cover followed by Dactylis glomerata at 12.0%, Elymus junceus at 3.7%, and Agropyron smithii at 3.4% cover. A. trachycaulum, Circium vulgare and an unknown forb each had less than 1.0% cover. The average total floral cover for the ten transects equaled 67.5%. Litter and rock accounted for 11.9% and 4.7% cover, respectively. The total ground cover, including the floral, litter, and rock catagories, was 84.1%.

The plants encountered appeared vigorous with no signs of chlorosis evident. Mature seedheads were common for all species found along the

transect. Individual plants of Elymus junceus found near the bottom of the slope were exceptionally vigorous specimens. Numerous seedlings were noted during the analysis indicating that reproduction was occuring throughout the site.

Ten transects were evaluated for this area. Using the statistical adequacy calculation, the minimum number of transects necessary for this site would have been approximately 1.5 (n = 10; X = 67.5; s = 5.017).

3.2 Belina Mine Site Disturbances.

The average total floral cover for Area A was 67.2%. Litter and rock accounted for 14.3% and 10.5% cover, respectively, resulting in a total average ground cover of 92.0%. Eleven species were encountered along the ten transect lines. D. glomerata was the dominant specie on this site providing 35.6% cover. P. pratensis had 15.4% cover followed by A. smithii, A. trachycaulum, Medicago sativa, and Salsola kali with 9.3% 1.0%, 1.9% and 1.1% cover, respectively. Species having less than 1.0% cover included Bromus inermis, E. junceus, Astragalus sp., and C. vulgare. Artemisia tridentata, the only shrub species encountered on the transects, provided 1.4% cover. A variety of other species, not hit on any transect, were observed on the site. These species included Symphoricarpos oreophilus, Hordeum, jubatum, populus tremuloides, Prunus virginiana, Carex sp. and several invading forbs.

Overall, this area appears to be the most vigorous with fully mature grasses, forbs, and shrubs covering the site. A. tridentata is very common on site despite the relatively low cover percentage shown by the data. Fully developed seedheads were common for all grass species encountered. No stressed or chlorotic plants were observed during the field analysis.

Ten transects were extended on this area and the sample adequacy calculation completed for the data. The number of transects required was 3.4(n = 10; X = 67.2; s = 7.554).

D. glomerata was, by far, the dominant specie on site B with an average of 50.2% cover. Of the eight other species encountered along the transects, only P. pratensis at 3.9% and Phlem sp. (believed to be Phlemalpinum) at 3.1% produced notable cover. Of the remaining five species encountered, moss accounted for 2.1% cover while B. inermis, E. junceus, M. sativa, A. tridentata and Picea engelmannii each accounted for less than 1.0% cover. Total floral cover equaled 61.2 percent. Together with floral cover, litter at 26.2% and rock at 8.3% resulted in a total ground cover of 95.7%, the highest of all areas sampled. Other species observed on site included A. tridentata, Carex sp., Festuca sp., Picea pungens, and several invading forbs.

Few seedheads were observed on this site though the species present appeared very vigorous. The high level of litter, primarily year-old grass blades, appears to further confirm the overall vigor of this population. The absence of mature seedheads is believed to be a function of the northerly aspect of the site resulting in a later maturing plant population.

Ten transects were extended on this site and the data was used to calculate sample adequacy. Approximately 1.3 transects would have been necessary. The sample mean was 61.1% and the sample standard deviation

equaled 4.122.

The total ground cover on Area G, planted in 1985, was 68.7%. Total floral cover, litter, and rock accounted for 28.9%, 21.2%, and 18.6%, respectively. The dominant species on site was Festuca rubra with 19.0% cover. This species is believed to be a volunteer from the mulch application. Eleven other species were encountered along the transects. D. glomerata (4.6%), A. smithii (1.5%), and P. pratensis (1.0%) were the most notable of these species. The remaining eight species (Agropyron dasystachyum , A. trachycaulum, B. inermis, E. junceus, Achillea millifolium, M. sativa, M. officinalis and an unknown forb) each had less than 1.0% cover.

Planted in the fall of 1985, the individual plants on this site appeared healthy. No evidence of chlorosis and little evidence of stress was noted. Developing seedheads were observed for all grasses found along the transects with the exception of E. junceus. Flowers for both planted legumes were observed on site.

Statistical adequacy calculations conducted on the data from ten transects ($X = 28.9$, $s = 4.840$) showed that sample adequacy could have been attained with 7.6 transects.

4.0 PRODUCTIVITY MEASUREMENTS

All weights reported in this section are oven-dry weights unless otherwise noted.

4.1 Valcam Loadout Facility Disturbance

The average productivity for a 0.5 meter quadrat was 66.44 grams or the equivalent of approximately 1,182 pounds per acre. Forb production was relatively low at 0.59 grams per 0.5 meter quadrat.

Fifteen quadrats were sampled to meet initial sample adequacy calculations. Calculations completed on the dry weights of the 15 samples showed seven quadrats required sampling for adequacy ($X = 66.5$; $s = 10.757$).

4.2 Belina Mine Site Disturbances.

At Area A, the average production per 0.5 meter quadrat was 123.17 grams. This equates to 2191 pounds of oven-dry forage per acre. Forbs and shrubs averaged 17.69 and 12.93 grams per 0.5 meter quadrat, respectively.

Adequacy calculations completed on dry weights of the ten collected samples showed that four quadrats would have been sufficient for sampling ($X = 123.2$; $s = 15.040$).

The average production at Area B was 49.24 grams per 0.5 meter quadrat or 877 pounds per acre. No forbs or shrubs were collected from any quadrat.

Calculations completed for the ten samples collected ($\bar{X} = 49.2$; $s = 7.611$) showed that sampling approximately six and one-half quadrats would have achieved sample adequacy.

The average quadrat at Area G yielded 47.18 grams of plant material which equals a per acre production of 840 pounds. Forbs averaged 2.17 grams per quadrat and were present on seven of the twelve quadrats clipped.

Calculations completed on the data from the twelve quadrats indicated that approximately eight quadrats sampled would have fullfilled sample adequacy ($\bar{X} = 47.2$; $s = 8.105$) requirements.

5.0 CONCLUSIONS

Average total floral cover percentages for the areas sampled ranged from 67.5% to 28.9%. The Valcam Loadout Facility and Belina Area A and B, all planted in 1980, had roughly identical percentages at 67.5%, 67.2% and 61.2%, respectively. Belina Area G, planted in the fall of 1985, had significantly less cover at 28.9%. It is believed that the latter percent cover should increase through subsequent growing seasons.

Species dominance varied from area to area. Dactylis glomerata was the dominant specie on Belina Areas A and B and a major component on the other area sampled. Poa pratensis was the dominant specie on the Valcam Loadout Facility area and showed excellent performance on Belina Areas A and B. Agropyron smithii, though never a truely dominant species, performed comparatively well on all areas with the exception of Belina Area B. A. dasystachyum is believed to be a stronger performer than the sample data would indicate. Some difficulty was encountered in separating this species from A. smithii in the field due to physiognomy. Elymus junceus was a notable component on the Valcam Loadout Facility area but was a minor species on all areas sampled at the Belina Mine Site. Artemisia tridentata, present on all areas sampled, was a strong performer only on Belina Area A.

Species diversity ranged from seven to twelve species over the four areas sampled. Belina Area G, which had the lowest total floral cover, showed the highest diversity. Belina Area B, with nine species counted within transects, appeared to be supporting a significant number of invading species. Most notable of these are Phlem sp. (3.1% cover) and Picea englemannii (1.0% cover). Numerous other species not counted on transects were present on this area which is the closest in proximity to a non-disturbed area of any temporary revegetation site sampled. Invasion of non-planted species appears to be a viable mechansim on this and other areas sampled. Though present on all sites, Medicago sativa and Melilotus officinalis were not overly impressive performers. This may, in large part, be due to the fact that fall seedings were completed for all temporary revegetation sites. Fall seeding is generally thought to suppress the establishment of these legume species.

Vegetation at all areas sampled appeared healthy. No signs of chlorosis or other nutrient deficiencies were observed. Mature seedheads were found on all areas sampled with the exception of Belina Area B. The absence of seedheads at area B was believed to be due to areas physical conditions. This cold, north-facing area retains snow much later into the spring than does other sampled sites delaying the maturity of indigenous vegetation. It is believed that seedheads will develop and mature as the season progresses.

Productivity ranged from 840 to 2,192 pounds per acre oven-dry weight.

Area A, containing notable forb and shrub components as compared to other areas sampled, had the highest recorded production. Belina Area B and Belina Area G had production rates of 877 and 840 pounds per acre, respectively. It is believed Area site B. production is depressed due to the physical site conditions described above but will continue to increase through this growing season as seedheads develop. The comparatively low production rate of Area G is due to the fact that this site has experienced less than one full growing season. As the age of this stand increases, productivity should increase as well.

The data presented in this report suggest that acceptable cover and productivity values and notable diversity can be produced on all substitute topsoil material stockpiled at the Valcam Loadout Facility and Belina Mine Site disturbances. Existing cover and productivity data for all areas compare favorably with general revegetation and native "range" levels considering the length of time since these areas were planted and the aspect factor affecting Belina Area B. There appears to be no reason, based on these data, why the material stockpiled should not be considered acceptable seedbed material for use during revegetation of the Valcam Loadout Facility and Belina Mine Site disturbances.

Materials and Methods Used To Revegetate Temporary Revegetation Areas Analyzed in 1986

Valcam Loadout Facility

Site preparation and planting date: Fall 1980
Depth of substitute topsoil material: 6-8'
Seedbed preparation: dozer tracking
Fertilization: method - hydraulic
amount - 100 lbs N per acre every 3 years beginning 3rd year following seeding
Seeding method: hydroseeding
Mulching: method - hydromulching, broadcast
material and amount - wood fiber - Conwed 2,000-1500 to 2000 lbs/acre; straw - 4,000 lbs/acre
Mulch anchoring: tackifier included with hydromulch; none

Belina Area A and Area B

Site preparation and planting date: Fall 1980
Depth of substitute topsoil material: 6"
Seedbed preparation: dozer tracking
Fertilization: method - hydraulic
amount - 100 lbs N per acre every 3 years beginning 3rd year following seeding
Seeding method: hydroseeding
Mulching: method - hydromulching
material and amount - wood fiber - Conwed 2,000 - 1500 to 2000 lbs/acre
Mulch anchoring: tackifier included with hydromulch

Belina Area G

Site preparation and planting date: Fall 1985
Depth of substitute topsoil material: 6"

Seedbed preparation: dozer tracking
Fertilization: method - hydraulic
amount - 100 lbs N per acre every 3 years beginning 3rd year following seeding

Seeding method: hydroseeding
Mulching: method - hydromulching
material and amount - wood fiber - Conwed 2,000 - 1500 to 2000 lbs/acre; straw - 4,000 lbs/acre
Mulch anchoring: tackifier included with hydromulch; none

Seed Mixtures Used on Temporary Revegetation Areas
Belina Area A, Belina Area B, and Valcam Loadout Facility

Species (PLS)	% of Mixture
Agropyron dasyastachyum (Thickspike wheatgrass)	8
Agropyron riparium (Streambank wheatgrass)	16
Agropyron smithii (Western wheatgrass)	12
Agropyron trachycaulum (Slender wheatgrass)	16
Bromus marginatus (Mountain brome)	5
Dactylis glomerata (Orchardgrass)	9
Elymus junceus (Russian wildrye)	8
Poa pratensis (Kentucky bluegrass)	13
Medicago sativa (Alfalfa)	6
Melilotus officinalis (Yellow sweetclover)	2
Artemisia tridentata vaseyana (Mountain big sagebrush)	4
Chrysothamnus nauseosus (Rubber rabbitbrush)	1
Chrysothamnus vicidiflorus (Douglas rabbitbrush)	<1
	100

Belina Area G

Species (PLS)	% of Mixture
Agropyron dasystachyum (Thickspike wheatgrass)	10
Agropyron smithii (Western wheatgrass)	16
Agropyron spicatum (Bluebunch wheatgrass)	9
Agropyron trachycaulum (Slender wheatgrass)	11
Bromus marginatus (Mountain brome)	9
Dactylis glomerata (Orchardgrass)	4
Elymus junceus (Russian wildrye)	6
Poa pratensis (Kentucky bluegrass)	4
Medicago sativa (Alfalfa)	4
Melilotus officinalis (Yellow sweetclover)	2
Artemisia tridentata vaseyana (Mountain big sagebrush)	16
Chrysothamnus nauseosus (Rubber rabbitbrush)	4
Chrysothamnus vicidiflorus (Douglas rabbitbrush)	5
	100

TEST PLOT PROGRAM 1987

In 1987 an agreement was reached between OSM, UDOGM and Valley Camp to establish vegetative test plots at both the Valcam Loadout Facility and the Belina Mine Site to satisfy conditions #5 and #6 of the original approved permit. These plots were to determine if the existing soils are in fact, "Suitable Growth Material" (Vegetation-Supporting Material as per R614-301-521.270.) for reclamation purposes.

BELINA MINE SITE

The test plot will be approximately 60 feet by 60 feet in size. The previously constructed area where the test plots are to be implemented at the Belina Mine Site consists of two differing soil materials. This break will be the boundary running east and west. The plots will be divided again perpendicular to the slope, thereby subdividing the test plot into equal cells of 30 by 30 feet. The second division will contain a no fertilizer and a fertilizer treatment. The fertilizer treatment will consist of amending the suitable growth material (Vegetation-Supporting Material) to be equivalant to the native undisturbed soils. The native sample location will be located above the portals in the undisturbed permit area. The two soil types in the test plot area will also be sampled. All sampling will consist of the upper six inches of the soil profile. Analysis will consist of the following parameters: nitrogen, available phosphorus, potassium, and pH. A total of three soil samples will be obtained at the Belina Mine Site.

The recommended fertilizer application will be broadcast, followed by deep raking on the respective treatment. The test plot will be broadcast seeded with the attached seed mix and mulched with 2000 lbs/ac wood fiber hydromulch. The test site will have markers on the corners of each treatment a minimum of three feet above ground.

VALCAM LOADOUT FACILITY SITE

The test plot will be approximately 20 x 40 feet in size. The surficial materials are contaminated with coal materials from previous coal stockpiling. All contaminated material will be scraped from the test plot site. The suitable growth materials (Vegetation-Supporting Material) will be amended to be equivalent to the surrounding undisturbed soils. This will entail obtaining one soil sample from the native undisturbed soils on the adjacent hill slope and one soil sample from the soil materials to be redistributed. Sampling will be analyzed as described above. After the site has been scraped clean the plot will be ripped to a 10-12 inch depth to reduce compaction and enhance the adberence of the suitable growth materials (Vegetation-Supporting Materials) to be redistributed.

Approximately 14.8 cubic yards of suitable growth material (Vegetation-Supporting Material) will be salvaged from the southwest corner of the main loadout pad and redistributed to a six inch depth over the ripped soil materials. The fertilizer will then be broadcast and deep raked, the area broadcast seeded with the attached seed mix and mulched with 2000 lbs/ac wood fiber hydromulch. This site is to be fenced within one week of seeding.

The test plots should be established the first week of October, 1987, weather permitting. Please inform the Division of the exact day of implementation so that the Division staff may be on site to resolve any implementation problems, should they arise. Monitoring of the test plots should be conducted as per the attached schedule.

MONITORING AND REPORTING

Monitoring of the test plots will include sampling species composition, cover (by species and total vegetation cover), woody plant density and productivity as per the following:

Species composition	years 1 thru 5
Cover	years 2 thru 5
Woody plant density	years 3 thru 5
Productivity	years 4 thru 5

During years 4 and 5 monitoring will include sampling of appropriate vegetation reference areas to provide a comparison to demonstrate revegetation success.

Results of monitoring are to be summarized and submitted with the annual report.

SEED MIX FOR VEGETATION TEST PLOTS
(as built)

Belina Mine Site

Species	#PLS/Ac.	PLS/ft2	#PLS/ plot	#bulk/ plot
Grasses:				
Agropyron dasystachyum `Critana' thickspike wheatgrass	3.0	10.7	.165	.202
Agropyron smithii `Arriba' western wheatgrass	4.0	11.0	.22	.350
Bromus marginatus `Bromar'mountain brome	4.0	7.3	.22	.306
Poa canbyi `Canbar'canby bluegrass	0.5	10.6	.027	.047
Poa pratensis Kentucky bluegrass	0.1	4.9	.006	.007
Forbs:				
*Achillea millefolium Western yarrow	0.02	1.2	.001	.001
Artemisia ludoviciana `summit' louisiand sagewort	0.1	10.3	.006	.014
Linum lewisii `Apar' lewis flax	1.0	6.7	.055	.061
Hedysarum boreale Northern sweetvetch	2.0	1.6	.11	.157
Melilotus officinalis yellow sweetclover	2.0	11.9	.11	.130
Penstemon strictus `Bandera' Rocky Mtn. penstemon	0.8	10.9	.044	.052
Shrubs:				
*Amelanchier alnifolia Serviceberry	1.6	1.6	.086	.09
Artemisia tridentata vasayana Mountain big sagebrush	0.2	11.5	.011	.014
Chrysothamnus nauseosus albicaulis Whitestem rubber rabbitbrush	0.3	2.4	.015	.014
Rosa woodsii Woods rose	1.0	1.0	.055	.092
Sambucus coerulea Blue elderberry	1.0	5.0	.055	.092
Symphoricarpos oreophilus Mountain Snowberry	2.0	3.4	.11	.122
Totals	23.62	112.0	1.301	1.878

Rate is for broadcast or hydroseeding. Rate/plot is based on plot size of 60' x 40'. * Rate reduced for these species due to lack of sufficent seed for original seeding rate.

SEED MIX FOR VEGETATION TEST PLOTS
(as built)

Valcam Loadout Facility

Species	#PLS/Ac.	PLS/ft2	#PLS/ plot	#bulk/ plot
Grasses:				
Agropyron dasystachyum `Critana' thickspick wheatgrass	4.0	14.2	.037	.09
Agropyron smithii `Arriba' western wheatgrass	4.0	11.0	.073	.117
Bromus marginatus `Bromar' mountain brome	5.0	9.2	.092	.128
Poa pratensis Kentucky bluegrass	0.2	9.8	.004	.005
Forbs:				
Artemisia ludoviciana `Summit' louisiana sagewort	0.1	10.3	.002	.005
Limun lewisii `Apar' lewis flax	1.0	6.7	.018	.02
Medicago sativa `Ladak' alfalfa	1.5	7.2	.03	.038
Melilotus officinalis yellow sweetclover	2.0	11.9	.037	.043
Penstemon strictus `Bandera Rocky Mtn. penstemon	0.5	6.8	.009	.011
Shrubs:				
Artemisia tridentata vaseyana Mountain big sagebrush	0.1	5.8	.002	.003
Chrysothamnus nauseosus albicaulis Whitestem rubber rabbitbrush	0.4	3.1	.006	.059
Rosa woodsii Woods rose	1.0	1.0	.001	.031
Totals	19.9	98.0	0.364	0.550

Rate is for broadcast or hydroseeding methods. Rate/plot is based on plot size of 40' x 20'.

1988 RESULTS OF VEGETATION SAMPLING AND TEST PLOT MONITORING

Prepared by
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Report by
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Fieldwork: Patrick D. Collins
P. Dean Collins

October 1988

INTRODUCTION

Vegetation test plots were constructed in 1987 to test revegetation potential of available soil material (Vegetation-Supporting Material) of the Mine Permit Area. The test plot design was developed by the State of Utah, Division of Oil, Gas & Mining UDOGM and Valley Camp of Utah, Inc. Plot construction (layout and earthmoving work) was accomplished by (or under the direction of) Valley Camp of Utah, Inc. Seed, fertilizer and hydromulch by the specified design was applied by Mt. Nebo Scientific in October of 1987.

Two main areas were used as sites for the vegetation test plots. These areas were called the Valcam Loadout Facility Site and the Belina Mine Site. The Valcam Loadout Facility site is located south of the truck load-out pad and east of the railroad tracks on an old coal storage area. The Belina Mine Site is on the slope south of the sediment pond.

Monitoring was initiated by sampling the vegetation on the two sites by Mt. Nebo Scientific in August of 1988. An additional site that had been previously implemented by a different contractor was also sampled for comparison at the same time. Results of the quantitative sampling are summarized in this report.

METHODS.

Quantitative and qualitative data were taken on each of the two sites. Bi-directional random placement of sampling plots were designed to provide unbiased accuracy of the data compiled. A randomized block design was implemented to insure adequate representation of the entire plot. On the Valcam Loadout Facility Site, three 12.5 meter transects were regulary placed on the plot to adequately cover the entire plot. Twenty sample points were then placed every 1.5 meters along these transects. A one meter buffer strip was placed around the entire plot where sample points were avoided to limit sample bias. There was only one treatment to be monitored on this plot.

The Belina Mine Site, however, had four different treatments to be sampled, plus the one site that was implemented by another contractor. Therefore, a total of five areas or "subplots" were sampled. the subplots were labeled on the data summary tables by directional locations and treatments and are listed below:

1. NE Subplot, Light Soil A, Fertilized
2. NW Subplot, Light Soil S, Unfertilized
3. SE Subplot, Gray Soil B, Fertilized
4. SW Subplot, Gray Soil B, Unfertilized
5. MC Plot, east and adj. to NEBO SW Plot

Three transects were also placed on each of the subplots listed above. Eight sample locations were regularly placed on each treatment with a total of 40 samples for all treatments where quadrat placement was avoided.

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

Sampling adaquacy for cover on the Valcam Loadout Facility Site was achieved using formulas from Snedocor and Cochran (1980), insuring that 80% of the sample were within 10% of the true mean of the test plots. Sample number of the Belina Mine Site was determined by Lynn Kunzler (UDOGM). All sample means, standard deviations, and sample sizes were included in this report to enable the reviewers to apply futher statistical tests if desired.

Plant species nomenclature follows Welsh et al. (A Utah Flora. 1987. Great Basin Natural Memoir NO. 9). Sample design and Methodologies were approved by a representative of the State of Utah, UDOGM (Lynn Kunzler, Reclamation Biologist).. Mr. Kunzler was present on site upon initiation of the test plot sampling in 1988.

RESULTS.

Summary Tables
All results of the vegetation sampling for 1988 are shown on the summary tables (Tables 1-12). Included in these tables are:

1) Percent cover and standard deviations (total living cover, mulch and litter, bare ground, rock),
2) composition (% shrubs, forbs, grasses),
3) cover and frequency by species,
4) sample sizes.

NOMENCLATURE

Because the author decided to use the most recent nomenclature for plant species for the summary tables, and because some of the species on the original seed mix list have been changed, a list is provided below showing the old and new scientific names.

Old Name (on seed mix lists)	New Name (Welsh 1987)
Shrubs	
Amelanchier alnifolia	Amelanchier alnifolia
Artemisia tridentata var. vaseyana	Artemisia tridentata vaseyana
Chrysothamnus nauseosus albicaulis	C. nauseosus albicaulis
Rosa woodsii	Rosa woodsii
Sambucus coerulea	Sambucus coerulea
Symphoricarpos oreophilus	Symphoricarpos oreophilus
Forbs	
Achillea millefolium	Achillea millefolium
Artemisia ludoviciana	Artemisia ludoviciana
Linum lewissii	Linum perenne ssp. lewisii
Hedysarum boreale	Hedysarum boreale
Medicago sativa	Medicago satiav
Melilotus officinalis	Melilotus officinalis
Penstemon strictus	Penstemon strictus
Grasses	
Agropyron dasystachyum	Elymus lanceolatus
Agropyron smithii	Elymus smithii
Bromus Marginatus	Bromus carinatus
Poa canbyi	Poa canbyi
Poa partensis	Poa pratensis

The test plots will continue to be monitored according to the schedule accepted by the State of Utah, (UDOGM), and each years results will be included in the annual report or as soon as it is available from MT. Nebo Scientific Research and Consulting.

TABLE 1: 1988 SAMPLING RESULTS-BELINA PLOT
(NE Subplot, Light Soil A, Fertilized)

Total cover and composition for the revegetation test plots of Valley Camp of Utah. The table shows means, standard deviations and sample sizes.

	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE *
COVER			
Total Living cover	30.25	5.63	8.00
Mulch and Litter	28.13	8.27	8.00
Bareground	6.88	2.42	8.00
Rock	34.75	9.31	8.00
COMPOSITION			
Shrubs	0.39	1.03	8.00
Forbs	1.95	1.53	8.00
Grasses	97.66	2.08	8.00

*Sample size was determined by Utah Division of Oil Gas and Mining (See METHODS).

TABLE 2: 1988 SAMPLING RESULTS-BELINA PLOT
(NE Subplot, Light Soil A, Fertilized)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

COVER BY SPECIES

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Picea pungens	0.13	0.13	8.00	12.50
FORBS				
Epilobium helleanum	0.38	0.48	8.00	37.50
Hedysarum boreale	0.13	0.33	8.00	12.50
Melitotus officinalis	0.13	0.33	8.00	12.50
GRASSES				
Agropyron cristatum	2.75	2.82	8.00	50.00
Elymus lanceolatus	0.63	1.65	8.00	12.50
Elymus smithii	12.88	6.90	8.00	87.50
Elymus spicatus	4.00	5.32	8.00	50.00
Poa pratensis	9.25	10.02	8.00	62.50

TABLE 3: 1988 SAMPLING RESULTS-BELINA PLOT
(NW Subplot, Light Soil A, Unfertilized)

Total cover and composition for the revegetation test plots of Valley Camp of Utah. The table shows means, standard devations and sample sizes.

COVER

	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE*
Total Living Cover	20.75	5.93	8.00
Mulch and Litter	17.50	13.92	8.00
Bareground	8.75	4.84	8.00
Rock	53.00	16.48	8.00
COMPOSITION			
Shrubs	---	---	---
Forbs	15.53	17.46	8.00
Grasses	84.47	17.76	8.00

*Sample size was determined by Utah Division of Oil, Gas and Mining (See METHODS)

TABLE 4: 1988 SAMPLING RESULTS-BELINA PLOT
(NW Subplot, Light Soil A, Unfertilized)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

COVER BY SPECIES

SPECIES	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS	----	----	----	----
FORBS				
Epilobium halleanum	1.75	1.98	8.00	62.50
Linum perenne ssp. lewissii	0.13	0.33	8.00	12.50
Melilotus officinalis	0.25	0.43	8.00	12.50
Saxifraga sp.	0.13	0.33	8.00	12.50
Urtica dioica	0.75	1.98	8.00	12.50
GRASSES				
Agropyron cristatum	0.25	0.66	8.00	12.50
Bromus carinatus	1.13	1.69	8.00	25.00
Elymus cinereus	0.63	1.65	8.00	12.50
Elymus lanceolatus	2.88	4.99	8.00	25.00
Elymus smithii	7.50	6.48	8.00	75.00
Elymus spicatus	4.63	7.61	8.00	50.00
Hordeum jubatum	0.13	0.33	8.00	12.50
Poa pratensis	0.63	1.65	8.00	12.50

TABLE 5: 1988 SAMPLING RESULTS-BELINA PLOT
(SE Subplot, Gray Soil B, Fertilized)

Total cover and composition for the revegetation test plots of Valley Camp of Utah. The table sbows means, standard deviations and sample sizes.

COVER

	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE*
Total Living Cover	26.00	7.91	8.00
Mulch and litter	31.15	11.27	8.00
Bareground	14.63	9.80	8.00
Rock	28.13	7.06	8.00

COMPOSITION

Shrubs	----	----	----
Forbs	11.02	11.24	8.00
Grasses	88.98	11.24	8.00

*Sample size was determined by Utah Division of Oil, Gas and Mining (See METHODS)

TABLE 6: 1988 SAMPLING RESULTS-BELINA PLOT
(SE Subplot, Gray Soil B, Fertlized)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

COVER BY SPECIES

SPECIES	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS	----	----	----	----
FORBS				
Epilobium halleanum	1.25	1.48	8.00	75.00
Hedysarum boreale	0.13	0.33	8.00	12.50
Iva axillarus	0.13	0.33	8.00	12.50
Lappula squarrosa	0.13	0.33	8.00	12.50
Linum perenne	0.13	0.33	8.00	12.50
Melilotus officinalis	0.13	0.33	8.00	12.50
Penstemon strictus	0.13	0.33	8.00	12.50
GRASSES				
Bromus carinatus	4.00	3.24	8.00	62.50
Elymus lanceolatus	1.25	3.31	8.00	12.50
Elymus smithii	11.25	6.23	8.00	87.50
Elymus spicatus	4.00	6.95	8.00	25.00
Poa pratensis	3.38	4.72	8.00	37.50

TABLE 7: 1988 SAMPLING RESULTS-BELINA PLOT
(SW Subplot, Gray Soil B, Unfertilized)

COVER

	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE*
Total Living Cover	20.13	9.56	8.00
Mulch and Litter	25.00	7.50	8.00
Bareground	18.13	9.66	8.00
Rock	36.75	8.30	8.00

COMPOSITION

Shrubs	----	----	----
Forbs	7.10	6.62	8.00
Grasses	92.90	6.62	8.00

*Sample size was determined by Utah Division of Oil, Gas and Mining (See METHODS).

TABLE 8: 1988 SAMPLING RESULTS-BELINA PLOT
(SW Subplot, Gray Soil B, Unfertilized)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

	COVER BY SPECIES			
SPECIES	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS	----	----	----	----
FORBS				
Epilobium halleanum	0.63	0.70	8.00	50.00
Fragaria vesca	0.13	0.33	8.00	12.50
Hedysarum boreale	0.38	0.48	8.00	37.50
Melilotus officinalis	0.13	0.33	8.00	12.50
Penstemon strictus	0.13	0.33	8.00	12.50
GRASSES				
Bromus carinatus	3.88	5.69	8.00	62.50
Elymus smithii	7.38	5.41	8.00	100.00
Elymus spicatus	5.00	8.47	8.00	37.50
Poa pratensis	2.50	2.92	8.00	50.00

TABLE 9: 1988 SAMPLING RESULTS-BELINA SITE
(MC Plot, east and adjacent to MT. NEBO'S SW PLOT)

Total cover and composition for the revegetation test plots of Valley Camp of Utah. The table shows means, standard deviations and sample sizes.

	COVER		
	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE*
Total Living Cover	5.50	1.32	8.00
Mulch and litter	43.13	24.61	8.00
Bareground	26.38	19.87	8.00
Rock	25.00	9.89	8.00
	COMPOSITION		
Shrubs	2.50	6.61	8.00
Forbs	26.16	27.28	8.00
Grasses	71.34	27.52	8.00

*Sample size was determined by Utah Division of Oil, Gas and Mining (See METHODS).

TABLE 10: 1988 SAMPLING RESULTS-BELINA PLOT
(MC Plot, east and adjacent to MT. NEBO'S SW Subplot)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

COVER BY SPECIES

SPECIES	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Amalanchier utahensis	0.13	0.33	8.00	12.50
FORBS				
Epilobium halleanum	0.25	0.66	8.00	12.50
Hedysarum boreale	0.38	0.48	8.00	37.50
Penstemon strictus	0.38	0.48	8.00	37.50
Polygonum aviculare	0.25	0.66	8.00	12.50
GRASSES				
Bromus carinatus	0.50	1.00	8.00	25.00
Bromus tectorum	0.88	1.62	8.00	37.50
Elymus lanceolatus	0.13	0.33	8.00	12.50
Elymus smithii	2.38	2.34	8.00	87.50
Poa pratensis	0.13	0.33	8.00	12.50

TABLE 11: 1988 SAMPLING RESULTS-PLOTS
(Single plot design)

Total cover and composition for the revegetation test plots of Valley Camp of Utah. The table shows means, standard deviations and sample sizes.

COVER

	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE*
Total Living Cover	27.90	8.83	20.00
Mulch and Litter	17.85	14.43	20.00
Bareground	44.50	26.06	20.00
Rock	9.75	8.62	20.00
COMPOSITION			
Shrubs	0.57	1.40	20.00
Forbs	83.26	11.16	20.00
Grasses	16.17	11.20	20.00

*Sample size insures 80% accuracy withis 10% of the true mean.

TABLE 12: 1988 SAMPLING RESULTS-UTAH PLOT
(Single Plot Design)

Mean percent cover, standard deviation, sample size and relative frequency by species for the revegetation test plots of Valley Camp of Utah.

COVER BY SPECIES

SPECIES	%MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
SHRUBS				
Artemisia tridentata	0.15	0.36	20.00	15.00
FORBS				
Artemisia ludowiciana	0.10	0.30	20.00	10.00
Chaenactis douglasii	0.10	0.30	20.00	10.00
Chenopodium fremontii	0.10	0.30	20.00	10.00
Circium sp.	0.60	0.66	20.00	50.00
Erigeron sp.	0.15	0.36	20.00	15.00
Eriogonum sp.	0.15	0.36	20.00	15.00
Gayophytum ramosissismum	0.30	0.46	20.00	30.00
Lappula occidentalis	1.15	1.74	20.00	40.00
Linum perenne ssp lewisii	0.30	0.46	20.00	30.00
Melilotus officinalis	7.15	5.77	20.00	85.00
Polygonum aviculare	1.30	2.10	20.00	35.00
Salsola iberica	11.90	7.76	20.00	100.00
GRASSES				
Bromus carinatus	1.65	2.52	20.00	45.00
Elymus lanceolatus	0.80	1.54	20.00	35.00
Elymus smithii	2.00	1.82	20.00	65.00

For the 1989 Test Plot Survey, see Appendix R614-301-341.300. (Mt. Nebo Scientific Reasearch and Consulting.

Immediately following the final year of monitoring, all parties will determine if the available soils are adaquate for use as Vegetation-Supporting Material for reclamation. Also just prior to the time of reclamation the test plots will be sampled for species composition, cover (by species and total vevetation cover), woody plant density and productivity and the soils will be tested to determine the fertilizer treatment needed to initiate and support the vegetation communities.

Within this same time frame, disease/pest testing will be done to evaluated if a control plan will be needed. If it becomes necessary to devise a Disease/Pest Control Plan, Division approval of the plan will be obtained prior to implementation of such plan. D/P testing will be ongoing during the bonded period to assure against invasion of pest or disease.

Irrigation is not envisioned as part of reclamation as the average precipitation should promote germination and adaquate growth for all species planted.

R614-301-342. thru 342.400. Fish and Wildlife.

See R614-301-330.

R614-301-350. Performance Standards.

R614-301-351. General Requirements.

All coal mining and reclamation operations will be carried out according to plans provided under R614-301-330 thru 340..

R614-301-352. Contemporaneous Reclamation.

The revegetation on all disturbed land by the coal mining and reclamation operations will be done as contemporaneous as practicable.

R614-301-353. thru 301-353.300. Revegetation: General Requirements.

The vegetative cover will be diverse, effective, and permanent, and comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the Division, being at least equal in extent of cover to the natural vegetation of the area and be capable of stabilizing the soil surface from erosion. The reestablished plant species will be compatible with the approved postmining land use and have the same seasonal characteristics of growth as the original vegetation. Also it will be capable of self-regeneration and plant succession and be compatible with the plant and animal species of the area and meet the requirements of applicable Utah and federal seed, poisonous and noxious plant and introduced species laws or regulations.

R614-301-353.400.

N/A

R614-301-354. thru 301-355. Revegetation.

See R614-301-341.300.

R614-301-356. Revegetation: Standards for Success.

R614-301-356.100.

Success of revegetation will be judged on the effectiveness of the vegetation for the approved postmining land use, the extent of cover compared to the extent of cover of the reference area or other approved success standard, and the general requirements of R614-301-353.

For details see monitoring section under R614-301-341.250.

R614-301-356.300 thru 301-356.400.

Adaquate siltation structures will be maintained until the site has been vegetated and stabilized and removal is authorized by the Division. When structures are removed the affected area will be revegated in accordance with the Reclamation Plan.

R614-301-357. Thru 301-357.300.

Since the precipitation is in excess of 26 inches annually, it is assumed that the five-year extended liability period will apply.

No husbandry practices are envisioned at this point in time.

R614-301-358. Protection of Fish, Wildlife, and Related Environmental Values.

R614-301-358.100. Thru 301-358.530.

Valley Camp will, to the extent possible using the best technology currently available, minimuize disturbances and adverse impacts on fish, wildlife, and related environmental values and will achieve enhancement of such resources where practicable. Refer to R614-301-330.

TABLE OF CONTENTS

LAND USE AND AIR QUALITY R614-301-400.

R614-301-400. LAND USE AND AIR QUALITY.

R614-301-410. Land Use.

R614-301-411. Environmental Description.

See R614-301-320.

R614-301-411.100. Premining Land Use Information.

Eccles Canyon serves as the boundary between two livestock grazing allotments. The USDA Forest Service has range analysis maps for both areas. These maps were used to compile the premining land capability and the premining land use. See the Premining Land Use Map (R614-301-411.100.).

R614-301-411.110. thru 301-411.120.

The surrounding area is rich in mining history. For a number of years prior to the opening of the Utah No. 2 Mine in 1974 by Valley Camp of Utah, Inc., only limited mining activity had taken place in the area. However, early commercial production of coal was initiated in the region during the latter part of the nineteenth century. The Pleasant Valley Coal Company, Utah Fuel Company and others began mining operations in the Scofield area first. Wagon roads and then a narrow guage railroad were utilized to transport the coal to more heavily populated Utah and Salt Lake Valleys.

The oldest mine in the district, Utah No. 1 Mine, is situated on properties now held by Valley Camp, just south of the Valcam Loadout Facility on the east side of Mud Creek about three miles south of Scofield, Utah. It was opened in 1878 and was originally called the Mud Creek Mine. The portals of the mine were at tipple level above the railroad. Convential mining methods (drill, shoot, and load) and rail haulage were used, typical of most mines in this district. The principal operator at that time was Utah Fuel Company, a subsidary of the Denver and Rio Grande Western Railroad. This mine had several periods of activity but the workings were not extensive. Doelling (1972) estimated 713,800 tons total production.

The Union Pacific Mine just east of Scofield was opened in 1844 in a coal seam that had a thickness in excess of 30 feet. The upper seam split to north, however both splits were mined. An upper seam with about 100 feet of separation was also mined to some extent. Mining was terminated after the lower seam caught fire and to date is still burning.

The Winter Quarters Mine, about one and one-half miles west of Scofield, Utah, developed into the largest mine in the district, producing nearly 11 million ton of coal. Speiker (1931),

described the mine as having five openings, and eventually six openings. These operations were owned by the Utah Fuel Company (D&RGW). This mine was the site of a major disaster May 1, 1900, when more than 200 men were killed in a coal dust explosion.

Several other mines were opened in the vicinity of Scofield, but the only other mines of significance were the Kinney Mine to the Northeast, and later, the Colombine Mine near the same locality.

The Clear Creek Mines at Clear Creek, Utah were opened in 1899. The majority of the mining took place in the lower of two seams on the east side of the main valley. Extensive mining moved eastward until terminated by a major fault zone. A 1700' rock tunnel was driven across the fault zone and mining continued to the outcrop in upper Bob Wright Canyon.

In Eccles Canyon on the south side of Eccles Creek within Coastal States Mine site disturbed area, there was a small mining operation in the Lower O'Connor seam. Nothing is known about this mine or the period of activity and production is assumed to have been limited.

The Bentley, Huntington Mine and Loucks Mines were the only significant producer, as 440,000 ton of coal was produced between 1895 and the early 1940's (Doelling, 1972). These mines are located within the southern projection of the Connelville Block.

An early wagon mine, the Black Diamond Mine, was operated in upper Finn Canyon west of Clear Creek, Utah. The period of activity and the production are not known for certain, but it was probably operated intermittently between 1923 and 1941.

Mining from the O'Connor Mines in Boardinghouse Canyon later broke into the Black Diamond Mine. These mines lie immediately to the east of the O'Connor fault. Both the Upper and Lower O'Connor seams were mined, with each seam having a thickness of nearly 18 feet at the outcrop. The coal was shipped to the Castlegate prep plant near Helper, Utah, where it was washed and sold.

In 1974 Valley Camp of Utah, Inc. opened the Utah No. 2 Mine, which was projected to produce between one-half to three-quarters of a million ton annually, however unexpected faulting caused the operation to cease. In 1976, Valley Camp opened the Belina No. 1 Mine and constructed the necessary support facilities near the head of Whisky Canyon. The projected production was also from one-half to three-quarters of a million ton annually.

The historic land use at the Belina Mine Site is rangeland.

The land use in the immediate vicinity of the Utah No. 2 Mine, at the Valcam Loadout Facility has been historically mining.

Land use for the Belina Mine Site, Belina Haul Road and General Office areas were in fact only used for rangeland prior to Valley Camp's mining activities, while approximately 40% of the Valcam Loadout Facility was previously disturbed by the activities of Utah No. 1 Mine around the turn of the century, the remainder was rangeland.

** R614-301-400. **

The analysis of land capability and productivity is based on soil and vegetation studies, USDA information, and consultant work. The premining land use for the area affected by the surface facilities was capable of supporting shrub and brush rangeland and mixed forests. For specific information see SOILS R614-301-200. and BIOLOGY R614-301-300.

R614-301-411.130.

The land use classifications under local zoning laws for the Mine Permit Area are as follows:

CARBON COUNTY

All of the Mine Permit Area situated in Carbon County is zoned for Recreation, Forestry and Mining with the exception of the West half of the South West Quarter of Section 9, T13S, R7E SLB&M. This portion is zoned Critical Environmental (CE-1) back to RF&M is being prepared.

EMERY COUNTY

All of the Mine Permit Area situated in Emery County is zoned for Recreation, Forestry and Mining. However rezoning to Critical Environmental in certain sections, are being considered. When these changes are finalized, the changes will be noted in this permit.

R614-301-411.140. thru 301-411.145.

See Appendix R614-301-411.140. (AERC 1980), also see the Pleasant Valley Mining District Map (R614-301-521.111.)

R614-301-411.200. Previous Mining Activity.

There was no previous mining activity at the Belina Mine Site. Refer to R614-301-411.110. thru 301-411.120..

R614-301-412. thru 301-412.140. Reclamation Plan.

For a general description see BIOLOGY R614-301-300.. For details see ENGINEERING R614-301-500..

R614-301-412.200. Land owner or Surface Manager Comments.

Updated comments will be forthcoming.

R614-301-412.300.

N/A

R614-301-413. Preformance Standards.

R614-301-413.100. thru 301-413.120.

See SOILS R614-301-200., BIOLOGY R614-301-300. and ENGINEERING R614-301-500..

R614-301-413.200.

N/A

R614-301-413.300.

N/A

R614-301-420. Air Quality.

The Air Pollution Control Plan at Valley Camp has been approved by the State of Utah, Bureau of Air Quality, letter of May 23, 1975, and May 7, 1980. The USEPA (May 29, 1980 Ref. 8AH-A) has determined that Valley Camp does not require a Point Source Discharge Permit. Therefore, no air quality monitoring plan is proposed. See Appendix R614-301-420.

Fugitive Dust Control Plan

1. Conveyor hood sections will be securely positioned when transporting coal and will be maintained in good condition.

2. Conveyor head, reclaim tunnel feeder, and vibration feeder discharge chutes will be totally enclosed.

3. Conveyor skirt boards will be properly positioned when transporting coal and will be replaced as needed.

4. Stacker tube dust flaps will be replaced as needed.

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R614-301-500. ENGINEERING.

R614-301-510. Introduction.

The Engineering section of the Mine Permit Renewal Application is divided into the operation plan, reclamation plan, design criteria, and performance standards. All of the activities associated with the mining and reclamation operations are designed, located, constructed, maintained, and those considered reclaimed are in accordance with the operation and reclamation plan. All of the design criteria associated with the operation and reclamation plan have be met.

R614-301-511. General Requirements.

R614-301-511.100. thru 301-511.300.

This mine permit renewal application includes descriptions of the mining and reclamation operations with attendant maps, plans, and cross sections and its potential impacts to the environment as well methods and calculations utilized to achieve compliance with design criteria and reclamation.

R614-301-512. Certifications.

R614-301-512.100. Maps and Cross Sections.

All maps and cross sections specified under R614-301-512.100. thru 512.150. are prepared by, or under the direction of, and certified by a qualified, registered, professional engineer or land surveyor, with assistance from professionals of related fields. All maps and cross sections will be updated when necessary.

R614-301-512.200. Plans and Engineering Design.

All plans and engineering designs for excess spoil, durable rock fills, coal mine waste, impoundments, primary roads and variances from approximate original contour will be certified by a qualified registered professional engineer.

R614-301-512.210.

Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R614-301-535.100

R614-301-512.220.

Durable Rock Fills. The professional engineer experienced in the design of earth and rock fill will certify that the durable rock fill design will ensure the stability of the fill and meet design requirements according to R614-301-535.100 and 301-535.300.

R614-301-512.230.

Coal Mine Waste. The professional engineer experienced in the design of similar earth and waste structures must certify the design of the disposal facility according to R614-301-536.

R614-301-512.240.

Impoundments. The professional engineer will use current, prudent, engineering practices and will be experienced in the design and construction of impoundments and certify the design of the impoundment according to R614-301-743.

R614-301-512.250.

Primary Roads. The professional engineer will certify the design and construction or reconstruction of primary roads as meeting the requirements of R614-301-742.420.

R614-301-512.260.

Variance From Approximate Original Contour. The professional engineer will certify the design for the proposed variance from the approximate original contour, as described under R614-301-270., in conformance with professional standards established to assure the stability, drainage and configuration necessary for the intended use of the site.

R614-301-513. Compliance MHSA Regulations and Approvals.

R614-301-513.100. Coal Processing Waste Dams or Embankments.

There are no coal processing waste dams or embankments constructed within the Mine Permit Area. Should coal processing waste dams or embankments become necessary compliance with MSHA, 30 CFR 77.216-1 and 77.216-2 will be met. (see R614-301-528.400 and 301-536.820.).

R614-301-513.200. Impoundments/Sediment Ponds.

There are no impoundments/sediment ponds which meet the MSHA size or qualifying criteria within the Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary compliance with the requirements of MSHA, 30 CFR 77.216. will be met. (see R614-301-533.600., 301-742.222., and 301-742.223.).

R614-301-513.300. Disposal of Underground Developement Waste Coal Processing Waste, or Excess Spoil.

Disposal of underground development waste, coal processing waste, or excess spoil disposed of in the underground mine workings will be in accordance with a plan approved by MSHA and the Division. (see R614-301-528.321.).

R614-301-513.400. Refuse Piles.

There are no refuse piles associated with the Mine Permit Area. In the event construction of a refuse pile(s) is necessary, the requirements of MSHA, 30 CFR 77.214 and 77.215 will be met. (see R614-301-536.900.).

R614-301-513.500. Surface Openings.

Each shaft, drift adit, tunnel, exploratory hole, entry or other opening to the surface from the underground will be capped, sealed, backfilled or otherwise properly managed consistant with MSHA, 30 CFR 75.1771 (see to R614-301-551.).

R614-301-513.600. Discharges Into An Underground Mine.

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No water will be discharged into the mine(s) until approved by MSHA and the Division (see R614-301-731.511.4).

R614-301-513.800. Coal Mine Waste Fires.

Coal mine waste fires will be extinguished in accordance with a plan approved by MSHA and the Division (see R614-301-528.220.).

R614-301-514. Inspections.

All engineering inspections will be conducted by a qualified registered professional engineer or other qualified professional specialist under the direction of the qualified engineer, except as described under R614-301-514.330.

R614-301-514.100. thru 301-514.114.

Excess Spoil Inspections. Monitoring of all excess spoil fill will be conducted by the qualified registered professional engineer or specialist through out the duration of the project, which includes foundation preparation, removal of organic material and topsoil, placement of underdrains, protective filter systems, final surface drainage systems, final grading and revegation of the fill(s).

R614-301-514.120. Excess Spoil Certified Reports.

Certified reports will be provided to the Division by the qualified registered professional engineer promptly after each inspection of the fill(s) indicating proper construction and maintainance as designed and that it is in accordance to the approved plan and R614-301 and R614-302 Rules. The report will include any structural instability, weakness, or hazardous condition.

R614-301-514.130. Excess Spoil Drainage System and Protective Filters Certified Reports.

R614-301-514.131.

Certified reports will include color photographs during and after construction, prior to being covered with the spoil. This pertains to segmented construction as well.

** R614-301-500. **

R614-301-514.132.

Excess durable rock spoil placed in single or multiple lifts where the underdrain system is constructed simulaneously with excess spoil placement by the natural segregation of dumped materials, in accordance with R614-301-535.300. and R614-301-745.300., color photographs will be taken of the underdrain as the underdrain system is being formed.

R614-301-514.133.

Photographs will be of adequate size, scale, and number to depict the site features.

R614-301-514.140. Inspection Reports.

Copies of all inspection reports will be kept at the General Office.

R614-301-514.200. Refuse Piles.

Valley Camp has not constructed any refuse piles. Should it become necessary to construct a refuse pile(s) a professional engineer or specialist experienced in the construction of similar earth and waste structures will inspect the refuse pile during construction.

R614-301-514.210.

Regular inspections by the engineer or specialist will also be conducted during placement and compaction of coal mine waste materials. More frequent inspections will be conducted if a danger of harm exists to the public health and safety or the environment. Inspections will continue until the refuse pile has been finally graded and revegetated or until a later time as required by the Division.

R614-301-514.220. thru 301-514.224.

Such inspection will be made at least quarterly throughout construction and during the following critical construction periods of foundation preparation, including the removal of all

organic material and topsoil, the placement of underdrains and protective filter systems, the installation of final surface drainage systems, and the final graded and revegetated facility.

R614-301-514.230.

A qualified registered professional engineer will provide a certified report to the Division promptly after each inspection that the refuse pile has been constructed and maintained as designed and in accordance with the approved plan and R614 Rules. The report will include appearances of instability, structural weakness, and other hazardous conditions.

R614-301-514.240.

A certified report on the drainage system and protective filters will include color photographs taken during and after construction, and before underdrains are covered with coal mine waste. If the underdrain system is constructed in phases, each phase will be certified separately. The photographs accompanying each certified report will be taken in adaguate size and number with enough terrain or other physical features of the site shown to provide a relative scale to the photographs and to specifically and clearly identify the site.

R614-301-514.250.

Copies of each inspection report will be retained at the General Office.

R614-301-514.300. Impoundments.

R614-301-514.310. thru 301-514.313 Certified Inspections.

There is no impoundments which meet the MSHA requirements within the Mine Permit Area. Should it become necessary to construct such an impoundment the follow will complied with:

Certified Inspection. A professional engineer or specialist experienced in the construction of impoundments will inspect the impoundment and the engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R614 Rules. The report will include discussion of any appearances of instability,

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structural weakness or the other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability.

R614-301-514.320. Weekly Inspections.

Weekly inspections. Impoundments subject to MSHA, 30 CFR 77.216 will be examined in accordance with 30 CFR 77.216-3.

R614-301-514.330. Quarterly Inspections.

Other impoundments, not subject to MSHA, 30 CFR 77.216 will be monitored quarterly by a qualified person designated by the operator for appearance of structural weakness and other hazardous conditions.

R614-301-515. Reporting and Emergency Procedures.

R614-301-515.100.

At any time a slide occurs which may have a potential adverse effect on public health, safety or the environment, Valley Camp will notify the Division as soon as possible and will comply with the remedial measures required to stabilized the slide.

R614-301-515.200. Impoundment Hazards.

If during an examination or inspection of an impoundment, there is a potential hazard discovered the person(s), who have examined the impoundment will inform the Division of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented, the Division will be notified immediately.

R614-301-515.300. Temporary Cessation.

R614-301-515.310. thru 301-515.311.

During a temporary cessation, provisions of the approved permit will be carrried out. All mine portals will be maintained and the surface facilities will be secured where there is no current operations.

** R614-301-500. **

R614-301-515.320.

Should a temporary cessation of coal mining and reclamation operations of 90 days or more occur, the division will be notified by registered letter, which will contain the following required information.

1. Exact number of surface acres,
2. Horizontal and vertical extent of subsurface strata in the Mine Permit Area prior to cessation,
3. Extent and kind of reclamation of surface area which will have been accomplished, and identification of the backfilling, regrading, revegetation, environmental monitoring, portal closures and water treatment activities taking place during temporary cessation.

R614-301-520. Operation Plan.

R614-301-521. General.

This plan includes maps, cross sections, narratives, descriptions, and calculations indicating how the relevant requirements are met. Also the permit describes and identifies the lands subject to coal mining and reclamation operations over the estimated life of the operations.

R614-301-521.100. Cross Sections and Maps.

Cross sections, maps and plans shows all relevant information required by the Division.

R614-301-521.110. Previously Mined Areas.

R614-301-521.111.

Pleasant Valley Mining District Map (R614-301-521.111.) shows the location and extent of known workings of active, inactive, or abandoned underground mines, including mine openings to the surface within the Mine Permit Area and adjacent areas. These maps are prepared and certified according to R614-301-512.

R614-301-521.120. Existing Surface and Subsurface Facilities and Features Maps.

R614-301-521.121.

The maps show all buildings and within 1000 feet of the Mine Permit Area, with identification of the current use of the buildings. (see Maps R614-301-521.124. Sheets 1 thru 4)

R614-301-521.122.

Location of all surface and subsurface man-made features within, passing through, or passing over the Mine Permit Area are depicted on the maps which are most applicable.

R614-301-521.123.

All public roads located in or within 100 feet of the Mine Permit Area are shown on Permit Area Base Map, (R614-301-100.).

R614-301-521.124.

All pertinent features of this section are exhibited on the following 100 scale maps;

Title	Drawing No.	Sheet No.
Valcam Loadout Facility	R614-301-521.124.	Sheet 1
Belina Haul Road	R614-301-521.124.	Sheet 2
Belina Haul Road	R614-301-521.124.	Sheet 3
Belina Mine Site	R614-301-521.124.	Sheet 4

R614-301-521.125.

For the location of each sedimentation pond (001A thru 004A) and the filter pond (005A), see R614-301-521.124.

R614-301-521.130. Landowners and Right of Entry and Public Interest Maps.

** R614-301-500. **

R614-301-521.131.

All boundaries of lands and names of present owners of record of both surface and subsurface within the Mine Permit Area are shown on the Surface Ownership Map (R614-301-112.500.) and the Coal Ownership Map (R614-301-112.600.), respectively.

R614-301-521.132.

The permit boundary is shown on all applicable maps.

R614-301-521.133. thru 521.133.2.

N/A

R614-301-521.140. Mine Maps and Permit Area Maps.

R614-301-521.141.

The boundaries of all areas affected over the estimated total life of the coal mining and reclamation operations, with size, sequence and timing of the mining of subareas for the lands to be affected throughout the operation. (see R614-301-521.111.)

R614-301-521.142. Planned Subsidence Mining Methods.

The subsidence "Draw Angle" lines as well as the mine plan forecast exhibits past, present and future mining methods used to control and minimize subsidence related damage. See R614-301-525.

R614-301-521.143. Disposal Sites.

There are no disposal sites within the Mine Permit Area.

R614-301-521.150. Land Surface Configuration Maps.

All design related contour maps are 1" = 50' with 5' contours or 1" = 100' with 5' contours. The 1" = 50' maps that are related to operations are be identified by Title, Regulation No.

** R614-301-500. **