Task ID #4642

GENWAL™ RESOURCES, INC.

794 North "C" Canyon Rd,
P.O. Box 910,
East Carbon, Utah 84520
Telephone (435) 888-4000 Fax (435) 888-4002

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

RECEIVED
JUL 18 2014
DIV OF OIL, GAS & MINING

July 16, 2014

Re: Permit Revision to add Kenilworth Lease 007/019

Dear Mr. Haddock:

UtahAmerican Energy, Inc. has held the Kenilworth lease for almost six years and as of now the lease has not been added to the Approved Tower MRP. By means of this application UEI desires to add the lease to the Tower Permit.

It is our understanding since the permit area will increase 56% the submittal will be considered a significant revision. Since the expansion is totally underground there is no increase in disturbed area.

Previously the Kenilworth addition was submitted as an Appendix and rejected by DOGM. The MRP for Tower was old and neglected and had to be totally rewritten or reformatted, as a result the complete text for all chapters is being submitted. Because the permit has been totally rewritten or reformatted a redline strike out is of little use, however, one has been submitted in its own three ring binder. An attempt has been made to retain the history while updating the sections with the new Kenilworth information.

Please find the following included in the submittal.

1) Proposed legal notice: Let me know when we can advertise.

2) Chapter 1 has been reformatted, a table of contents added and the Kenilworth information added to the legal descriptions. Maps relating to Chapter 1 have also been revised. A copy of the Kenilworth Lease has been added to Appendix "J".

3) Chapter 2 has been reformatted, a table of contents added and the Kenilworth information added. Soil maps have been revised to reflect the Kenilworth addition. Since no additional surface disturbance is anticipated addition soil surveys are not required.

4) Chapter 3 has been reformatted, a table of contents added and the Kenilworth

information added. Even though the Kenilworth addition is totally underground with no surface disturbance anticipated raptor surveys were completed. Kenilworth raptor surveys for 2007 and 2014 have been added to Appendix "D". Maps identifying Mule Deer, Elk, and Sage Grouse distribution has been added. An updated vegetation map has been added.

5) Chapter 4 has been reformatted, a table of contents added and the Kenilworth information added. Since the Kenilworth lease is totally underground changes in land use and air quality is not anticipated.

6) Chapter 5 has been rewritten and reformatted. A table of contents has been added to the front of the chapter. The many duplications found in Chapter 5 have been eliminated. Areas relating to Hydrology has been moved to the Hydrology section. Areas relating to Geology has been moved to the Geology sections. New subsidence control maps have been added showing the proposed subsidence points over the Kenilworth lease.

7) Chapter 6 has been reformatted and a table of contents added.

8) Chapter 7 has been reformatted and a table of contents added along with the Kenilworth information. The many duplications have been removed. A new Spring and Seep inventory was completed. Data from previous spring and seep inventories as well as monitoring information has been added. A new spring monitoring map has been added showing the Kenilworth monitoring locations. A new PHC has been included at the end of Appendix L. Monitoring of the Kenilworth locations will continue two years prior to any second mining within the Kenilworth lease.

9) Chapter 8 has been reformatted and a table of contents added. Since the Kenilworth lease is totally underground., with no anticipated surface disturbance, the bonding did not change.

Attached you will find the revisions to the approved MRP reflecting adding Kenilworth to the Permit.

Since the Kenilworth lease was included in the Willow Creek permit, which has Federal Mine Approval, the submittal may not need additional Federal Approval.

If you have any questions please give me a call.

Sincerely,

R. Jay Marshall

R. Jay Marshall
Resident Agent

# APPLICATION FOR PERMIT PROCESSING

| Permit Change ☐ | New Permit ☐ | Renewal ☐ | Transfer ☐ | Exploration ☐ | Bond Release ☐ | Permit Number: ACT/007/019 |
|---|---|---|---|---|---|---|
| Title of Proposal: Adding Kenilworth Lease to the Permit 14-003 | | | | | | Centennial Coal Mine |
| | | | | | | Permittee: UtahAmerican Energy, Inc. |

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

**Instructions:** *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation*

| | | |
|---|---|---|
| ☐ Yes | ☐ No | 1. Change in the size of the Permit Area? 1,7611.13 acres Disturbed Area? 0 acres decrease. |
| ☐ Yes | ☐ No | 2. Is the application submitted as a result of a Division Order? DO # |
| ☐ Yes | ☐ No | 3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| ☐ Yes | ☐ No | 4. Does application include operations in hydrologic basins other than as currently approved? |
| ☐ Yes | ☐ No | 5. Does application result from cancellation, reduction or increase of insurance or reclamation bond? |
| ☐ Yes | ☐ No | 6. Does the application require or include public notice/publication? |
| ☐ Yes | ☐ No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| ☐ Yes | ☐ No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| ☐ Yes | ☐ No | 9. Is the application submitted as a result of a Violation? NOV # |
| ☐ Yes | ☐ No | 10. Is the application submitted as a result of other laws or regulations or policies? Explain: |
| ☐ Yes | ☐ No | 11. Does the application affect the surface landowner or change the post mining land use? |
| Yes | ☐ No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?) |
| ☐ Yes | ☐ No | 13. Does the application require or include collection and reporting of any baseline information? |
| ☐ Yes | ☐ No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| ☐ Yes | ☐ No | 15. Does application require or include soil removal, storage or placement? |
| ☐ Yes | ☐ No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| ☐ Yes | ☐ No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| ☐ Yes | ☐ No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| ☐ Yes | ☐ No | 19. Does the application require or include certified designs, maps, or calculations? |
| ☐ Yes | ☐ No | 20. Does the application require or include subsidence control or monitoring? |
| ☐ Yes | ☐ No | 21. Have reclamation costs for bonding been provided for? |
| ☐ Yes | ☐ No | 22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| ☐ Yes | ☐ No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |

**X Attach 3 complete copies of the application.**

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

R. Jay Marchbanks — 7/16/14
Signed - Name - Position - Date

Subscribed and sworn to before me this 16th day of July, 20 2014

Notary Public

My Commission Expires: 03.27.17
Attest: STATE OF UTAH
COUNTY OF Carbon

LINDA KERNS
NOTARY PUBLIC • STATE of UTAH
COMMISSION # 663615
COMM. EXP. 03/27/2017

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ASSIGNED TRACKING NUMBER

# Application for Permit Processing
# Detailed Schedule of Changes to the MRP

Title of Proposal: Adding Kenilworth Lease to the Permit 14-003

Permit Number: ACT/007/019

Mine: Centennial Mine

Permittee: UtahAmerican Energy, Inc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit application. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

| | | | DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED |
|---|---|---|---|
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Plates : 1, 2, 3, 4, 18, 19, 21, 22, 25, 26, and 29 |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Plates: 34A, 34B, 34C, and 34D |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Plates: Figure 5, Figure 6, Figure 1-2, Figure 1-2A, Figure 4-1 |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Plates: Figure 7-1, Figure 7-2, and Figure 1-1 |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Plate 19A |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Appendix 1 Parts 1 and 3 |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Kenilworth BLM lease to end of Appendix "J" |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Appendix B |
| ☐ ADD | ☐ REPLACE | ☐ MOVE | Plate 34A to the Confidential File |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 1 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 2 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 3 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 4 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 5 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 6 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 7 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | Chapter 8 Text |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |
| ☐ ADD | ☐ REPLACE | ☐ REMOVE | |

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

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**Centennial Project**
**List of Plates in Permit**
(March 2014)

| Plate Number | Plate Name | New or Revised | Electronic Copy | Mylar Only | Notes |
|---|---|---|---|---|---|
| 1 | Centennial Project - General Location Map | X | dwg | | |
| 1A | Centennial Project - Coal Leases and Acquisitions | | dwg | | Omitted |
| 2 | Centennial Project - Surface Ownership Map | X | dwg | | |
| 3 | Centennial Project - Mineral Ownership Map | X | dwg | | |
| 4 | Centennial Project - Leases | X | dwg | | |
| 5 | Surface Area Boundary - Deadman Canyon | | | X | No change |
| 6 | As-Constructed Surface Facilities - Deadman Canyon | | dwg | | |
| 6A | Left-Fork Fan Area - As Constructed | | | X | No change |
| 7 | As Proposed Surface Facilities - Deadman Canyon | | | X | No change |
| 8 | Support Facilities - Surface Area Drainage | | PDF | | |
| 9 | Watershed & Culvert Sizing and Revegetation Reference Areas | | | X | No change |
| 10 | Proposed Sediment Pond 'E-PM' - Post Mining | | | X | No change |
| 11 | Catch Basin 'B' - As Constructed | | | X | No change |
| 12 | Sediment Pond 'C' - As Constructed | | | X | No change |
| 13 | Sediment Pond 'E' - Proposed Aberdeen Surface | | | X | No change |
| 14 | Cut & Fill Cross Section Reference - Deadman Canyon | | PDF | | |
| 15 | Cut & Fill Cross Sections; Original Surface, As Constructed, As Reclaimed - Deadman Canyon (18 Sheets) | | | X | No change |
| 16 | Post Mining Hydrology - Final Reclamation Plan - Deadman Canyon - Phase I | | PDF | | |
| 17 | Final Mining Hydrology - Final Reclamation - Phase II - Deadman Canyon | | PDF | | |
| 17A | Reclamation Watershed Map | | | X | No change |
| 18 | Soil Survey Map - Deadman Canyon | | | X | No change |
| 19 | Vegetation Survey Map - Deadman Canyon | | | X | No change |
| 19A | Vegetation Map - Mt. Nebo | | | | No Original |
| 20 | Revegetation Map - Deadman Canyon | | | X | No change |
| 21 | Surface Geology of the Andalex Resources' Mine Plan Area | X | dwg | | |
| 22 | Centennial Project - Geologic Cross Section Reference and Drill Hole Locations | X | dwg | | |
| 23 | Centennial Project - Cross Section A-A' | | PDF | | No change |
| 24 | Centennial Project - Cross Section B-B' | | PDF | | No change |
| 25 | Centennial Project - Subsidence Monitoring Stations | X | dwg | | |
| 26 | Lower Sunnyside Seam Production Areas | X | dwg | | |
| 27 | Centennial Seam Production Areas | | dwg | | No change |
| 28 | Gilson Seam Production Areas | | dwg | | No change |
| 29 | Proposed Mine Plan - Aberdeen Seam | X | dwg | | |
| 30 | Proposed Mine Plan - Gilson Seam | | dwg | | Omitted |
| 31 | Proposed Mine Plan - Centennial Seam | | | | No change |
| 32 | Pinnacle Mine - Current Mine Plan (Mine is closed and sealed) | | | | Missing (Omitted) |
| 33 | Apex Mine - Current Mine Plan (Mine is closed and sealed) | | | | Missing (Omitted) |
| 34A | Centennial Project - Wildlife Distribution Map | X | dwg | | |
| 34B | Centennial Project - Wildlife Distribution Map | X | dwg | | |
| 34C | Centennial Project - Wildlife Distribution Map | X | dwg | | |
| 34D | Centennial Project - Wildlife Distribution Map | X | dwg | | |
| 35 | Typical Road Cross Sections | | | X | No change |
| 36 | Topsoil Storage Pile "G" | | | X | No change |
| 37 | Topsoil Piles - Deadman Canyon | | | X | No change |
| 38 | Previously Omitted | | | | Omitted |
| 39 | Previously Omitted | | | | Omitted |
| 40 | Centennial Seam Isopach (Mine is closed and sealed) | | | | Omitted |
| 41 | Proposed Mine Plan - Centennial Seam (Mine is closed and sealed) | | | | Omitted |
| | | | | | |
| Figure 4 | Water Quality Data | | PDF | | No change |
| Figure 5 | Surface and Ground Water Rights | X | PDF | | |
| Figure 6 | Ground and Surface Water Monitoring | X | PDF | | |
| | | | | | |
| Figure 1-2 | Centennial Leases / Permit Area | X | dwg | | |
| Figure 1-2A | Centennial Disturbed Area | X | dwg | | |
| | | | | | |
| Figure 7-1 | Water Monitoring Locations | X | dwg | | |
| | | | | | |
| Figure 1-1 | GVH Locations Map | X | dwg | | |

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

~~MINING AND RECLAMATION PLAN~~

# ~~CHAPTER 1, LEGAL~~
# CHAPTER 1

## Legal, Financial, Compliance And Related Information

**C/007/019**

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(Revised)
May, 2014

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# CHAPTER 1, LEGAL

## R645-301-100. ~~GENERAL~~General

The ~~Mathis Tract and new Federal Summit Creek~~Kenilworth Lease (UTU-81893), Boundary Change is simply an extension of our underground mine workings and will in no way involve any new surface facilities or otherwise have any affect on the surface. It does not involve any new hydrologic basins. It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which was approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 1986 through the normal LBA process after an application by Andalex Resources. Refer to R645-301-200 through R645-301-800 for additional information.

## R645-301-110. LEGAL, FINANCIAL, AND COMPLIANCE INFORMATION

### Legal, Financial, Compliance and Information

The objective of this chapter is to set forth all relevant information concerning ownership and control of Andalex Resources, Inc., the ownership and control of the property to be affected by mining activities and all other information and documentation required.

Please note that right-of-entry information for all new Leases is included in Appendix J, "Other Approvals". This includes the short form of the Mathis lease recorded at Carbon County.

### Compliance Information

a) Suspension and Revocation

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

b) Forfeiture of Bond

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

c) History of Violations

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-111. INTRODUCTION

### Overview and Summary of Project

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are now essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam. The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T12 and 13S and R10 and 11E (See Plate 1).

The Operator relinquished portions of the mined out Federal coal leases in two separate lease relinquishments. The first lease relinquishment approved 3/12/2012 reduced the Federal coal leased acreage from 5,436.24 down to 2,813.48. The second coal relinquishment reduced the Federal coal lease even further down to 894.55 acres. UEI retained all areas of surface disturbance conducted in association with the underground mining and surface access to the gob-vent holes was retained through surface use agreements.

With the relinquishments the permit acreage dropped from 6,516.91 down to 2,274.77 acres. When Kenilworth lease is added the permit acreage goes back up to 4,035.90 which is the new permit acreage. The disturbed area has not changed and remains at 47.19 acres. Since the disturbed

area has not changed and the disturbed legal description stays the same the bond does not change with the addition of the Kenilworth lease. The breakdown of Federal, and Fee for both coal leases and surface leases are shown on Tables 1-1 for Coal leases and 1-2 for Surface leases.

The existing permit's property is located in the Book Cliffs coal field and includes Alrad Canyon, Deadman Canyon, Starpoint Canyon, Straight Canyon, and Hoffman Creek Canyon areas. The Kenilworth Tract occupies the area of Summit Creek, Deep Canyon and Mathis Canyon. The Coal outcrops along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.

There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development is from water encountered in the existing underground mine workings. Culinary usage is supplied by an independent contractor who hauls Price City culinary water to the mine on an as-needed basis. Historically, coal mining has been the only industry in the permit area and there are several abandoned mines located on the property. Other than the GVH holes, no oil or gas wells exist in the area.

Access to the existing mine surface facilities area is by way of the Airport Road, an existing paved county road which has been upgraded and is maintained by Carbon County. It is used as an access road as well as a haul road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on rights-of-way granted by the Bureau of Land Management. This is also a small private easement granted to Andalex from David Cave for a small portion of pond E. Andalex has acquired all applicable state and federal licenses, permits, and rights-of-way necessary to conduct mining activities on all private (fee) and federal leases.

As of 7-6/2007 the Apex Mine and the Pinnacle Mine have been worked out. Also, The BLM has recently determined that the Aberdeen mine is mined out. The Apex Mine has been sealed at the portals. The Pinnacle mine is still being ventilated because the power to the Aberdeen mine runs into

the Pinnacle mine from the substation and then drops down to the Aberdeen Mine through a borehole connecting the two mines. However, there are no plans to produce any more coal from the Pinnacle Mine. Therefore, all future mine production on the Centennial Project will be solely from the Kenilworth Lease in the Aberdeen Mine.

The mining method being employed in the Aberdeen Mine is gateroad development utilizing continuous miners with final extraction by longwall. Certain fringe area reserves, if any, inadequate for longwall panels, will be evaluated for possible room-and-pillar mining.

This operation does not face any of the mining complications caused by faults or other intrusive geologic features. The mine plan area is located in a region where mining has been the major industry; therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Andalex's prudent management, the Centennial Project will continue to be a model mining operation in the Carbon County area with very minimal environmental and socioeconomic impact.

Upon cessation of final mining activities, reclamation activities will commence as soon as is practicable, according to the plans outlined in this application. The land will be restored according to available technology to as nearly its original condition as is possible.

### Organization of Application

This underground mining permit application has been organized in accordance with the general requirements for format and contents as outlined in the R645- Coal Mining Rules.

## R645-301-111.100. OBJECTIVES

### Objectives

The objective of this chapter is to set forth all relevant information concerning ownership and control of Andalex Resources, Inc., the ownership and control of the property to be affected by mining activities and all other information and documentation required.

Please note that right-of-entry information for all new Leases is included in Appendix J, "Other Approvals".

**R645-301-111.200. RESPONSIBILITY**

Andalex Resources, Inc., is responsible for submission of information and will pay abandoned mine reclamation fees.

**R645-301-111.300. APPLICABILITY**

The requirements of R645-301-100 apply to Andalex Resources, Inc.

**R645-301-112. IDENTIFICATION OF INTERESTS**

a) Permit Applicant

Andalex Resources, Inc.
Tower Division
P.O. Box 910
East Carbon, Utah 84520-0910
(801) 888-4000

b) Legal and Equitable Owners of Record

Earth work for the Aberdeen Mine was completed in 1989. Surface facilities for the Aberdeen Mine were completed early in 1990. All existing facilities are located either on land owned by Zions Securities Corporation or on federal land. The addresses of these owners of record are as follow:

Bureau of Land Management (801) 524-3004
Utah State Office
324 South State Street
Salt Lake City, Utah 84111

Zion Securities Corporation (801) 363-3841
10 East South Temple
Salt Lake City, Utah 84111

All coal to be mined on the permit area is owned by the federal government, Zion Securities Corporation, Sunedco Coal Company or AMCA Coal Leasing, Inc. The addresses of these owners of record are as follow:

Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

AMCA Coal Leasing, Inc.
PO Box 910
East Carbon, Utah 84520-0910

Zion Securities Corporation
10 East South Temple
Salt Lake City, Utah 84111
Sunedco Coal Company
7401 West Mansfield Avenue
Suite 418
P.O. Box 35-B
Lakewood, Colorado 80235

**R645-301-112.100. TYPE OF BUSINESS**

Andalex Resources is a corporation organized and existing under the laws of Delaware and qualified to do business in Utah. Andalex Resources, Inc, is a wholly owned subsidiary of UtahAmerican Energy Inc., which in turn is a wholly owned subsidiary of Murray Energy Corporation. Andalex began mining operations in the Pinnacle Mine October, 1980, and in the Apex Mine in late 1982. Mining commenced in the Aberdeen Mine in mid-1988. These mines are located on fee and federal lands in Carbon County, Utah. Andalex, the designated operator, along with AMCA Coal Leasing, Inc., its land acquisition and development branch, controls all federal and fee mining leases within the mine plan area. This underground mining permit application has been prepared by Andalex Resources and is being submitted for review and approval by the appropriate regulatory authorities.

**R645-301-112.200. NAMES, LOCATIONS, RESIDENT AGENT**

Resident Agent who will accept service of process for Andalex Resources, Inc., Tower Division, Centennial Mines, ACT/007/019:

Jay Marshall
Andalex Resources, Inc.
Tower Division
P.O. Box 910

East Carbon, Utah 84520-0910

Also, see Chapter 8, Page 24 for notarized statement pertaining to completeness and accuracy.

**R645-301-112.300. OTHER THAN SINGLE PROPRIETORSHIPS**

Andalex Resources, Inc., Tower Division, holds the exclusive coal operating interests in the permit area.

**R645-301-112.310. OFFICERS AND SHAREHOLDERS**

See Appendix 1, Part 1 for ownership and control information.

**R645-301-112.320. OWNERSHIP AND CONTROL RELATIONSHIP TO APPLICANT**

See Appendix 1, Part 1 for ownership and control information.

**R645-301-112.400. PENDING, CURRENT AND PREVIOUS COAL PERMITS**

See Appendix 1, Part 2 for current and previous coal mining permits

**R645-301-112.500. SURFACE AND MINERAL OWNERSHIP**

**Owners of Record of Surface and Subsurface Contiguous Areas**

Names and addresses of all owners of record for all surface and subsurface areas contiguous to and within the permit area are listed below and indicated on Plates 2 and 3.

**Subsurface Owners** (See Plate 3 for Mineral Ownership)

Franklin Real Estate Company (contiguous)
(American Electric Power)
#2 Broadway
New York, New York

Bureau of Land Management (contiguous & within)
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

Andalex Resources, Inc. (within)
PO Box 910
East Carbon, Utah 84502-0910

Zion Security Corp. (within)
10 East South Temple
Salt Lake City, Utah 84111

Mathis Land Co. (contiguous & within)
Sunnyside Star Route
Price, Utah 84501

**Surface Owners** (See Plate 2 Surface Ownership)

Deseret Title Holding Corp (within)
50 E North Temple
Tax Div.-22nd Floor
Salt Lake City, Utah 84150

Bureau of Land Management (contiguous & within)
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

Dave Cave et al (contiguous & within)
1220 South 530 West
Price, Utah 84501

Shimmin Investments Ltd (contiguous)
P.O. Box 785
Price, Utah 84501

Mathis Land Co. (contiguous & within)
2699 E Hwy 6
Price, Utah 84501

State of Utah (contiguous & within)
School Trust Lands Administration
355 West North Temple
3 Triad Center, Suite 400
Salt Lake City, Utah 84180

Scott W. Mathis, et al (contiguous and within)
1322 S Fairgrounds Rd
Price, Utah 84501

Scott W. And Donna Mathis, (contiguous and within)
1322 S Fairgrounds Rd
Price, Utah 84501

Mathis Canyon Inc (contiguous)
c/o Arnold Mathis
1366 South Fairgrounds
Price, Utah 84501

Blackhawk Coal Company (contiguous)
700 Morrison Road
Gahanna, Ohio 43232

Mary Frandsen Trust (contiguous)
506 S 100 W
American Fork, Utah 84003

## R645-301-112.600. ADJACENT SURFACE AND MINERAL OWNERSHIP

**Interests in Contiguous Lands**

The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior; therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.

## R645-301-112.700. MSHA NUMBERS FOR ALL MINE-ASSOCIATED STRUCTURES

The Centennial Project includes the development of three separate mines. All are currently in operation. The names and M.S.H.A. I.D. numbers for existing mines and all sections are as follow:

Pinnacle Mine - M.S.H.A. I.D. #42-01474
Apex Mine - M.S.H.A. I.D. #42-01750 -Inactive
Aberdeen Mine - M.S.H.A. I.D. #42-02028

## R645-301-112.800. STATEMENT OF ALL LANDS AND INTERESTS IN LANDS

The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior; therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.

## R645-301-113. VIOLATION INFORMATION

### History of Violations

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.100. COMPLIANCE INFORMATION

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.110. SUSPENDED OR REVOKED PERMITS

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

~~b) Forfeiture of Bond~~

~~Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.~~

~~c) History of Violations~~

~~Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.~~

## R645-301-111. INTRODUCTION

### Overview and Summary of Project

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam.

The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T12 and 13S and R10 and 11E (See Figure 1-2. The mining property contains approximately 6528.83 acres. Of this, 1081.5 acres are fee surface and coal leased from the following: Zion Security Corporation (200 acres), Mathis (640 acres), Sunedco (200 acres), Andalex Resources fee (40 acres), and David Cave (1.5 acres). An additional 5435.88 acres are federal leases, consisting of SL-027304 (235.96 acres), SL-063058 (400 acres), U-010581 (1,842.39 acres), U-05067 (360 acres), UTU-66060 (1093.32 acres), UTU-69600 (801.48 acres) and UTU-79975 (702.73 acres). The remaining 11.45 acres are BLM surface rights-of-way #62045 (10 acres) and #64158 (1.45 acres). Please see Figure 1-2 and Figure 1-2(A).

This property is located in the Book Cliffs coal field and includes Alrad Canyon, Deadman Canyon, Starpoint Canyon, Straight Canyon, and Hoffman Creek Canyon areas with coal outcropping along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.

There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development is from water encountered in the existing underground mine workings. Culinary usage is supplied by an independent contractor who hauls Price City culinary water to the mine on an as-needed basis. Historically, coal mining has been the only industry in the

permit area and there are several abandoned mines located on the property. No oil or gas wells exist in the area.

Access to the mine plan area is by way of the Airport Road, an existing paved county road which has been upgraded and is maintained by Carbon County. It is used as an access road as well as a haul road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on rights-of-way granted by the Bureau of Land Management. This is also a small private easement granted to Andalex from David Cave for a small portion of pond E. Andalex has acquired all applicable state and federal licenses, permits, and rights-of-way necessary to conduct mining activities on all private (fee) and federal leases.

As of 7-6/2007 the Apex Mine and the Pinnacle Mine have been worked out. The Apex Mine has been sealed at the portals. The Pinnacle mine is still being ventilated because the power to the Aberdeen mine runs into the Pinnacle mine from the substation and then drops down to the Aberdeen Mine through a borehole connecting the two mines. However, there are no plans to produce any more coal from the Pinnacle Mine. Therefore, all existing and future mine production from the Centennial Project will be solely from the Aberdeen Mine

The mining method being employed in the Aberdeen Mine is gateroad development utilizing continuous miners with final extraction by longwall. Certain fringe area reserves, inadequate for longwall panels, will be by room-and-pillar method.

This operation does not face any of the mining complications caused by faults or intrusives. The mine plan area is located in a region where mining has been the major industry, therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Andalex's prudent management, the Centennial Project will continue to be a model mining operation in the Carbon County area with very minimal environmental and socioeconomic impact.

Upon cessation of final mining activities, reclamation activities will commence as soon as is practicable, according to the plans outlined in this application. The land will be restored according to available technology to as nearly its original condition as is possible.

**Organization of Application**

This underground mining permit application has been organized in accordance with the general requirements for format and contents as outlined in the R645- Coal Mining Rules.

## R645-301-111.100. OBJECTIVES

### Objectives

The objective of this chapter is to set forth all relevant information concerning ownership and control of Andalex Resources, Inc., the ownership and control of the property to be affected by mining activities and all other information and documentation required.

Please note that right-of-entry information for all new Leases is included in Appendix J, "Other Approvals".

## R645-301-111.200. RESPONSIBILITY

Andalex Resources, Inc., is responsible for submission of information and will pay abandoned mine reclamation fees.

## R645-301-111.300. APPLICABILITY

The requirements of R645-301-100 apply to Andalex Resources, Inc.

## R645-301-112. IDENTIFICATION OF INTERESTS

a) Permit Applicant

Andalex Resources, Inc. (Employer ID # 61-0931325)
P.O. Box 910
East Carbon, Utah 84520
(801) 888-4000

b) Legal and Equitable Owners of Record

Earth work for the Aberdeen Mine was completed in 1989. Surface facilities for the Aberdeen Mine were completed early in 1990. All existing facilities are located either on land owned by Zions Securities Corporation or on federal land. The addresses of these owners of record are as follow:

Bureau of Land Management (801) 524-3004
Utah State Office
P.O. Box 45155
Salt Lake City, Utah 84145-0155

Zion Securities Corporation (801) 363-3841
10 East South Temple
Salt Lake City, Utah 84111

All coal to be mined on the permit area is owned by the federal government, Zion Securities Corporation, Sunedco Coal Company or AMCA Coal Leasing, Inc, a wholly-owned subsidiary of UtahAmerican Energy Inc.. The addresses of these owners of record are as follow:

Bureau of Land Management
Utah State Office
P.O. Box 45155
Salt Lake City, Utah 84145-0155

AMCA Coal Leasing, Inc. (Employer No. 61-0914254)
PO Box 910
East Carbon, Utah 84520

Zion Securities Corporation
10 East South Temple
Salt Lake City, Utah 84111

Sunedco Coal Company
7401 West Mansfield Avenue
Suite 418
P.O. Box 35-B
Lakewood, Colorado 80235

## R645-301-112.100. TYPE OF BUSINESS

Andalex Resources is a corporation organized and existing under the laws of Delaware and qualified to do business in Utah. Andalex Resources, Inc, is a wholly owned subsidiary of UtahAmerican Energy Inc., which in turn is a wholly owned subsidiary of Murray Energy Corporation, which in turn is a wholly-owned subsidiary of Murray Energy Holdings Co. Andalex began mining operations in the Pinnacle Mine October, 1980, and in the Apex Mine in late 1982. Mining commenced in the Aberdeen Mine in mid-1988. These mines are located on fee and federal lands in Carbon County, Utah. Andalex, the designated operator, along with AMCA Coal Leasing, Inc., its land acquisition and development branch, controls all federal and fee mining leases within the mine plan area. This underground mining permit application has been prepared by Andalex Resources and is being submitted for review and approval by the appropriate regulatory authorities.

## R645-301-112.200. NAMES, LOCATIONS, RESIDENT AGENT

Resident Agent who will accept service of process for Andalex Resources, Inc., Centennial Mines, ACT/007/019.

Dave Shaver
Andalex Resources, Inc.
P.O. Box 910
East Carbon, Utah 84520
phone: (435) 888-4017

Also, see Chapter 8 for notarized statement pertaining to completeness and accuracy.

## R645-301-112.300. OWNERSHIP AND CONTROL

See Appendix 1, Part 1 for ownership and control information.

## R645-301-112.310. OFFICERS AND SHAREHOLDERS

See Appendix 1, Part 1 for ownership and control information.

## R645-301-112.320. OWNERSHIP AND CONTROL RELATIONSHIP TO APPLICANT

See Appendix 1, Part 1 for ownership and control information.

## R645-301-112.400. PENDING, CURRENT AND PREVIOUS COAL PERMITS

See Appendix 1, Part 2 for current and previous coal mining permits

## R645-301-112.500. SURFACE AND MINERAL OWNERSHIP

### Owners of Record of Surface and Subsurface Contiguous Areas

Names and addresses of all owners of record for all surface and subsurface areas contiguous to and within the permit area are listed below and indicated on Plates 2 and 3.

### Subsurface Owners

Franklin Real Estate Company (American Electric Power)
#2 Broadway
New York, New York (contiguous)

~~Bureau of Land Management~~
~~Utah State Office~~
~~P.O. Box 45155~~
~~Salt Lake City, Utah 84145-0155 (contiguous & within)~~

~~State of Utah~~
~~School and Institutional Trust Lands Administration (SITLA)~~
~~675 East 500 South, Suite 500~~
~~Salt Lake City, Utah 84102-2818 (contiguous)~~

~~Andalex Resources, Inc.~~
~~PO Box 910~~
~~East Carbon, Utah 84520 (within)~~

~~Sunedco Coal Company~~
~~7401 West Mansfield Avenue~~
~~Suite 418~~
~~P.O. Box 35-B~~
~~Lakewood, Colorado 80235 (contiguous & within)~~

~~Zion Security Corp.~~
~~10 East South Temple~~
~~Salt Lake City, Utah 84111 (within)~~

~~Mathis Land Co.~~
~~Sunnyside Star Route~~
~~Price, Utah 84501 (contiguous & within)~~

~~Oso Energy Resources~~
~~900 Main Avenue~~
~~Durango, Colorado 81301 (Gas rights)~~

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~~**Surface Owners**~~

~~Bureau of Land Management~~
~~Utah State Office~~
~~P.O. Box 45155~~
~~Salt Lake City, Utah 84145-0155 (contiguous & within)~~

~~Gladys R. Artman~~
~~P.O. Box 22~~
~~Mountain City, Georgia 30562 (contiguous & within)~~

~~F. and D. Shimmin~~
~~711 North 5th East~~
~~Price, Utah 84501 (contiguous)~~

~~Sunedco Coal Company~~
~~7401 West Mansfield Avenue~~
~~Suite 418~~
~~P.O. Box 35-B~~
~~Lakewood, Colorado 80235 (contiguous & within)~~

~~R. and E. Nelson~~
~~583 Sundial Drive~~
~~Moab, Utah 84532 (within)~~

~~Mathis Land Co.~~
~~Sunnyside Star Route~~
~~Price, Utah 84501 (contiguous & within)~~

~~J & S Critchlow (Cave, et.al)~~
~~144 South 1650 East~~
~~Price, Utah 84501 (contiguous & within)~~

~~Andalex Resources Inc.~~
~~P.O. Box 910~~
~~East Carbon, Utah 84520 (within)~~

~~Zion Security Corporation~~
~~10 East South Temple~~
~~Salt Lake City, Utah 84111 (within)~~

~~State of Utah~~
~~School and Institutional Trust Lands Administration (SITLA)~~
~~675 East 500 South, Suite 500~~
~~Salt Lake City, Utah 84180 (contiguous & within)~~

~~R645-301-112.600. ADJACENT SURFACE AND MINERAL OWNERSHIP~~

~~Interests in Contiguous Lands~~
~~The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior, therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.~~

## R645-301-112.700. MSHA NUMBERS FOR ALL MINE-ASSOCIATED STRUCTURES

The Centennial Project includes the development of three separate mines. The names and M.S.H.A. I.D. numbers for existing mines and all sections are as follow:

Pinnacle Mine - M.S.H.A. I.D. #42-01474
Apex Mine - M.S.H.A. I.D. #42-01750
Aberdeen Mine - M.S.H.A. I.D. #42-02028

## R645-301-112.800. STATEMENT OF ALL LANDS AND INTERESTS IN LANDS

The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior, therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.

## R645-301-113. VIOLATION INFORMATION

### History of Violations

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.100. COMPLIANCE INFORMATION

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.110. SUSPENDED OR REVOKED PERMITS

~~Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.~~

**R645-301-113.120. FORFEITED BONDS**

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

**R645-301-113.200. EXPLANATION OF PERMIT OF BOND FORFEITURE**

N/A

**R645-301-113.210 PERMIT AND BOND IDENTIFICATION**

~~N/A~~ The following is a list of all other licenses and permits under applicable state and federal land-use, air and water quality, water rights and health and safety laws and regulations held by Andalex in order to conduct underground coal mining activities.
All permits listed are up to date and current. The NPDES Permit for the Centennial Project has been replaced by an individual UPDES permit, UT0025674.

1) State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

- Mining and Reclamation Plan for Andalex Resources' Centennial Project
Permit I.D. Number C/007/019
Approved January 4, 1982

2) State of Utah
Department of Environmental Quality
Division of Air Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- Air Quality Approval Order, Permit No DAGE-977-96
Approved June 13, 1980

3) State of Utah
Department of Environmental Quality
Division of Water Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- UPDES permit UT0025674
  (Replaced previous EPA NPDES permit)

- Water Quality - Sediment and Drainage
  Approved May 14, 1980

- Septic and Culinary Plan (2)
  Approved September 17, 1980 (Office Site)
  Approved May 8, 1980 (Bathhouse Facility)

4) Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345
- Access Road Right-of-Way
  Permit Number U-45966
  Granted September 1, 1980

- Buried Telephone Cable Right-of-Way
  Permit Number U-36739
  Granted November 20, 1978

- Power Transmission Line Right-of-Way
  Permit Number U-36741
  Granted November 20, 1978, assigned to UP&L

- Material Storage Site Right-of-Way
  Permit Number U-45965
  Granted September 11, 1980

- Aberdeen Mine Right-of-Way
  Permit Number UTU-62045
  Granted June 6, 1988

5) Mine Safety and Health Administration (M.S.H.A.)
P.O. Box 25367
Denver, Colorado 80225
(District 9)

Pinnacle Mine I.D. 42-01474
Apex Mine I.D. 42-01750 (inactive)
Aberdeen Mine I.D. 42-02028

- Roof Control Plan
  Reviewed and approved every six months

- Ventilation System and Methane and Dust Control Plan
  Reviewed and approved every six months

- Smoking Prohibition Plan
  Approved August 4,1992

- Training Plan
  Approved November 27, 1990

- Instruction Program: Firefighting and Evacuation Plan
  Approved August 4, 1992

- SCSR Storage Plan
  Approved May 18, 1992

- Chest X-Ray Plan
  Approved March 15, 1990

**R645-301-113.220. REGULATORY AUTHORITIES INVOLVED**

See above

**R645-301-113.230. CURRENT STATUS OF PERMIT AND BOND**

See above

**R645-301-113.240. ADMINISTRATIVE OR JUDICIAL PROCEDURES**

Appendix 1, Part 3

**R645-301-113.250. CURRENT STATUS OF PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.300. LIST OF ALL VIOLATIONS NOTICES**

Appendix 1, Part 3

**R645-301-113.310. IDENTIFICATION OF VIOLATIONS**

Appendix 1, Part 3

**R645-301-113.320. DESCRIPTION OF VIOLATIONS**

Appendix 1, Part 3

**R645-301-113.330. LOCATION OF VIOLATIONS PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.340. STATUS OF VIOLATIONS PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.350. ACTIONS TAKEN TO ABATE VIOLATIONS**

Appendix 1, Part 3

**R645-301-114. RIGHT-OF-ENTRY INFORMATION**

Andalex Resources, Inc., in sublease agreement with AMCA Coal Leasing, Inc., currently holds approximately ~~6528~~4,035.~~83~~90 acres of private and federal coal leases and rights-of-way listed below, all of which are included in their entirety within the permit area. Andalex basis its legal right to enter and conduct mining activities in the permit area pursuant to the language contained in the Federal Coal Leases, Section 2, Rights of Lessee as follows:

> "The lessor, in consideration of any bonus paid (or to be paid if deferred), rents and royalties and other conditions hereinafter set forth, hereby grants and leases to the lessee the exclusive right and privilege to mine and dispose of all coal ... subject to the conditions, limitations and prohibitions provided in this lease and in applicable acts and regulations, the right to construct all works, buildings, structures, equipment, and appliances which may be necessary and convenient for the mining and preparation of the coal for market, and subject to the conditions herein provided, to use so much of the surface as may reasonably be required in the exercise of the rights and privileges herein granted..."

A similar right to enter and conduct underground mining activities is contained in the private lease agreement with the Zion Securities Corporation as follows:

> "During the life of the lease, so long as lessee is not in default hereunder, it may freely prospect, mine and develop the lease premises, extract and sell such coal therefrom as it may elect, and use the surface and underground thereof for all lawful purposes including the exploration and mining to be conducted therein and thereon. It may also use the leased lands in connection with the mining and development of other lands which it may own, lease, or acquire as a part of its general mining operations in the area."

Legal right-of-entry information for all federal and fee leases and rights-of-way are found in Appendix J, "Other Approvals". None of the leases' rights-of-entry is a subject of pending litigation.

~~The Federal Coal Leases~~

**The Federal and Fee Coal Leases:** Federal and Fee Coal as well as ROW's and Easements are described ~~as follows (please see Figure 1-2):~~

~~**1) SL-027304:**~~
~~Tract 1: (original lease)~~
~~T.13S., R.11E., SLM, Utah~~
~~Sec. 7, S2SE4,~~
~~Sec. 18; NW4NE4.~~

~~Tract 2: (lease modification)~~
~~T.13S., R.11E., SLM, Utah~~
~~Sec. 7, Lot 4;~~
~~Sec. 18; Lot 1, N2NE4NW4, SW4NE4NW4~~
~~entire lease (Tracts 1 and 2) containing 235.96 acres, more or less.~~

~~This lease was originally assigned to W.F. Olsen on September 1, 1925. On May 1, 1959, the lease was assigned to F.H. Larson and then to Centennial Coal Associates on February 1, 1973. AMCA Coal Leasing, Inc., acquired the lease in February, 1977 and subsequently added Tract 2 through lease modification criteria on October 26, 1981.~~

*****(NOTE: The legal description of the composite lease as described on the existing BLM lease form is as follows:
T.13S., R.11E., SLM, Utah
Sec. 7, Lot 4, S2SE4
Sec. 18, Lot 1, NW4NE4, N2NE4NW4, SW4NE4NW4
containing 235.96 acres, more or less.)*****

2) SL-063058:
Tract 1: (original lease)
T.13S., R.11E., SLM, Utah
Sec. 8, S2SW4,
Sec. 17, N2NW4, SE4NW4,
Sec. 18, NE4NE4.

Tract 2: (lease modification)
T.13S., R.11E., SLM, Utah
Sec. 17, SW4NW4, NE4NW4SW4, W2NW4SW4,
Sec. 18, E2SE4NE4, NW4SE4NE4, SW4NE4, E2NE4SE4 entire lease containing 400 acres, more or less.

The original lease of 80 acres was assigned to C.D. Sutton on August 3, 1942. On July 27, 1950, the lease was amended to embrace 200 acres. An additional 40 acres was added December 13, 1951. The leases were posted to F.H. Larson on May 1, 1970 and then to Centennial Coal Associates on February 1, 1973. AMCA Coal Leasing, Inc., acquired the lease in February, 1977 and subsequently added Tract 2 through the federal lease modification criteria.

*****(NOTE: The legal description of the composite lease as described on the existing BLM lease form is as follows:
T.13S., R.11E., SLM, Utah
Sec. 8, S2SW4
Sec. 17, NW4, NE4NW4SW4, W2NW4SW4
Sec. 18, NE4NE4, E2SE4NE4, NW4SE4NE4, SW4NE4, E2NE4SE4
containing 400 acres, more or less.)*****

3) UTU-010581:
Tract 1: (original lease)
T.13S., R.11E., SLM, Utah
Sec. 5, All
Sec. 6, All
Sec. 7, Lot 1, NE4, NE4NW4, N2SE4,
Sec. 8, N2, N2S2, S2SE4,
Sec. 9, W2SW4,
Sec. 17, N2NE4.

Tract 2: (lease modification)
T.13S., R.11E., SLM, Utah
Sec. 17; S2NE4, N2NE4SW4, NE4SE4, N2NW4SE4
entire lease containing 1,842.39 acres, more or less.

This lease was assigned to C.D. Sutton on February 1, 1956. On May 1, 1970 the lease was assigned to F.H. Larson and then to Centennial Coal Associates on February 1, 1973. AMCA Coal Leasing, Inc., acquired the lease in February, 1977 and subsequently added Tract 2 through the federal lease modification criteria.

*****(NOTE: The legal description of the composite lease as described on the existing BLM lease form is as follows:
T.13S., R.11E., SLM, Utah
Sec. 5; All
Sec. 6; All
Sec. 7; Lot 1, NE4NW4,NE4, N2SE4
Sec. 8; N2, N2S2, S2SE4
Sec. 9; W2SW4
Sec. 17; NE4, N2NE4SW4, NE4SE4, N2NW4SE4
containing 1,842.39 acres, more or less.)*****

4) U-05067-08916
T.13S., R.11E., SLM, Utah
Sec. 4; Lots 5-8
Sec. 9; NW4NE4, N2NW4, SW4NW4, NE4SW4
containing 360 acres, more or less.

5) UTU-66060
Tract 1: (original lease)
T.12S, R.11E., SLM, Utah
Sec. 31; Lots 3-6, Lots 13-22

T.13S, R.10E., SLM, Utah
Sec. 1; Lots 1-8, S2N2
Sec. 12; Lot 1

Tract 2: (lease modification)
T.12S., R.11E., SLM, Utah
Sec. 31; Lot 12
Sec. 32; W2SW4, SW4NW4
entire lease containing 1093.32 acres more or less.

~~UTU-66060 is subject to the terms and conditions set forth in the Federal Coal Lease issued by the~~ in Table 1-1 Below:
Plate 3 depicts on a map the Coal Leases:

# TABLE 1-1
## Andalex Resources, Inc.
## Tower Division
### Centennial Project Permit Coal Lease Areas

## FEDERAL COAL LEASES

### Federal Lease UTU-66060

T. 13 S., R. 10 E., SLM, Utah

Section 1

| | | |
|---|---|---|
| Lot 3 | 40.59 | Acres |
| Lot 4 | 40.82 | Acres |
| S1/2 NE | 80.00 | Acres |
| **Total** | **161.41** | **Acres** |

### Federal Lease UTU-69600

T. 13 S., R.10 E., SLM, Utah

Section 1

| | | |
|---|---|---|
| SW1/4 | 160.00 | Acres |

Section 12

| | | |
|---|---|---|
| Lot 3 | 36.71 | Acres |
| Lot 4 | 37.16 | Acres |
| Lot 5 | 44.08 | Acres |
| Lot 6 | 45.01 | Acres |
| Lot 7 | 47.17 | Acres |
| Lot 11 | 47.05 | Acres |
| W1/2 NW | 80.00 | Acres |
| **Total** | **497.18** | **Acres** |

### Federal Lease UTU-010581

T. 13 S., R. 11 E., SLM, Utah

Section 7

| | | |
|---|---|---|
| NW SE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

## Federal Lease UTSL-27304

T. 13 S., R. 11 E., SLM, Utah

Section 7

| | | |
|---|---|---|
| Lot 4 | 42.98 | Acres |

Section 18

| | | |
|---|---|---|
| Lot 1 | 42.98 | Acres |
| NW NE | 40.00 | Acres |
| N1/2 NE NW | 20.00 | Acres |
| SW NE NW | 10.00 | Acres |
| **Total** | **155.96** | **Acres** |

## Federal Lease SL-63058

T. 13 S., R. 11 E., SLM, Utah

Section 18

| | | |
|---|---|---|
| SW NE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

## Federal Lease UTU-81893 (Kenilworth Lease)

T. 12 S., R. 10 E., SLM, Utah

Section 26

| | | |
|---|---|---|
| N1/2 SW1/4 | 80.00 | Acres |
| SE SW | 40.00 | Acres |
| SE | 160.00 | Acres |

Section 27

| | | |
|---|---|---|
| S1/2 | 320.00 | Acres |

Section 34

| | | |
|---|---|---|
| S1/2 NE | 80.00 | Acres |
| NW NE | 40.00 | Acres |
| NW | 160.00 | Acres |
| S1/2 | 320.00 | Acres |

Section 35

| | | |
|---|---|---|
| NE | 160.00 | Acres |
| S1/2 NW | 80.00 | Acres |
| S1/2 | 320.00 | Acres |
| **Total** | **1,760.00** | **Acres** |

## Total of Federal Leases 2,654.55 Acres

## FEE COAL LEASES

### Mathis Fee Lease

T. 12 S., R. 10 E., SLM, Utah
Section 36

| | | |
|---|---|---|
| All | 640.00 | Acres |
| **Total** | **640.00** | **Acres** |

### Zion Fee Lease

T. 13 S., R. 11 E., SLM, Utah
Section 7

| | | |
|---|---|---|
| Lot 2 | 42.99 | Acres |
| Lot 3 | 42.99 | Acres |
| SE NW | 40.00 | Acres |
| E1/2 SW | 80.00 | Acres |
| **Total** | **205.98** | **Acres** |

**Total of Fee Leases 845.98 Acres**

## ROW'S

**Bureau of Land Management** ~~October 3, 1994.~~

~~*****(NOTE: The legal description of the composite lease as described on the existing BLM lease form is as follows:~~
~~T.12S., R.11E., SLM, Utah~~
~~Sec. 31; Lots 3-6, Lots 12-22~~
~~Sec. 32; W2SW4, SW4NW4~~
~~T.13S., R.10E., SLM, Utah~~
~~Sec. 1; Lots 1-8, S2N2~~
~~Sec. 12; Lot 1~~
~~containing 1093.32 acres more or less.)*****~~

~~6) UTU-69600~~

~~T.13S., R10E. SLM, Carbon County, Utah~~
~~Sec. 1: SW4~~
~~Sec. 12: lots 2-11, W2W2, NE4SW4~~

containing 801.48 acres, more or less

The name and address of the lessor is American Electric Power Service Corporation, Fuel Supply Department, P.O. Box 700, Lancaster, Ohio 43130. This agreement was executed on May 1, 1992.

7) UTU-79975

T. 12S., R. 11E. SLM, Utah
Sec. 29; SW4SW4, SW4SE4
Sec. 30; Lots 4, 12, 14-16
Sec. 31; Lots 1, 2, 7-11
Sec. 32, W2NE4, E2NW4, NW4NW4, NE4SW4
containing 702.73 acres, more or less.

The private fee leases are described as follows (see Figure 1-2):

8) Mathis Fee Lease

T.12S., R.10E., SLM, Utah
Sec. 36; All
containing 640 acres, more or less.

9) Zion Fee Lease

T.13S., R.11E., SLM, Carbon County, Utah
Sec. 7; S2NW4, N2SW4, SE4SW4
containing 200 acres, more or less.

The name and address of the lessor is Zion Securities Corporation, 10 East South Temple Street, Salt Lake City, Utah. This lease was originally made and entered into between Zion's and Centennial Coal

Associates on August 1, 1972. AMCA Coal Leasing Inc. acquired the lease in February, 1977.

10) Sunedco Fee Lease

T.13S., R.11E., SLM, Carbon County, Utah
Sec. 9; E2NE4, SW4NE4, N2SE4
containing 200 acres, more or less.

The name and address of the lessor is Sunedco Coal Company, 7401 West Mansfield Avenue, Suite 418, P.O. Box 35-B, Lakewood, Colorado 80235. AMCA Coal Leasing, Inc. acquired the lease in June, 1988.

11) Andalex Fee

T.13S., R.11E.,SLM, Carbon County, Utah
Sec. 9; SE4NW4
containing 40 acres, more or less.

The surface rights-of-way are described as follows (see Figure 1-2):

12) BLM Right-of-Way U-62045

T.13S., R.11E., SLM, Carbon County, Utah
Sec. 18; SE4NE4NW4 containing 10 acres, more or less.

This right-of-way was granted for construction of some of the surface facilities in Deadman Canyon, namely certain structures associated with the Aberdeen mine surface facilities in the southernmost area of the mineyard.

~~The grantor is the Department of the Interior,~~ ROW U-62045

T. 13 S., R. 11 E., SLM, Utah
Section 18
SE NE NW 10.00 Acres

**Total** **10.00 Acres**

**Bureau of Land Management**~~, 400 West 200 South, Suite 500, Salt Lake City, Utah 84145-0155~~

~~13) BLM Right-of-Way UTU-64158~~

~~T.13S., R.10E., SLM, Carbon County, Utah~~
~~Sec. 13; Lot 1 (portions of)~~

~~T.13S., R.11E., SLM, Carbon County, Utah~~
~~Sec. 18; Lot 2, NE4SW4 (portions of) containing 1.45 acres, more or less.~~

~~This right-of-way was granted for construction of the main mine fan installation and the access road in the Left Fork.~~

~~The grantor is the Department of the Interior, Bureau of Land Management, 400 West 200 South, Suite 500, Salt Lake City, Utah 84145-0155~~

~~14) Cave Private Land Easement~~

~~T.13S., R.11E., SLM, Carbon County, Utah~~
~~Sec. 18; A portion of NE4NE4SE4NW4 containing 1.5 acres, more or less.~~

~~This easement was granted for the construction of sediment pond E located at the extreme southern end of the mineyard.~~

~~This easement has been granted by David R Cave et al whose address is 3379 East Hwy 6, Price, Utah 84501.~~

| | | |
|---|---|---|
| Permit Area | Total lease area (described above) | 6528.83 acres |
| | Less Oso gaswell area | 11.92 acres |
| | Total permit area | 6516.91 acres |

The following is a description of the Permit Area as shown on Figure 1-2. This is a composite description of all federal and private coal leases and rights-of-way listed above which comprise the permit area, less the Oso gaswell and pipeline area, which has been deleted from the permit area. Oso Oil and Gas Properties, LLC (15810 Park Ten Place, Suite 160, Houston TX 77084) is the owner of the gas rights from all gas being liberated from the gob vent holes (GVH) on the leases associated with the ROW UTU-64158

(Left fork fan and access road)

**Located within:**

T. 13 S., R. 10 E., SLM, Utah
Section 13
Lot 1

T. 13 S., R. 11 E., SLM, Utah
Section 18
Lot 2
NE SW

Total 1.45 Acres

**Total of BLM R.O.W.'S 11.45 Acres**

## Private Easements

### Cave Private Easement

**Located within:**

T. 13 S., R. 11 E., SLM, Utah
Section 18
SE NW 1.50 Acres

**Total Cave 1.50 Acres**

**Total Private Easements 1.50 Acres**

# TABLE 1-2

## Andalex Resources, Inc.
## Tower Division

**Centennial Project**~~. Refer to Appendix Z for a complete legal description of the OSO gaswell/pipeline. Sections marked with an asterisk (*) are included in their entirety within the permit area.~~

~~T.12S., R.10E., SLM, Carbon County, Utah~~
~~Sec. 36;All (Mathis fee lease)~~
~~except for 1.64 acres associated with the Oso pipeline (see Appendix Z)~~

~~T.12S., R.11E., SLM, Carbon County, Utah~~
~~Sec. 29;SW4SW4, SW4SE4 (part of UTU-79975)~~

~~Sec. 30;Lots 4,12,14-16 (part of UTU-79975)~~

~~Sec. 31;Lots 1, 2, 7-11 (part of UTU-79975)~~

~~Lots 3-6, 12-22 (part of UTU-66060)~~
~~except for 7.86 acres associated with the Oso gaswell and pipeline (see Appendix Z)~~

~~Sec. 32;W2NE4, E2NW4, NW4NW4, NE4SW4 (part of UTU-79975)~~

~~W2SW4, SW4NW4 (part of UTU-66060)~~

~~T.13S., R.10E., SLM, Carbon County, Utah~~
~~Sec. 1;Lots 1-8, S2N2 (part of UTU-66060)~~
~~except for 2.42 acres associated with the Oso pipeline (see Appendix Z)~~

~~SW4 (part of UTU-69600)~~

~~Sec. 12*;Lot 1 (part of UTU-66060)~~

~~Lots 2-11, W2W2, NE4SW4 (part of UTU-69600)~~

~~Sec. 13.Lot 1 (a portion thereof, part of BLM ROW 64158)~~

~~T.13S., R.11E., SLM, Carbon County, Utah~~
~~Sec. 4;Lots 5-8 (part of U-05067)~~

~~Sec. 5*;All (part of UTU-010581)~~

~~Sec. 6*;All (part of UTU-010581)~~

~~Sec. 7*;Lot 1, NE4NW4, NE4, N2SE4 (part of UTU-010581)~~

~~Lot 4, S2SE4 (part of SL-027304)~~

~~S2NW4, N2SW4, SE4SW4 (Zions Fee Lease)~~

~~Sec. 8*;N2, N2S2, S2SE4 (part of UTU-010581)~~

~~S2SW4 (part of SL-63058)~~

~~Sec. 9;E2NE4, SW4NE4, SE4NW4, N2SE4 (Sunedco Fee Lease)~~

~~NW4NE4, N2NW4, SW4NW4, NE4SW4 (part of U-05067)~~
~~Sec. 17;NE4, N2NE4SW4, NE4SE4, N2NW4SE4 (part of UTU-010581)~~

~~NW4, NE4NW4SW4, W2NW4SW4 (part of SL-063058)~~
~~Sec. 18;NE4NE4, E2SE4NE4, NW4SE4NE4, SW4NE4, E2NE4SE4 (part of SL-063058)~~

~~Lot 1, NW4NE4, N2NE4NW4, SW4NE4NW4 (part of SL-027304)~~

~~SE4NE4NW4 (BLM ROW U-62045)~~

~~Lot 2, NE4SW4 (portions thereof, part of BLM ROW UTU-64158)~~

~~NE4NE4SE4NW4 (a portion thereof, Cave private surface easement)~~

**Surface Only Leases Within Permit Area**

## Federal Lease UTU-66060

T. 13 S., R. 10 E., SLM, Utah
Section 1

| | | |
|---|---|---|
| Lot 1 | 40.12 | Acres |
| Lot 2 | 40.35 | Acres |

T. 12 S., R. 11 E., SLM, Utah
Section 31

| | | |
|---|---|---|
| Lot 3 | 7.58 | Acres |
| Lot 4 | 7.60 | Acres |
| Lot 5 | 7.17 | Acres |
| Lot 12 | 40.00 | Acres |
| Lot 13 | 1.13 | Acres |
| Lot 14 | 40.00 | Acres |
| Lot 15 | 40.00 | Acres |
| Lot 16 | 40.00 | Acres |
| Lot 21 | 22.86 | Acres |
| **Total** | **286.81** | **Acres** |

## Federal Lease UTU-79975

T. 12 S., R. 11 E., SLM, Utah
Section 31

| | | |
|---|---|---|
| Lot 2 | 7.53 | Acres |
| Lot 7 | 40.00 | Acres |
| Lot 8 | 40.00 | Acres |
| Lot 10 | 40.00 | Acres |
| Lot 11 | 40.00 | Acres |
| **Total** | **167.53** | **Acres** |

## Federal Lease UTU-010581

T. 13 S., R. 11 E., SLM, Utah
Section 7

| | | |
|---|---|---|
| SW NE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

**Federal Lease UTSL-27304**

T. 13 S., R. 11 E., SLM, Utah
Section 7
SW SE 40.00 Acres

**Total 40.00 Acres**

**Surface Only Permit Area 534.34 Acres**

## PERMIT AREA TABULATION

| | | |
|---|---|---|
| Federal Coal Leases: | 2,654.55 | Acres (Including Kenilworth) |
| Fee Coal Leases: | 845.98 | Acres |
| BLM Surface R.O.W. | 11.45 | Acres |
| Private Easements: | 1.50 | Acres |
| Surface Only Federal Leases: | 534.34 | Acres |
| Permit Area Subtotal | 4,047.82 | Acres |
| Less OSO Gaswell Area | -11.92 | Acres |
| **Total Permit Area:** | **4,035.90** | **Acres** |

**R645-301-114.100. DOCUMENTATION**

Appendix J

**R645-301-114.200. SEVERED SURFACE AND MINERAL ESTATES**

Appendix J

**R645-301-114.210. WRITTEN SURFACE OWNER CONSENT FOR COAL EXTRACTION**

Appendix R

**R645-301-114.220. CONVEYANCE EXPRESSLY GRANTING RIGHT TO MINE COAL**

Appendix J

**R645-301-114.230. DOCUMENTATION OF LEGAL AUTHORITY TO MINE COAL**

Appendix J

**R645-301-114.300. ADJUDICATION OF PROPERTY RIGHTS DISPUTES**

**R645-301-114.300. ADJUDICATION OF PROPERTY RIGHTS DISPUTES**

The Division does not have the authority to adjudicate property rights disputes.

**R645-301-115. STATUS OF UNSUITABILITY CLAIMS**

Carbon County has authorized mining and reclamation activities within 100 feet of County Road 299. (See Appendix B)

**R645-301-115.100. IDENTIFICATION OF LANDS UNSUITABLE**

The permit area is not within an area designated unsuitable for the surface effects of underground coal mining activities or under study for designation in an administrative proceeding initiated under those pasts. Further, there are no occupied dwellings within 300 feet of the permit area including the Hoffman Creek area.

**R645-301-115.200. CLAIMS OF EXEMPTION BY COMMITMENT PRIOR TO JANUARY 4, 1977**

None.

**R645-301-115.300. MINING AND RECLAMATION OPERATIONS WITHIN 300 FEET OF AN OCCUPIED DWELLING OR WITHIN 100 FEET OF A PUBLIC ROAD**

None.

**R645-301-116. PERMIT TERM**

The starting and termination dates as well as the horizontal and vertical extent of the proposed underground mining activities over the total life of the permit are indicated on the revised Pinnacle underground layout map included as Plate 30. Also refer to the underground layout maps for the Apex and Aberdeen Mines (see Plates 29 and 31). Refer to plate 41.

**R645-301-116.100. SCHEDULE OF PHASED MINING AND RECLAMATION ACTIVITIES**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases.

Andalex has added a fan installation in the left-hand fork of Deadman Canyon. This installation was conducted according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) The location of this breakout is shown on Plate 29~~ (R.O.W.).~~

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. No significant erosion problems have occurred, Andalex will notify the Division in the event of any slides or other damage.

Andalex will cover acid or toxic forming materials if any are encountered. Andalex will advise the Division in the

event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

**R645-301-116.200. PERMIT TERM IN EXCESS OF FIVE YEARS**

The requested term of this permit is five years. Andalex will then apply for five year extensions over the life of the mine.

**R645-301-116.210. COMPLETENESS AND ACCURACY FOR LONGER TERM**

N/A

**R645-301-116.220. DEMONSTRATION OF NEED FOR LONGER TERM**

N/A

**R645-301-117. INSURANCE, PROOF OF PUBLICATION AND FACILITIES OR STRUCTURES USED IN COMMON**

Appendix B contains certificates of liability insurance covering personal injury and property damage resulting from this operation. Andalex commits to mitigate all subsidence related damage to renewable resources, including, but not limited to water, grazing, and wildlife habitat including raptor nests.

**R645-301-117.100. LIABILITY INSURANCE**

Appendix B

**R645-301-117.200. NEWSPAPER PUBLICATION**

A copy of the newspaper advertisement of this Mining and Reclamation Plan and proof of publication of the advertisement is filed with the Division and made part of the complete application. ~~Also, please refer to this chapter for the public notice and proof of publication for the newly acquired Sunedco Lease.~~

**R645-301-117.300. FACILITIES USED IN COMMON**

The Centennial Project includes the development of three separate mines. All are currently in operation. The names and M.S.H.A. I.D. numbers for existing mines and all sections are as follow:

Pinnacle Mine - M.S.H.A. I.D. #42-01474
Apex Mine - M.S.H.A. I.D. #42-01750 (inactive)
~~Apex~~Aberdeen Mine - M.S.H.A. I.D. ~~#42-01750~~#42-02028
~~Aberdeen Mine - M.S.H.A. I.D. #42-02028~~

All coal from the newly acquired AEP Lease will be mined simply as an underground extension of the existing Pinnacle and Aberdeen Mines.

**R645-301-118. FILING FEE**

N/A Page 1-27 of document

**R645-301-120. PERMIT APPLICATION FORMAT AND CONTENTS**

Summary of Table of Contents


R645-301-100. General

R645-301-200. Soils

R645-301-300. Biology

R645-301-400. Land Use and Air Quality

R645-301-500. Engineering

R645-301-600. Geology

R645-301-700. Hydrology

R645-301-800. Bonding and Insurance


**R645-301-121. REQUIREMENTS**

**R645-301-121.100. CURRENT INFORMATION**

Information is current.

**R645-301-121.200. CLEAR AND CONCISE**

Information is clear and concise.

**R645-301-121.300. FORMAT REQUIREMENTS**

To facilitate review of the application, each chapter listed above has been further divided into specific parts and sections. These can be found listed in the detailed table of contents appearing at the beginning of this text along with the page numbers on which they appear. This table of contents also contains lists of figures, tables, plates, exhibits, and appendices to facilitate cross referencing between chapters.

Exhibits include appropriate supporting documents, reports and publications and are included as appendices.

Maps which were not reduced to fit into the text are included in a separate volume as plates. All maps and plans are submitted in accordance with the requirements.

## R645-301-123. APPLICATION FOR PERMITS, CHANGES, RENEWALS, OR TRANSFERS

Text deleted as instructed by Technical analysis.

## R645-301-130. REPORTING AND TECHNICAL DATA

Persons and Consultants Involved

The following persons and/or organizations were involved in collection and analysis of the technical data set forth in this application.

1. In-House Consulting Services

   a) Andalex Resources, Inc. - AMCA Coal Leasing, Inc.
   Samuel C. Quigley - Western Project Manager (Former)
   Michael W. Glasson - Senior Geologist (Former)
   Allen D. Emmel - Environmental Planning Coordinator (Former)

2. Outside Consulting Services

   a) Dan W. Guy - Registered Professional Engineer (State of Utah No. 4548)
   Price, Utah
   -Sedimentation and Drainage Control Plan (April, 1980)

- Wastewater Disposal System; Pinnacle Mine (April, 1980)
Office Building (September, 1980)

b) Bruce T.S. Ware - Registered Land Surveyor
Price, Utah

c) A and W Surveying
Price, Utah

d) Commercial Testing & Engineering Co.
Denver, Colorado

e) Standard Laboratories
Huntington, Utah

f) Western Testing and Engineering
Helper, Utah

g) VanCott, Bagely, Cornwall and McCarthy
Attorneys at Law
Salt Lake City, Utah

h) Rollins, Brown, and Gunnel
Provo, Utah

i) Brigham Young University
Provo, Utah
Department of Zoology
Clayton M. White
(Raptor Study)
Department of Anthropology/Archaeology
Dr. Ray T. Matheny
(Archaeological Survey)

j) Earth Environmental Consultants
Albuquerque, New Mexico

k) Vaughn Hansen Associates
Salt Lake City, Utah
(Hydrology Study)

l) Horrocks Engineers
American Fork, Utah

Coordination and Consultation with Governmental Agencies

The following governmental agencies were consulted in the preparation of information set forth in this application.

U.S. Department of Agriculture
Soil Conservation Service
Price, Utah
(Soil and Vegetation Survey)

U.S. Department of the Interior
Bureau of Land Management
Price, Utah
Salt Lake City, Utah

Office of Surface Mining, Reclamation and Enforcement
Denver, Colorado

U.S. Geological Survey
Salt Lake City, Utah

State of Utah:
Department of Natural Resources
Division of Oil, Gas, and Mining
Salt Lake City, Utah

Antiquities Section (Consulting Services Branch)
Salt Lake City, Utah
(Archaeological Survey)

Department of Natural Resources
Division of Wildlife Resources
Salt Lake City, Utah

References:

AMCA Coal Leasing, Inc., 1978. Mining and Reclamation Plan, Zion's Fee. Submitted to the State of Utah, Department of Natural Resources, D.O.G.M.

Centennial Coal Associates, 1976. Mining Application. Submitted to the U.S. Geological Survey.

Doelling, H.H., 1972. Central Utah Coal Fields. U.G.M.S. Monograph Series No. 3.

U.S.D.A., 1978. Soil Survey and Interpretations of the Coal Creek Emery Portion of the Price River and Emery County Areas, Carbon and Emery Counties, Utah. S.C.S.

U.S.D.I., 1979. Final Environmental Statement, Development of Coal Resources in Central Utah, Parts 1 and 2.

U.G.M.S., 1966. Central Utah Coals. U.G.M.S. Bulletin No. 80.

**R645-301-131. TECHNICAL DATA REQUIREMENTS**

Where applicable, technical data submitted has been identified as to who prepared the information and is stamped by that registered professional engineer (P.E.).

**R645-301-132. TECHNICAL ANALYSES REQUIREMENTS**

Analyses are prepared by a qualified professional engineer.

**R645-301-140. MAPS AND PLANS**

**R645-301-141. MAP FORMATS**

**R645-301-142. PHASES OF OPERATIONS AND MINING ACTIVITY**

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are now essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam.

The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T12 and 13S and R10 and 11E (See Figure 1-2. The existing permit property is located in the Book Cliffs coal field and includes Alrad Canyon, Deadman Canyon, Starpoint Canyon, Straight Canyon, and Hoffman Creek Canyon areas. The Kenilworth Tract occupies the area of Summit Creek, Deep Canyon and Mathis Canyon. The Coal outcrops along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.

There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development and culinary usage is supplied by wells that have been drilled.

Historically, coal mining has been the only industry in the permit area and there are several abandoned mines located on the property. No oil or gas wells exist in the area.

Access to the mine plan area is by an existing paved county road which has been upgraded and is maintained by Carbon County. Maintenance consists of paving, chipping, patching, culvert work, ditch work, signs, snow removal, painting, patrolling (county sheriff), etc., as needed. Andalex assumes no responsibility for road maintenance or repair. The road is used as an access road as well as a haul road. It should be noted that in the event of a catastrophic event which damaged the road, Andalex would pursue all avenues to assist Carbon County in reparation of the road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on rights-of-way granted by the Bureau of Land Management. This is also a small private easement granted to Andalex from Gladys M. Artman for a small portion of pond E. All proposed facilities are indicated in this application. Andalex has acquired all applicable state and federal licenses, permits, and rights-of-way necessary to conduct mining activities on the Zion's fee property and contiguous federal leases.

As of 7-6/2007 the Apex Mine and the Pinnacle Mine have been worked out. The Apex Mine has been sealed at the portals. The Pinnacle mine is still being ventilated because the power to the Aberdeen mine runs into the Pinnacle mine from the substation and then drops down to the Aberdeen Mine through a borehole connecting the two mines. However, there are no plans to produce any more coal from the Pinnacle Mine. Therefore, all existing and future mine production from the Centennial Project will be solely from the Aberdeen Mine

Upon cessation of mining activities, reclamation activities will commence as soon as is practicable, according to the approved Mining and Reclamation Plan. The land will be restored according to available technology to as nearly its original condition as is possible.

This operation does not face any of the mining complications caused by faults or intrusives. The mine plan area is located in a region where mining has been the major industry; therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Andalex's prudent management, the Centennial Project has become a model mining operation in the Carbon County area with very minimal environmental and socioeconomic impact.

**R645-301-142.100. PRIOR TO AUGUST 3, 1977**

None by Andalex Resources. Several mines were operated by other independent companies or individuals in areas presently consumed by Andalex's surface facilities. Andalex's encroachment onto these previously disturbed areas transferred the responsibility for reclamation to Andalex. The specific locations of disturbed areas prior to Andalex's mining activities is irrelevant.

**R645-301-142.200. AFTER AUGUST 3, 1977**

All of Andalex's surface facilities and mining operations began after August 3, 1977.

**R645-301-142.210. PRIOR TO MAY 3, 1978**

See R645-301-142.100.

**R645-301-142.220. SMALL OPERATOR'S EXEMPTION PRIOR TO JANUARY 1, 1979**

N/A

**R645-301-142.300. AFTER MAY 3, 1978 (OR JANUARY 1, 1979 FOR SMALL OPERATOR'S EXEMPTION) AND PRIOR TO APPROVAL OF STATE PROGRAM**

N/A

**R645-301-142.400. AFTER ISSUANCE OF PERMIT BY THE DIVISION**

~~Refer to permit area map, Plate 4~~

The following is a list of all other licenses and permits under applicable state and federal land-use, air and water quality, water rights and health and safety laws and regulations held by Andalex in order to conduct underground coal mining activities.

All permits listed are up to date and current. The NPDES Permit for the Centennial Project has been replaced by an individual UPDES permit, UT0025674.

1) State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

- Mining and Reclamation Plan for Andalex Resources' Centennial Project
Permit I.D. Number C/007/019
Approved January 4, 1982

2) State of Utah
Department of Environmental Quality
Division of Air Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- Air Quality Approval Order, Permit No DAGE-977-96
Approved June 13, 1980

3) State of Utah
Department of Environmental Quality
Division of Water Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- UPDES permit UT0025674
  (Replaced previous EPA NPDES permit)

- Water Quality - Sediment and Drainage
  Approved May 14, 1980

- Septic and Culinary Plan (2)
  Approved September 17, 1980 (Office Site)
  Approved May 8, 1980 (Bathhouse Facility)

4) Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

- Access Road Right-of-Way
  Permit Number U-45966
  Granted September 1, 1980

- Buried Telephone Cable Right-of-Way
  Permit Number U-36739
  Granted November 20, 1978

- Power Transmission Line Right-of-Way
  Permit Number U-36741
  Granted November 20, 1978, assigned to UP&L

- Material Storage Site Right-of-Way
  Permit Number U-45965
  Granted September 11, 1980

- Aberdeen Mine Right-of-Way
  Permit Number UTU-62045
  Granted June 6, 1988

5) Mine Safety and Health Administration (M.S.H.A.)
P.O. Box 25367
Denver, Colorado 80225
(District 9)

Pinnacle Mine I.D. 42-01474
Apex Mine I.D. 42-01750 (inactive)
Aberdeen Mine I.D. 42-02028

- Roof Control Plan
  Reviewed and approved every six months

- Ventilation System and Methane and Dust Control Plan
  Reviewed and approved every six months

- Smoking Prohibition Plan
  Approved August 4,1992

- Training Plan
  Approved November 27, 1990

- Instruction Program: Firefighting and Evacuation Plan
  Approved August 4, 1992

- SCSR Storage Plan
  Approved May 18, 1992

- Chest X-Ray Plan
  Approved March 15, 1990

**R645-301-150. COMPLETENESS**

Per Division.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 1

## Legal, Financial, Compliance And Related Information

**C/007/019**

(Revised)
July, 2014

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# CHAPTER 1, LEGAL

## R645-301-100. General

The Kenilworth Lease (UTU-81893),Boundary Change is simply an extension of our underground mine workings and will in no way involve any new surface facilities or otherwise have any affect on the surface. It does not involve any new hydrologic basins. It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which was approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 1986 through the normal LBA process after an application by Andalex Resources. Refer to R645-301-200 through R645-301-800 for additional information.

## R645-301-110. LEGAL, FINANCIAL, AND COMPLIANCE INFORMATION

### Legal, Financial, Compliance and Information

The objective of this chapter is to set forth all relevant information concerning ownership and control of Andalex Resources, Inc., the ownership and control of the property to be affected by mining activities and all other information and documentation required.

Please note that right-of-entry information for all new Leases is included in Appendix J, "Other Approvals". This includes the short form of the Mathis lease recorded at Carbon County.

### Compliance Information

a) Suspension and Revocation

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

b) Forfeiture of Bond

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

c) History of Violations

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-111. INTRODUCTION

### Overview and Summary of Project

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are now essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam. The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T12 and 13S and R10 and 11E (See Plate 1).

The Operator relinquished portions of the mined out Federal coal leases in two separate lease relinquishments. The first lease relinquishment approved 3/12/2012 reduced the Federal coal leased acreage from 5,436.24 down to 2,813.48. The second coal relinquishment reduced the Federal coal lease even further down to 894.55 acres. UEI retained all areas of surface disturbance conducted in association with the underground mining and surface access to the gob-vent holes was retained through surface use agreements.

With the relinquishments the permit acreage dropped from 6,516.91 down to 2,274.77 acres. When Kenilworth lease is added the permit acreage goes back up to 4,035.90 which is the new permit acreage. The disturbed area has not changed and remains at 47.19 acres. Since the disturbed area has not changed and the disturbed legal description

stays the same the bond does not change with the addition of the Kenilworth lease. The breakdown of Federal, and Fee for both coal leases and surface leases are shown on Tables 1-1 for Coal leases and 1-2 for Surface leases.

The existing permit's property is located in the Book Cliffs coal field and includes Alrad Canyon, Deadman Canyon, Starpoint Canyon, Straight Canyon, and Hoffman Creek Canyon areas. The Kenilworth Tract occupies the area of Summit Creek, Deep Canyon and Mathis Canyon. The Coal outcrops along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.

There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development is from water encountered in the existing underground mine workings. Culinary usage is supplied by an independent contractor who hauls Price City culinary water to the mine on an as-needed basis. Historically, coal mining has been the only industry in the permit area and there are several abandoned mines located on the property. Other than the GVH holes, no oil or gas wells exist in the area.

Access to the existing mine surface facilities area is by way of the Airport Road, an existing paved county road which has been upgraded and is maintained by Carbon County. It is used as an access road as well as a haul road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on rights-of-way granted by the Bureau of Land Management. This is also a small private easement granted to Andalex from David Cave for a small portion of pond E. Andalex has acquired all applicable state and federal licenses, permits, and rights-of-way necessary to conduct mining activities on all private (fee) and federal leases.

As of 7-6/2007 the Apex Mine and the Pinnacle Mine have been worked out. Also, The BLM has recently determined that the Aberdeen mine is mined out. The Apex Mine has been sealed at the portals. The Pinnacle mine is still being ventilated because the power to the Aberdeen mine runs into the Pinnacle mine from the substation and then drops down to

the Aberdeen Mine through a borehole connecting the two mines. However, there are no plans to produce any more coal from the Pinnacle Mine. Therefore, all future mine production on the Centennial Project will be solely from the Kenilworth Lease in the Aberdeen Mine.

The mining method being employed in the Aberdeen Mine is gateroad development utilizing continuous miners with final extraction by longwall. Certain fringe area reserves, if any, inadequate for longwall panels, will be evaluated for possible room-and-pillar mining.

This operation does not face any of the mining complications caused by faults or other intrusive geologic features. The mine plan area is located in a region where mining has been the major industry; therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Andalex's prudent management, the Centennial Project will continue to be a model mining operation in the Carbon County area with very minimal environmental and socioeconomic impact.

Upon cessation of final mining activities, reclamation activities will commence as soon as is practicable, according to the plans outlined in this application. The land will be restored according to available technology to as nearly its original condition as is possible.

**Organization of Application**

This underground mining permit application has been organized in accordance with the general requirements for format and contents as outlined in the R645- Coal Mining Rules.

## R645-301-111.100. OBJECTIVES

**Objectives**

The objective of this chapter is to set forth all relevant information concerning ownership and control of Andalex Resources, Inc., the ownership and control of the property to be affected by mining activities and all other information and documentation required.

Please note that right-of-entry information for all new Leases is included in Appendix J, "Other Approvals".

**R645-301-111.200. RESPONSIBILITY**

Andalex Resources, Inc., is responsible for submission of information and will pay abandoned mine reclamation fees.

**R645-301-111.300. APPLICABILITY**

The requirements of R645-301-100 apply to Andalex Resources, Inc.

**R645-301-112. IDENTIFICATION OF INTERESTS**

a) Permit Applicant

Andalex Resources, Inc.
Tower Division
P.O. Box 910
East Carbon, Utah 84520-0910
(801) 888-4000

b) Legal and Equitable Owners of Record

Earth work for the Aberdeen Mine was completed in 1989. Surface facilities for the Aberdeen Mine were completed early in 1990. All existing facilities are located either on land owned by Zions Securities Corporation or on federal land. The addresses of these owners of record are as follow:

Bureau of Land Management (801) 524-3004
Utah State Office
324 South State Street
Salt Lake City, Utah 84111

Zion Securities Corporation (801) 363-3841
10 East South Temple
Salt Lake City, Utah 84111

All coal to be mined on the permit area is owned by the federal government, Zion Securities Corporation, Sunedco Coal Company or AMCA Coal Leasing, Inc. The addresses of these owners of record are as follow:

Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

AMCA Coal Leasing, Inc.
PO Box 910
East Carbon, Utah 84520-0910

Zion Securities Corporation
10 East South Temple
Salt Lake City, Utah 84111
Sunedco Coal Company
7401 West Mansfield Avenue
Suite 418
P.O. Box 35-B
Lakewood, Colorado 80235

**R645-301-112.100. TYPE OF BUSINESS**

Andalex Resources is a corporation organized and existing under the laws of Delaware and qualified to do business in Utah. Andalex Resources, Inc, is a wholly owned subsidiary of UtahAmerican Energy Inc., which in turn is a wholly owned subsidiary of Murray Energy Corporation. Andalex began mining operations in the Pinnacle Mine October, 1980, and in the Apex Mine in late 1982. Mining commenced in the Aberdeen Mine in mid-1988. These mines are located on fee and federal lands in Carbon County, Utah. Andalex, the designated operator, along with AMCA Coal Leasing, Inc., its land acquisition and development branch, controls all federal and fee mining leases within the mine plan area. This underground mining permit application has been prepared by Andalex Resources and is being submitted for review and approval by the appropriate regulatory authorities.

**R645-301-112.200. NAMES, LOCATIONS, RESIDENT AGENT**

Resident Agent who will accept service of process for Andalex Resources, Inc., Tower Division, Centennial Mines, ACT/007/019:

Jay Marshall
Andalex Resources, Inc.
Tower Division
P.O. Box 910
East Carbon, Utah 84520-0910

Also, see Chapter 8, Page 24 for notarized statement pertaining to completeness and accuracy.

**R645-301-112.300. OTHER THAN SINGLE PROPRIETORSHIPS**

Andalex Resources, Inc., Tower Division, holds the exclusive coal operating interests in the permit area.

**R645-301-112.310. OFFICERS AND SHAREHOLDERS**

See Appendix 1, Part 1 for ownership and control information.

**R645-301-112.320. OWNERSHIP AND CONTROL RELATIONSHIP TO APPLICANT**

See Appendix 1, Part 1 for ownership and control information.

**R645-301-112.400. PENDING, CURRENT AND PREVIOUS COAL PERMITS**

See Appendix 1, Part 2 for current and previous coal mining permits

**R645-301-112.500. SURFACE AND MINERAL OWNERSHIP**

**Owners of Record of Surface and Subsurface Contiguous Areas**

Names and addresses of all owners of record for all surface and subsurface areas contiguous to and within the permit area are listed below and indicated on Plates 2 and 3.

**Subsurface Owners** (See Plate 3 for Mineral Ownership)

Franklin Real Estate Company (contiguous)
(American Electric Power)
#2 Broadway
New York, New York

Bureau of Land Management (contiguous & within)
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

Andalex Resources, Inc. (within)
PO Box 910
East Carbon, Utah 84502-0910

Zion Security Corp. (within)
10 East South Temple
Salt Lake City, Utah 84111

Mathis Land Co. (contiguous & within)
Sunnyside Star Route
Price, Utah 84501

**Surface Owners** (See Plate 2 Surface Ownership)

Deseret Title Holding Corp (within)
50 E North Temple
Tax Div.-22nd Floor
Salt Lake City, Utah 84150

Bureau of Land Management (contiguous & within)
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

Dave Cave et al (contiguous & within)
1220 South 530 West
Price, Utah 84501

Shimmin Investments Ltd (contiguous)
P.O. Box 785
Price, Utah 84501

Mathis Land Co. (contiguous & within)
2699 E Hwy 6
Price, Utah 84501

State of Utah (contiguous & within)
School Trust Lands Administration
355 West North Temple
3 Triad Center, Suite 400
Salt Lake City, Utah 84180

Scott W. Mathis, et al (contiguous and within)
1322 S Fairgrounds Rd
Price, Utah 84501

Scott W. And Donna Mathis,(contiguous and within)
1322 S Fairgrounds Rd
Price, Utah 84501

Mathis Canyon Inc (contiguous)
c/o Arnold Mathis
1366 South Fairgrounds
Price, Utah 84501

Blackhawk Coal Company (contiguous)
700 Morrison Road
Gahanna, Ohio 43232

Mary Frandsen Trust (contiguous)
506 S 100 W
American Fork, Utah 84003

## R645-301-112.600. ADJACENT SURFACE AND MINERAL OWNERSHIP

**Interests in Contiguous Lands**

The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior; therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.

## R645-301-112.700. MSHA NUMBERS FOR ALL MINE-ASSOCIATED STRUCTURES

The Centennial Project includes the development of three separate mines. All are currently in operation. The names and M.S.H.A. I.D. numbers for existing mines and all sections are as follow:

Pinnacle Mine - M.S.H.A. I.D. #42-01474
Apex Mine - M.S.H.A. I.D. #42-01750 -Inactive
Aberdeen Mine - M.S.H.A. I.D. #42-02028

## R645-301-112.800. STATEMENT OF ALL LANDS AND INTERESTS IN LANDS

The Uintah-Southwest Utah Federal Coal Leasing Program has been dropped by the U.S. Department of Interior; therefore, previous expressions of interests by this company are no longer valid. However, existing unleased federally owned coal resources remain of interest to Andalex at such time as currently controlled reserves have been exhausted.

## R645-301-113. VIOLATION INFORMATION

### History of Violations

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.100. COMPLIANCE INFORMATION

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

Appendix 1, Part 3 contains a listing of all violations received within the last three years prior to the date of this application by Andalex and affiliated companies.

## R645-301-113.110. SUSPENDED OR REVOKED PERMITS

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex haven't had a mining permit suspended or revoked within the last five years.

## R645-301-113.120. FORFEITED BONDS

Andalex Resources, Inc., affiliates or persons controlled by or under common control with Andalex have not forfeited a mining bond or similar security in lieu of bond.

## R645-301-113.200. EXPLANATION OF PERMIT OF BOND FORFEITURE

N/A

## R645-301-113.210 PERMIT AND BOND IDENTIFICATION

The following is a list of all other licenses and permits under applicable state and federal land-use, air and water quality, water rights and health and safety laws and regulations held by Andalex in order to conduct underground coal mining activities.
All permits listed are up to date and current. The NPDES Permit for the Centennial Project has been replaced by an individual UPDES permit, UT0025674.

1) State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

- Mining and Reclamation Plan for Andalex Resources' Centennial Project
  Permit I.D. Number C/007/019
  Approved January 4, 1982

2) State of Utah
Department of Environmental Quality
Division of Air Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- Air Quality Approval Order, Permit No DAGE-977-96
  Approved June 13, 1980

3) State of Utah
Department of Environmental Quality
Division of Water Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- UPDES permit UT0025674
  (Replaced previous EPA NPDES permit)

- Water Quality - Sediment and Drainage
  Approved May 14, 1980

- Septic and Culinary Plan (2)
  Approved September 17, 1980 (Office Site)
  Approved May 8, 1980 (Bathhouse Facility)

4) Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345
- Access Road Right-of-Way
  Permit Number U-45966
  Granted September 1, 1980

- Buried Telephone Cable Right-of-Way
  Permit Number U-36739
  Granted November 20, 1978

- Power Transmission Line Right-of-Way
  Permit Number U-36741
  Granted November 20, 1978, assigned to UP&L

- Material Storage Site Right-of-Way
  Permit Number U-45965
  Granted September 11, 1980

- Aberdeen Mine Right-of-Way
  Permit Number UTU-62045
  Granted June 6, 1988

5) Mine Safety and Health Administration (M.S.H.A.)
P.O. Box 25367
Denver, Colorado 80225
(District 9)

Pinnacle Mine I.D. 42-01474
Apex Mine I.D. 42-01750 (inactive)
Aberdeen Mine I.D. 42-02028

- Roof Control Plan
  Reviewed and approved every six months

- Ventilation System and Methane and Dust Control Plan
  Reviewed and approved every six months

- Smoking Prohibition Plan
  Approved August 4,1992

- Training Plan
  Approved November 27, 1990

- Instruction Program: Firefighting and Evacuation Plan
  Approved August 4, 1992

- SCSR Storage Plan
  Approved May 18, 1992

- Chest X-Ray Plan
  Approved March 15, 1990

**R645-301-113.220. REGULATORY AUTHORITIES INVOLVED**

See above

**R645-301-113.230. CURRENT STATUS OF PERMIT AND BOND**

See above

**R645-301-113.240. ADMINISTRATIVE OR JUDICIAL PROCEDURES**

Appendix 1, Part 3

**R645-301-113.250. CURRENT STATUS OF PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.300. LIST OF ALL VIOLATIONS NOTICES**

Appendix 1, Part 3

**R645-301-113.310. IDENTIFICATION OF VIOLATIONS**

Appendix 1, Part 3

**R645-301-113.320. DESCRIPTION OF VIOLATIONS**

Appendix 1, Part 3

**R645-301-113.330. LOCATION OF VIOLATIONS PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.340. STATUS OF VIOLATIONS PROCEEDINGS**

Appendix 1, Part 3

**R645-301-113.350. ACTIONS TAKEN TO ABATE VIOLATIONS**

Appendix 1, Part 3

**R645-301-114. RIGHT-OF-ENTRY INFORMATION**

Andalex Resources, Inc., in sublease agreement with AMCA Coal Leasing, Inc., currently holds approximately 4,035.90 acres

of private and federal coal leases and rights-of-way listed below, all of which are included in their entirety within the permit area. Andalex basis its legal right to enter and conduct mining activities in the permit area pursuant to the language contained in the Federal Coal Leases, Section 2, Rights of Lessee as follows:

> "The lessor, in consideration of any bonus paid (or to be paid if deferred), rents and royalties and other conditions hereinafter set forth, hereby grants and leases to the lessee the exclusive right and privilege to mine and dispose of all coal ... subject to the conditions, limitations and prohibitions provided in this lease and in applicable acts and regulations, the right to construct all works, buildings, structures, equipment, and appliances which may be necessary and convenient for the mining and preparation of the coal for market, and subject to the conditions herein provided, to use so much of the surface as may reasonably be required in the exercise of the rights and privileges herein granted..."

A similar right to enter and conduct underground mining activities is contained in the private lease agreement with the Zion Securities Corporation as follows:

> "During the life of the lease, so long as lessee is not in default hereunder, it may freely prospect, mine and develop the lease premises, extract and sell such coal therefrom as it may elect, and use the surface and underground thereof for all lawful purposes including the exploration and mining to be conducted therein and thereon. It may also use the leased lands in connection with the mining and development of other lands which it may own, lease, or acquire as a part of its general mining operations in the area."

Legal right-of-entry information for all federal and fee leases and rights-of-way are found in Appendix J, "Other Approvals". None of the leases' rights-of-entry is a subject of pending litigation.

**The Federal and Fee Coal Leases**: Federal and Fee Coal as well as ROW's and Easements are described in Table 1-1 Below: Plate 3 depicts on a map the Coal Leases:

# TABLE 1-1
## Andalex Resources, Inc.
## Tower Division
### Centennial Project Permit Coal Lease Areas

## FEDERAL COAL LEASES

### Federal Lease UTU-66060

T. 13 S., R. 10 E., SLM, Utah

Section 1

| | | |
|---|---|---|
| Lot 3 | 40.59 | Acres |
| Lot 4 | 40.82 | Acres |
| S1/2 NE | 80.00 | Acres |
| **Total** | **161.41** | **Acres** |

### Federal Lease UTU-69600

T. 13 S., R.10 E., SLM, Utah

Section 1

| | | |
|---|---|---|
| SW1/4 | 160.00 | Acres |

Section 12

| | | |
|---|---|---|
| Lot 3 | 36.71 | Acres |
| Lot 4 | 37.16 | Acres |
| Lot 5 | 44.08 | Acres |
| Lot 6 | 45.01 | Acres |
| Lot 7 | 47.17 | Acres |
| Lot 11 | 47.05 | Acres |
| W1/2 NW | 80.00 | Acres |
| **Total** | **497.18** | **Acres** |

### Federal Lease UTU-010581

T. 13 S., R. 11 E., SLM, Utah

Section 7

| | | |
|---|---|---|
| NW SE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

## Federal Lease UTSL-27304

T. 13 S., R. 11 E., SLM, Utah

Section 7

| | | |
|---|---|---|
| Lot 4 | 42.98 | Acres |

Section 18

| | | |
|---|---|---|
| Lot 1 | 42.98 | Acres |
| NW NE | 40.00 | Acres |
| N1/2 NE NW | 20.00 | Acres |
| SW NE NW | 10.00 | Acres |
| **Total** | **155.96** | **Acres** |

## Federal Lease SL-63058

T. 13 S., R. 11 E., SLM, Utah

Section 18

| | | |
|---|---|---|
| SW NE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

## Federal Lease UTU-81893 (Kenilworth Lease)

T. 12 S., R. 10 E., SLM, Utah

Section 26

| | | |
|---|---|---|
| N1/2 SW1/4 | 80.00 | Acres |
| SE SW | 40.00 | Acres |
| SE | 160.00 | Acres |

Section 27

| | | |
|---|---|---|
| S1/2 | 320.00 | Acres |

Section 34

| | | |
|---|---|---|
| S1/2 NE | 80.00 | Acres |
| NW NE | 40.00 | Acres |
| NW | 160.00 | Acres |
| S1/2 | 320.00 | Acres |

Section 35

| | | |
|---|---|---|
| NE | 160.00 | Acres |
| S1/2 NW | 80.00 | Acres |
| S1/2 | 320.00 | Acres |
| **Total** | **1,760.00** | **Acres** |

## Total of Federal Leases 2,654.55 Acres

# FEE COAL LEASES

## Mathis Fee Lease

T. 12 S., R. 10 E., SLM, Utah
Section 36

| | | |
|---|---|---|
| All | 640.00 | Acres |
| **Total** | **640.00** | **Acres** |

## Zion Fee Lease

T. 13 S., R. 11 E., SLM, Utah
Section 7

| | | |
|---|---|---|
| Lot 2 | 42.99 | Acres |
| Lot 3 | 42.99 | Acres |
| SE NW | 40.00 | Acres |
| E1/2 SW | 80.00 | Acres |
| **Total** | **205.98** | **Acres** |

**Total of Fee Leases 845.98 Acres**

# ROW'S

## Bureau of Land Management ROW U-62045

T. 13 S., R. 11 E., SLM, Utah
Section 18

| | | |
|---|---|---|
| SE NE NW | 10.00 | Acres |
| **Total** | **10.00** | **Acres** |

## Bureau of Land Management ROW UTU-64158 (Left fork fan and access road)

### Located within:

T. 13 S., R. 10 E., SLM, Utah
Section 13
Lot 1

T. 13 S., R. 11 E., SLM, Utah
Section 18
Lot 2
NE SW

| | | |
|---|---|---|
| **Total** | **1.45** | **Acres** |

**Total of BLM R.O.W.'S 11.45 Acres**

# Private Easements

## Cave Private Easement

**Located within:**

T. 13 S., R. 11 E., SLM, Utah
Section 18
SE NW 1.50 Acres

**Total Cave 1.50 Acres**

## Total Private Easements 1.50 Acres

# TABLE 1-2

## Andalex Resources, Inc.
## Tower Division
### Centennial Project Surface Only Leases Within Permit Area

## Federal Lease UTU-66060

T. 13 S., R. 10 E., SLM, Utah
Section 1

| | | |
|---|---|---|
| Lot 1 | 40.12 | Acres |
| Lot 2 | 40.35 | Acres |

T. 12 S., R. 11 E., SLM, Utah
Section 31

| | | |
|---|---|---|
| Lot 3 | 7.58 | Acres |
| Lot 4 | 7.60 | Acres |
| Lot 5 | 7.17 | Acres |
| Lot 12 | 40.00 | Acres |
| Lot 13 | 1.13 | Acres |
| Lot 14 | 40.00 | Acres |
| Lot 15 | 40.00 | Acres |
| Lot 16 | 40.00 | Acres |
| Lot 21 | 22.86 | Acres |
| **Total** | **286.81** | **Acres** |

## Federal Lease UTU-79975

T. 12 S., R. 11 E., SLM, Utah
Section 31

| | | |
|---|---|---|
| Lot 2 | 7.53 | Acres |
| Lot 7 | 40.00 | Acres |
| Lot 8 | 40.00 | Acres |
| Lot 10 | 40.00 | Acres |
| Lot 11 | 40.00 | Acres |
| **Total** | **167.53** | **Acres** |

## Federal Lease UTU-010581

T. 13 S., R. 11 E., SLM, Utah
Section 7

| | | |
|---|---|---|
| SW NE | 40.00 | Acres |
| **Total** | **40.00** | **Acres** |

**Federal Lease UTSL-27304**

T. 13 S., R. 11 E., SLM, Utah
Section 7
SW SE 40.00 Acres

**Total** **40.00 Acres**

**Surface Only Permit Area 534.34 Acres**

## PERMIT AREA TABULATION

| | | |
|---|---|---|
| Federal Coal Leases: | 2,654.55 | Acres (Including Kenilworth) |
| Fee Coal Leases: | 845.98 | Acres |
| BLM Surface R.O.W. | 11.45 | Acres |
| Private Easements: | 1.50 | Acres |
| Surface Only Federal Leases: | 534.34 | Acres |
| Permit Area Subtotal | 4,047.82 | Acres |
| Less OSO Gaswell Area | -11.92 | Acres |
| **Total Permit Area:** | **4,035.90** | **Acres** |

**R645-301-114.100. DOCUMENTATION**

Appendix J

**R645-301-114.200. SEVERED SURFACE AND MINERAL ESTATES**

Appendix J

**R645-301-114.210. WRITTEN SURFACE OWNER CONSENT FOR COAL EXTRACTION**

Appendix R

**R645-301-114.220. CONVEYANCE EXPRESSLY GRANTING RIGHT TO MINE COAL**

Appendix J

**R645-301-114.230. DOCUMENTATION OF LEGAL AUTHORITY TO MINE COAL**

Appendix J

**R645-301-114.300. ADJUDICATION OF PROPERTY RIGHTS DISPUTES**

**R645-301-114.300. ADJUDICATION OF PROPERTY RIGHTS DISPUTES**

The Division does not have the authority to adjudicate property rights disputes.

**R645-301-115. STATUS OF UNSUITABILITY CLAIMS**

Carbon County has authorized mining and reclamation activities within 100 feet of County Road 299. (See Appendix B)

**R645-301-115.100. IDENTIFICATION OF LANDS UNSUITABLE**

The permit area is not within an area designated unsuitable for the surface effects of underground coal mining activities or under study for designation in an administrative proceeding initiated under those pasts. Further, there are no occupied dwellings within 300 feet of the permit area including the Hoffman Creek area.

**R645-301-115.200. CLAIMS OF EXEMPTION BY COMMITMENT PRIOR TO JANUARY 4, 1977**

None.

**R645-301-115.300. MINING AND RECLAMATION OPERATIONS WITHIN 300 FEET OF AN OCCUPIED DWELLING OR WITHIN 100 FEET OF A PUBLIC ROAD**

None.

## R645-301-116. PERMIT TERM

The starting and termination dates as well as the horizontal and vertical extent of the proposed underground mining activities over the total life of the permit are indicated on the revised Pinnacle underground layout map included as Plate 30. Also refer to the underground layout maps for the Apex and Aberdeen Mines (see Plates 29 and 31). Refer to plate 41.

## R645-301-116.100. SCHEDULE OF PHASED MINING AND RECLAMATION ACTIVITIES

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases.

Andalex has added a fan installation in the left-hand fork of Deadman Canyon. This installation was conducted according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) The location of this breakout is shown on Plate 29.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. No significant erosion problems have occurred, Andalex will notify the Division in the event of any slides or other damage.

Andalex will cover acid or toxic forming materials if any are encountered. Andalex will advise the Division in the event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-116.200. PERMIT TERM IN EXCESS OF FIVE YEARS

The requested term of this permit is five years. Andalex will then apply for five year extensions over the life of the mine.

**R645-301-116.210. COMPLETENESS AND ACCURACY FOR LONGER TERM**

N/A

**R645-301-116.220. DEMONSTRATION OF NEED FOR LONGER TERM**

N/A

**R645-301-117. INSURANCE, PROOF OF PUBLICATION AND FACILITIES OR STRUCTURES USED IN COMMON**

Appendix B contains certificates of liability insurance covering personal injury and property damage resulting from this operation. Andalex commits to mitigate all subsidence related damage to renewable resources, including, but not limited to water, grazing, and wildlife habitat including raptor nests.

**R645-301-117.100. LIABILITY INSURANCE**

Appendix B

**R645-301-117.200. NEWSPAPER PUBLICATION**

A copy of the newspaper advertisement of this Mining and Reclamation Plan and proof of publication of the advertisement is filed with the Division and made part of the complete application.

**R645-301-117.300. FACILITIES USED IN COMMON**

The Centennial Project includes the development of three separate mines. All are currently in operation. The names and M.S.H.A. I.D. numbers for existing mines and all sections are as follow:

Pinnacle Mine - M.S.H.A. I.D. #42-01474
Apex Mine - M.S.H.A. I.D. #42-01750 (inactive)
Aberdeen Mine - M.S.H.A. I.D. #42-02028

All coal from the newly acquired AEP Lease will be mined simply as an underground extension of the existing Pinnacle and Aberdeen Mines.

**R645-301-118. FILING FEE**

N/A Page 1-27 of document

## R645-301-120. PERMIT APPLICATION FORMAT AND CONTENTS

Summary of Table of Contents

R645-301-100. General

R645-301-200. Soils

R645-301-300. Biology

R645-301-400. Land Use and Air Quality

R645-301-500. Engineering

R645-301-600. Geology

R645-301-700. Hydrology

R645-301-800. Bonding and Insurance

## R645-301-121. REQUIREMENTS

### R645-301-121.100. CURRENT INFORMATION

Information is current.

### R645-301-121.200. CLEAR AND CONCISE

Information is clear and concise.

### R645-301-121.300. FORMAT REQUIREMENTS

To facilitate review of the application, each chapter listed above has been further divided into specific parts and sections. These can be found listed in the detailed table of contents appearing at the beginning of this text along with the page numbers on which they appear. This table of contents also contains lists of figures, tables, plates, exhibits, and appendices to facilitate cross referencing between chapters.

Exhibits include appropriate supporting documents, reports and publications and are included as appendices.

Maps which were not reduced to fit into the text are included in a separate volume as plates. All maps and plans are submitted in accordance with the requirements.

## R645-301-123. APPLICATION FOR PERMITS, CHANGES, RENEWALS, OR TRANSFERS

Text deleted as instructed by Technical analysis.

## R645-301-130. REPORTING AND TECHNICAL DATA

Persons and Consultants Involved

The following persons and/or organizations were involved in collection and analysis of the technical data set forth in this application.

1. In-House Consulting Services

   a) Andalex Resources, Inc. - AMCA Coal Leasing, Inc.
   Samuel C. Quigley - Western Project Manager (Former)
   Michael W. Glasson - Senior Geologist (Former)
   Allen D. Emmel - Environmental Planning Coordinator (Former)

2. Outside Consulting Services

   a) Dan W. Guy - Registered Professional Engineer (State of Utah No. 4548)
   Price, Utah
   -Sedimentation and Drainage Control Plan (April, 1980)

   - Wastewater Disposal System; Pinnacle Mine (April, 1980)
   Office Building (September, 1980)

   b) Bruce T.S. Ware - Registered Land Surveyor
   Price, Utah

   c) A and W Surveying
   Price, Utah

   d) Commercial Testing & Engineering Co.
   Denver, Colorado

   e) Standard Laboratories
   Huntington, Utah

f) Western Testing and Engineering
Helper, Utah

g) VanCott, Bagely, Cornwall and McCarthy
Attorneys at Law
Salt Lake City, Utah

h) Rollins, Brown, and Gunnel
Provo, Utah

i) Brigham Young University
Provo, Utah
Department of Zoology
Clayton M. White
(Raptor Study)
Department of Anthropology/Archaeology
Dr. Ray T. Matheny
(Archaeological Survey)

j) Earth Environmental Consultants
Albuquerque, New Mexico

k) Vaughn Hansen Associates
Salt Lake City, Utah
(Hydrology Study)

l) Horrocks Engineers
American Fork, Utah

Coordination and Consultation with Governmental Agencies

The following governmental agencies were consulted in the preparation of information set forth in this application.

U.S. Department of Agriculture
Soil Conservation Service
Price, Utah
(Soil and Vegetation Survey)

U.S. Department of the Interior
Bureau of Land Management
Price, Utah
Salt Lake City, Utah

Office of Surface Mining, Reclamation and Enforcement
Denver, Colorado

U.S. Geological Survey

Salt Lake City, Utah

State of Utah:
Department of Natural Resources
Division of Oil, Gas, and Mining
Salt Lake City, Utah

Antiquities Section (Consulting Services Branch)
Salt Lake City, Utah
(Archaeological Survey)

Department of Natural Resources
Division of Wildlife Resources
Salt Lake City, Utah

References:

AMCA Coal Leasing, Inc., 1978. Mining and Reclamation Plan, Zion's Fee. Submitted to the State of Utah, Department of Natural Resources, D.O.G.M.

Centennial Coal Associates, 1976. Mining Application. Submitted to the U.S. Geological Survey.

Doelling, H.H., 1972. Central Utah Coal Fields. U.G.M.S. Monograph Series No. 3.

U.S.D.A., 1978. Soil Survey and Interpretations of the Coal Creek Emery Portion of the Price River and Emery County Areas, Carbon and Emery Counties, Utah. S.C.S.

U.S.D.I., 1979. Final Environmental Statement, Development of Coal Resources in Central Utah, Parts 1 and 2.

U.G.M.S., 1966. Central Utah Coals. U.G.M.S. Bulletin No. 80.

## R645-301-131. TECHNICAL DATA REQUIREMENTS

Where applicable, technical data submitted has been identified as to who prepared the information and is stamped by that registered professional engineer (P.E.).

## R645-301-132. TECHNICAL ANALYSES REQUIREMENTS

Analyses are prepared by a qualified professional engineer.

**R645-301-140. MAPS AND PLANS**

**R645-301-141. MAP FORMATS**

**R645-301-142. PHASES OF OPERATIONS AND MINING ACTIVITY**

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are now essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam.

The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County in T12 and 13S and R10 and 11E (See Figure 1-2. The existing permit property is located in the Book Cliffs coal field and includes Alrad Canyon, Deadman Canyon, Starpoint Canyon, Straight Canyon, and Hoffman Creek Canyon areas. The Kenilworth Tract occupies the area of Summit Creek, Deep Canyon and Mathis Canyon. The Coal outcrops along the cliffs between 7,000 feet and 7,700 feet elevations. The topography is very rugged, the Book Cliffs being dissected by box canyons created by ephemeral streams. Large sandstone boulders eroded from the cliffs are scattered along the sides of the canyons. The land is undeveloped, used primarily for grazing, and there are no areas of national importance in the region. Mountain-Brush vegetative type covers most of the area.

There are no perennial streams or bodies of water on the property. Ground water recharge is from precipitation in the vicinity. Water supply for mine development and culinary usage is supplied by wells that have been drilled.

Historically, coal mining has been the only industry in the permit area and there are several abandoned mines located on the property. No oil or gas wells exist in the area.

Access to the mine plan area is by an existing paved county road which has been upgraded and is maintained by Carbon County. Maintenance consists of paving, chipping, patching, culvert work, ditch work, signs, snow removal, painting, patrolling (county sheriff), etc., as needed. Andalex assumes no responsibility for road maintenance or repair. The road is used as an access road as well as a haul road. It should be noted that in the event of a catastrophic event which damaged the road, Andalex would pursue all avenues to assist Carbon County in reparation of the road. All surface and support facilities necessary for present operations have been completed and are located on the Zion's fee or on rights-of-way granted by the Bureau of Land Management. This is also a small private easement granted to Andalex from Gladys M. Artman for a small portion of pond E. All proposed facilities are indicated in this application. Andalex has acquired all applicable state and federal licenses, permits, and rights-of-way necessary to conduct mining activities on the Zion's fee property and contiguous federal leases.

As of 7-6/2007 the Apex Mine and the Pinnacle Mine have been worked out. The Apex Mine has been sealed at the portals. The Pinnacle mine is still being ventilated because the power to the Aberdeen mine runs into the Pinnacle mine from the substation and then drops down to the Aberdeen Mine through a borehole connecting the two mines. However, there are no plans to produce any more coal from the Pinnacle Mine. Therefore, all existing and future mine production from the Centennial Project will be solely from the Aberdeen Mine

Upon cessation of mining activities, reclamation activities will commence as soon as is practicable, according to the approved Mining and Reclamation Plan. The land will be restored according to available technology to as nearly its original condition as is possible.

This operation does not face any of the mining complications caused by faults or intrusives. The mine plan area is located in a region where mining has been the major industry; therefore, the nearby communities are geared for coal operations. The labor supply is excellent and well trained. With these considerations, and Andalex's prudent management, the Centennial Project has become a model mining

operation in the Carbon County area with very minimal environmental and socioeconomic impact.

**R645-301-142.100. PRIOR TO AUGUST 3, 1977**

None by Andalex Resources. Several mines were operated by other independent companies or individuals in areas presently consumed by Andalex's surface facilities. Andalex's encroachment onto these previously disturbed areas transferred the responsibility for reclamation to Andalex. The specific locations of disturbed areas prior to Andalex's mining activities is irrelevant.

**R645-301-142.200. AFTER AUGUST 3, 1977**

All of Andalex's surface facilities and mining operations began after August 3, 1977.

**R645-301-142.210. PRIOR TO MAY 3, 1978**

See R645-301-142.100.

**R645-301-142.220. SMALL OPERATOR'S EXEMPTION PRIOR TO JANUARY 1, 1979**

N/A

**R645-301-142.300. AFTER MAY 3, 1978 (OR JANUARY 1, 1979 FOR SMALL OPERATOR'S EXEMPTION) AND PRIOR TO APPROVAL OF STATE PROGRAM**

N/A

**R645-301-142.400. AFTER ISSUANCE OF PERMIT BY THE DIVISION**

The following is a list of all other licenses and permits under applicable state and federal land-use, air and water quality, water rights and health and safety laws and regulations held by Andalex in order to conduct underground coal mining activities.

All permits listed are up to date and current. The NPDES Permit for the Centennial Project has been replaced by an individual UPDES permit, UT0025674.

1) State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210

Salt Lake City, Utah 84114-5801

- Mining and Reclamation Plan for Andalex Resources' Centennial Project
Permit I.D. Number C/007/019
Approved January 4, 1982

2) State of Utah
Department of Environmental Quality
Division of Air Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- Air Quality Approval Order, Permit No DAGE-977-96
Approved June 13, 1980

3) State of Utah
Department of Environmental Quality
Division of Water Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820

- UPDES permit UT0025674
(Replaced previous EPA NPDES permit)

- Water Quality - Sediment and Drainage
Approved May 14, 1980

- Septic and Culinary Plan (2)
Approved September 17, 1980 (Office Site)
Approved May 8, 1980 (Bathhouse Facility)

4) Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, Utah 84101-1345

- Access Road Right-of-Way
Permit Number U-45966
Granted September 1, 1980

- Buried Telephone Cable Right-of-Way
Permit Number U-36739
Granted November 20, 1978

- Power Transmission Line Right-of-Way

Permit Number U-36741
Granted November 20, 1978, assigned to UP&L

- Material Storage Site Right-of-Way
  Permit Number U-45965
  Granted September 11, 1980

- Aberdeen Mine Right-of-Way
  Permit Number UTU-62045
  Granted June 6, 1988

5) Mine Safety and Health Administration (M.S.H.A.)
P.O. Box 25367
Denver, Colorado 80225
(District 9)

Pinnacle Mine I.D. 42-01474
Apex Mine I.D. 42-01750 (inactive)
Aberdeen Mine I.D. 42-02028

- Roof Control Plan
  Reviewed and approved every six months

- Ventilation System and Methane and Dust Control Plan
  Reviewed and approved every six months

- Smoking Prohibition Plan
  Approved August 4,1992

- Training Plan
  Approved November 27, 1990

- Instruction Program: Firefighting and Evacuation Plan
  Approved August 4, 1992

- SCSR Storage Plan
  Approved May 18, 1992

- Chest X-Ray Plan
  Approved March 15, 1990

**R645-301-150. COMPLETENESS**

Per Division.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 2

## Soils

## C/007/019

(Revised)
May, 2014

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## R645-301-200. SOILS

## R645-301-210. INTRODUCTION

~~As the Mathis Tract and New Federal Summit Creek Lease. boundary change~~ The Kenilworth Lease (UTU-81893)Boundary Change is simply an extension to the Aberdeen Mine workings and will in no way involve any new surface facilities or otherwise have any affect on the surface. It does not involve any new hydrologic basins. It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which was approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 1986 through the normal LBA process after an application by Andalex Resources. Refer to R645-301-200 through R645-301-800 for additional information.

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam. The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County.(See Plate 1).

The Operator relinquished portions of the mined out Federal coal leases in two separate lease relinquishments. The first lease relinquishment approved 3/12/2012 reduced the Federal coal leased acreage from 5,436.24 down to 2,813.48. The second coal relinquishment reduced the Federal coal lease even further down to 894.55 acres. UEI retained all areas of surface disturbance conducted in association with the underground mining and surface access to the gob-vent holes was retained through surface use agreements.

With the relinquishments the permit acreage dropped from 6,516.91 down to 2,274.77 acres. When Kenilworth lease is added the permit acreage goes back up to 4,035.90 which is the new

permit acreage. The disturbed area has not changed and remains at 47.19 acres. Since the disturbed area has not changed and the disturbed legal description stays the same the bond does not change with the addition of the Kenilworth lease.

As the Kenilworth Tract is simply an extension of underground mine workings under roughly 2,600000 to 3,000 feet of cover there will be absolutely no effect on soils.

## R645-301-211. ~~——~~PREMINING SOIL RESOURCES

The ~~s~~Regional Soils ~~m~~Map, shown as Plate 18 in Volume II~~, is a combination of the information provided by both EEC and SCS~~. EEC performed the work on the north and south one-thirds of the disturbed area and the SCS performed the work on the one-third in the middle. This was for the original Pinnacle Mine approval on the Zion's Fee area (please see second half of Appendix M~~)~~.

The acreages given by EEC in their soils report does not include the entire disturbed area since we know that the SCS surveyed roughly one-third of the disturbed or "to be" disturbed area. The correct acreages as planimetered by Andalex staff is ~~34~~47.~~2~~19 acres including the GVH holes. This of course includes the area where the Aberdeen Mine has been developed. The area of disturbed Brycan is approximately 8 acres and the Datino is 4 acres within the SCS survey. EarthFax Engineering has performed the Order 1 soil survey for the left fork fan installation. (See Appendix M.)

## R645-301-212. ~~——~~STOCKPILING AND REDISTRIBUTION

### Topsoil Handling During Operations

Removal

The area from which topsoil ~~has~~ was projected to be~~en~~ removed is ~~34~~47.~~2~~19 acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site near the facility location. The topsoil was removed as a separate operation from areas to be disturbed by surface installations such as roads and areas upon which support facilities are sited. The left fork topsoil will be salvaged according to EarthFax.

Storage

The topsoil storage areas are shown on Plate 6. The topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation and the use

of berms.

Surveys conducted on the topsoil piles which were drawn into plans and profiles are now included in the plan in Volume II, Plates 37 and 36. This shows volumes stored currently.

The completed disturbance which reports to sedimentation Pond E is 9.96 acres. Please review the top soil summaries which show totals.

The new substitute topsoil pile plan and profile is included.

The new substitute topsoil will be protected by the use of vegetation.

Disturbed areas no longer required for the conduct of mining operations have been revegetated. Upon completion of mining activities, topsoil will be distributed and reclamation will commence as outlined. Andalex will adhere to all UDOGM guidelines.

## R645-301-220. ENVIRONMENTAL DESCRIPTION

~~Appendix M.~~ Regional soils information for the Kenilworth Tract is taken from the approved Willow Creek permit 007/0038, and is presented herein verbatim:

**3.1.1.3 Regional Soils Information**

The USDA-SCS General Soils Map - Carbon County Area, Utah, shows the following three general soils types as occurring within the boundaries of the permit area:

* Type 7 - Strych-Gerst-Travessilla: Shallow to very deep, well drained, nearly level to moderately steep soils, on outwash plains, benches and mesas

* Type 10 - Travessilla-Rock Outcrop-Midfork Family: Shallow to very deep, well drained, steep and very steep, soils; and rock outcrop, on mountain slopes and canyonsides

* Type 14 - Beje-Traq-Senchert: Shallow to very deep, well drained, gently sloping to moderately steep soils, on plateaus and mountain valley floors

Type 10 is found over approximately 85 percent of the permit area and is found in nearly all areas except a portion of the extreme northeast comer of the permit area and a narrow tier along the southern edge of the permit area. Descriptions of each of these primary soil types as contained in the USDA-SCS Soils Survey are as follows:

Additional information can be found in Appendix M.

## R645-301-221. PRIME FARMLAND INVESTIGATION

The land within the Kenilworth lease area has not been historically used as cropland, contains steep slopes, and the area is not conducive to intensive agricultural uses and no surface disturbance. The Permittee does not believe that any Prime Farmland exists with the permit revision area, Kenilworth lease, being added to the Mine and Reclamation Plan. The Kenilworth lease has been previously permitted under the Willow Creek Mine Permit ACT/007/0038. Since Kenilworth lease is found in T12S R10E Section 26, the Willow Creek Permit information found below is pertinent. Prime farmland information for the Kenilworth Tract is taken from the Willow Creek permit presented herein verbatim:

### 3.1.1.6 Prime Farm Land

Several previous investigations have been conducted for the permit area to determine whether any prime farmlands exist in the area. Each of these investigations involved formal consultation with the USDA-SCS. The initial determination, included in PRCCs Mining and Reclamation Permit application, was provided by Mr. George D. McMillan, USDA-SCS State Conservationist in a letter dated July 16, 1979. This letter concluded that, based upon the absence of any irrigation, and excessive slopes, no prime farmlands existed in the area corresponding to Townships 12 & 13 South, Ranges 8, 9 and 10 East. A second negative determination for prime farmlands in the permit area was issued in connection with the permitting efforts for the CGCC Permit submitted to UDOGM in February 1991. The CGCC permit application contains a letter dated May 21, 1991 from Mr. Ferris P. Allgood, USDA-SCS State Soil Scientist, stating that due to the excessive amount of rock fragments, high erodibility and lack of a reliable source of irrigation waters for lands within the CGCC Mine Permit area, the soils within this area are excluded from consideration as important farmlands. Confirmation of these negative determinations was included in the findings documents issued by UDOGM for both permit applications and documentation is provided in Exhibit 5, Soils Information. Since the limitations which exclude these soils for consideration as prime farmlands still exist, and all surface disturbance associated with the mining and reclamation activities will occur on either previously disturbed areas or on slopes greater than ten percent, UDOGM is requested to reaffirm the negative determination regarding the presence of prime farmland soils in the permit area.

Additional information can be found in Appendix M.

## R645-301-222. SOIL SURVEY

Appendix M

## R645-301-222.100. SOIL MAP

## R645-301-230. ——OPERATION PLAN

**Topsoil Handling During Operations**

Removal

The area from which topsoil has been removed is ~~34~~47.~~2~~19 acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site near the facility location. The topsoil was removed as a separate operation from areas to be disturbed by surface installations such as roads and areas upon which support facilities are sited. Approximately 750 cubic yards of topsoil will be stored in the left hand fork of Deadman Canyon for use during reclamation of the left fork fan installation. (See Plate LF-1.)

Storage

The topsoil storage areas are shown on Plate 6. The topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation and the use of berms.

Surveys conducted on the topsoil piles which were drawn into plans and profiles are now included in the plan in Volume II, Plates 37 and 36. This shows volumes stored currently.

The completed disturbance which reports to sedimentation Pond E is 9.96 acres. Please review the top soil summaries which show totals and deficiencies in R645-301-224.

The new substitute topsoil pile plan and profile is included.

The new substitute topsoil will be protected by the use of vegetation.

## R645-301-231. GENERAL REQUIREMENTS

## R645-301-231.100 REMOVAL AND STORAGE

See R645-301-212.

## R645-301-231.200. SUITABILITY OF TOPSOIL SUBSTITUTES

## R645-301-232.600. TIMING

All soils have been removed ~~with the exception of the fan break-out location in the left fork. This will be done in the autumn of 1995.~~

## R645-301-232.700. TOPSOIL AND SUBSOIL REMOVAL UNDER ADVERSE CONDITIONS

N/A

## R645-301-232.710. IMPRACTICABILITY

N/A

## R645-301-232.720. IMPORTING TOPSOIL MATERIAL

N/A

## R645-301-233. TOPSOIL SUBSTITUTES AND SUPPLEMENTS

See R645-301-224.

## R645-301-233.100. SELECTED OVERBURDEN MATERIALS

See R645-301-224.

## R645-301-233.200. SUITABILITY OF TOPSOIL SUBSTITUTES AND SUPPLEMENTS

See R645-301-224.

## R645-301-233.300. PHYSICAL AND CHEMICAL ANALYSES

Appendix M

## R645-301-233.310. SCS PUBLISHED DATA

Appendix M

## R645-301-233.320. SCS TECHNICAL GUIDES

Appendix M

See R645-301-212.

## R645-301-234.310. CAPABILITY OF HOST SITE

## R645-301-234.320. SUITABILITY FOR REDISTRIBUTION

See R645-301-212.

## R645-301-240. RECLAMATION PLAN

**Timetable of Major Reclamation Steps**

Introduction

As this is an underground mine, there will be a limited amount of surface disturbance, consequently, reclamation will be uncomplicated.

All disturbed areas no longer required for the conduct of mining operations were immediately revegetated. In the future, any areas no longer required for operations will also be immediately reclaimed and revegetated. The only new surface disturbance required at this time will be for a mine-fan break-out in the left fork of Deadman Canyon.

When buildings and final site preparation had been completed, the soil was revegetated to prevent erosion.

When the project is expired, all buildings and extraneous material will be removed, all mine openings will be covered and sealed, roads will be regraded and using the most advanced technology at the time, Andalex will re-establish the terrain to as nearly the original as practical. The area will be reseeded and vegetation re-established in accordance with recommendations from the regulatory authorities.

Reclamation Timetable

This timetable represents the general sequence which will be used for final reclamation. The bond estimate has the costs broken down on a site by site basis; however, actual work will be performed simultaneously at all the sites. For example, all structures and buildings will be removed prior to any recontouring. This will allow us to have certain equipment for certain jobs the shortest time possible. ~~It should also be noted that this project may coincide with a salvage project thereby reducing Andalex's cost, however, this is not reflected in the~~

~~bond estimate.~~ Detail of work involved in various jobs (portal seals, revegetation, etc.) ~~is~~can be found ~~elsewhere~~ in ~~this chapter~~Appendix C.~~-~~ The addition of the ~~AEP~~Kenilworth Lease will have no impact on the reclamation schedule or cost.

Phase I

Job 1. Portal Seals (include fan removal)
- a. 4 Apex
- b. 7 Pinnacle
- c. 7 Aberdeen (includes left fork)
- d. 5 Wells

Job 2. Building Removal
- a. 1 Shop
- b. 1 Main Office
- c. 3 Trailers (2 warehouse, 1 lab)
- d. 3 Lamphouses
- e. 3 Bathhouses

Job 3. Structure Removal
- a. 3 Mine Conveyor Structures
- b. 3 Truck Loadouts
- c. 1 Substation
- d. Power distribution lines
- e. 4 Water Tanks
- f. 5 Fuel Tanks
- g. Main and Side Culverts * ~~(includes left fork)~~

Job 4. Recontouring & Regrading*
- a. 105,500 yds.$^3$ fill material
- b. Enlarge Pond E, Remove B and C

Job 5. Compaction, Scarification
- a. 33.5 acres (not including Pond E)
- b. Additional sediment measures, i.e., check dams

Job 6. Topsoil Redistribution
- a. ~~34~~47.~~2~~19 acres (additional approved substitute hauled in if necessary)

* Culverts will be removed starting at the north end so that natural drainage may be re-established as the culvert is removed.

Job 7. REVEGATATION
- a. 2.15 acres shrubs
- b. 14.32 acres drainage (except Pond E)
- c. 17.03 acres slopes

**Reclamation Cost and Bonding**

Introduction

~~An estimate is provided in the Reclamation Cost Projection. Notably changed from the original bond estimate is the addition of the shop/warehouse complex, the removal of which will have to be added to~~ An estimate for the reclamation ~~cost. The original estimate has also been revised to reflect current prices and wage estimate has also been revised to reflect current prices and wage schedules. Andalex frequently requires the use of dirt contractors and is therefore current on equipment rental costs, labor costs, and productivity, since we have a great deal of experience with construction projects. Andalex has used its experience in construction and earth moving projects to estimate the amount of time which will be required and the equipment needed for individual reclamation activities. Andalex has also been involved with several revegetation projects from which it drew estimates.~~ costs is provided in appendix B. Andalex has provided, as Plate 15, accurate as built versus reclaimed cross sections which show the mass balance for earthwork. The approximate original contours will be achieved using the material cut out to create the fill areas. No material will be hauled in. Maps depicting accurately the surface facilities including topsoil areas, structures and facilities are included in Volume II and also specific topsoil maps and cross sections are included. Andalex expects to return topsoil to a depth of up to 6" around the surface area of ~~34~~47.~~2~~19 acres.

Phase I of the reclamation will include, chronologically, structure removal including culverts, portal sealing, well sealing, regrading, recontouring, distribution of topsoil and revegetation. Additional sediment control during Phase I such as straw dikes and rock check dams will be implemented as shown on Plate 16. Once Phase I is adequately achieved, Phase II will commence which includes the removal of sediment structure E and revegetation of this area. This is followed by monitoring, noting that monitoring had begun during Phase I. See 5.8 re Monitoring. This section discusses the extended period of liability as being ten years if necessary. The entire permit area receives less than 26 inches of annual precipitation; therefore, it is generally accepted that Andalex is subject to an extended period of liability. Obviously if revegetation is deemed successful prior to this ten year period, Andalex will request bond release. Andalex has not proposed any selective husbandry practices.

## Cost of Reclamation

Detailed Estimate

A detailed cost projection is included in Appendices B and C.

Calculations

Calculations of the estimate reclamation costs are included ~~following this page~~in Appendices A and B. Calculations for cuts and fills were made and are ~~summarized following the bond estimate~~included. This summary shows the mass balance for the entire disturbed area ~~including the Aberdeen site~~, as taken from Plates 14 and 15. Station numbers are referenced on Plate 14 and cross sections are shown on Plates 15-1, 2, and 3. Similarly, topsoil piles have been surveyed for the existing minesite and are summarized following the cut and fill summary. Because of deficits Andalex has committed to testing topsoil substitute areas.

## Bond or Surety Arrangement

Andalex currently holds a bond, approved by UDOGM in the amount ~~of $1,080,000.00 and it is included in this MRP in Appendix B.~~

~~Reclamation Plan (before bond estimate)~~

~~The productivity of equipment is somewhat difficult to predict, and therefore, Andalex feels that conservative estimates were in order. There are many variables which contribute to the productivity of a particular machine, including operator skill, type of material, and the condition of the material.~~

~~It is obvious that a front-end loader, for example, can move more topsoil from a pile than, for example, a bouldery conglomerate of highly compacted material.~~

~~However, for the purpose of this analysis, it should be assured that based on means cost data the following prices on earthwork can be used:~~

~~Open Dozer grading : $2.25/yd~~
~~Fill Placement : $1.16/yd~~
~~Topsoil Placement: $1.16/yd~~
~~Topsoil Hauling: $4.55/yd~~
~~Compaction: $.21/yd~~

~~The following cost projection reflects hourly rates. An~~

~~additional earthwork estimate can be found following the mass balance estimates.~~

shown in Appendix B.

Regarding the left hand fork fan installation, the specific time table for this project will coincide with the reclamation of the right hand fork minesite. ~~The bond estimate now includes this fan installation and is still well within Andalex's existing bond amount.~~ The specific schedule for reclamation of the fan will begin with the cut slope backfill, followed by removal of the culvert from the left fork drainage and, finally, by streambed reclamation the same as will be performed in the right hand fork. According to comments received by the majority of the surface lands managers, the access road to the left hand fork fan installation will be reclaimed by recontouring to the extent possible (this road has been in existence for over 50 years) and revegetated. One of the surface owners (Gladys Artman) has specifically indicated her desire to leave the road in place, therefore, her permission will be required to reclaim the road. Topsoil redistribution and revegetation will follow the culvert removal. During both construction and reclamation phases, Andalex will provide adequate supplementary sediment control in the form of silt fences and/or straw berms to prevent additional sediment loads to the drainage.

Andalex has supplied the Division with a Drawing entitled "Left Hand Fork Cut/Fill". This drawing has a notation which indicates that the existing contours will reflect the reclamation contours (post-mining).

~~Revised 8/8/95~~

1989

Reclamation Cost Projection

Centennial Project

Lower Sunnyside Mine

Restoration to pre-mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Coal Pile Storage Area | | | |
| a. Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. Fill pad | Loader | 55 | 4,400 |
| c. Contour slope including stream channel | D-7 | 50 | 4,000 |
| d. Compact | Loader | 15 | 1,200 |
| e. Replace topsoil | Loader | 23 | 1,840 |
| f. Grade topsoil | Grader | 15 | 1,050 |
| g. Revegetate | Drill | 7 | 350 |
| h. Stake | Engineer | 14 | 700 |
| Total Coal Pile Area: | | | $14,180 |
| 2. Roads | | | |
| a. Recontour | D-7 | 5 | $ 400 |
| b. Compact | Loader | 3 | 240 |
| c. Replace topsoil | Loader | 2 | 160 |
| d. Grade topsoil | Grader | 2 | 140 |
| e. Revegetate | Drill | 1 | 50 |
| Total Roads: | | | $ 990 |
| 3. Seal Wells (2) | | | |
| a. Fill, cement | | | $ 800 |
| Total Wells: | | | $ 800 |
| 4. Material Storage Area (including topsoil pile) | | | |
| a. Remove all structures | 5 man crew | 120 | $ 9,000 |
| b. Recontour including stream channel | D-7 | 30 | 2,400 |
| c. Compact | Loader | 4 | 320 |
| d. Replace topsoil | Loader | 8 | 640 |
| e. Grade topsoil | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| g. Stake | Engineer | 14 | 700 |
| Total Material Storage: | | | $13,440 |

Gilson (Pinnacle Mine)

Restoration to the pre-mining land use will require:

| | Job Description | Equipment | Hours | Cost |
|---|---|---|---|---|
| 1. | Mine Portal Area | | | |
| a. | Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. | Fill pad | Loader | 12 | 960 |
| c. | Contour slope | D-7 | 8 | 640 |
| d. | Compact | Loader | 4 | 320 |
| e. | Replace topsoil | Loader | 6 | 480 |
| f. | Grade topsoil | Grader | 4 | 280 |
| g. | Revegetate | Drill | 2 | 100 |
| h. | Stake slope | Engineer | 4 | 200 |
| | Total Portal: | | | $ 3,620 |
| 2. | Roads (1 mile) | | | |
| a. | Recontour | D-7 | 20 | $ 1,600 |
| b. | Compact | Loader | 10 | 800 |
| c. | Topsoil | Loader | 8 | 640 |
| d. | Grade | Grader | 8 | 560 |
| e. | Revegetate | Drill | 4 | 200 |
| | Total Roads: | | | $ 3,800 |
| 3. | Coal Pile Area | | | |
| a. | Fill pad | Loader | 16 | $ 1,280 |
| b. | Contour slope including stream channel | D-7 | 20 | 1,600 |
| c. | Compact | Loader | 4 | 320 |
| d. | Topsoil | Loader | 6 | 480 |
| e. | Grade | Grader | 4 | 280 |
| f. | Revegetate | Drill | 2 | 100 |
| g. | Stake | Engineer | 4 | 200 |
| | Total Stockpile Area: | | | $ 4,260 |
| 4. | Seal Wells | | | |
| a. | Fill, cement | | 8 | $ 1,000 |
| | Total Wells: | | | $ 1,000 |
| 5. | Material Storage & Building Areas | | | |
| a. | Remove all structures (including shop/ warehouse) | 5 man crew | 240 | $27,000 |
| b. | Recontour including stream channel | D-7 | 30 | 2,400 |
| c. | Compact | Loader | 4 | 320 |
| d. | Replace topsoil | Loader | 8 | 640 |
| e. | Grade | Grader | 4 | 280 |
| f. | Revegetate | Drill | 2 | 100 |
| | Total Material: | | | $30,740 |

Aberdeen Mine

Restoration to the pre-mining land use will require:

| | Job Description | Equipment | Hours | Cost |
|---|---|---|---|---|
| 1. | Mine Portal Area | | | |
| a. | Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. | Fill pad | Loader | 24 | 1,920 |
| c. | Contour slope | D-7 | 16 | 1,280 |
| d. | Compact | Loader | 8 | 640 |
| e. | Replace topsoil | Loader | 12 | 960 |
| f. | Grade topsoil | Grader | 8 | 560 |
| g. | Revegetate | Drill | 4 | 200 |
| h. | Stake slope | Engineer | 8 | 400 |
| | Total Portal Area: | | | $ 6,600 |
| 2. | Coal Pile Area (including topsoil storage and sedimentation pond) | | | |
| a. | Fill pad | Loader | 50 | $ 4,000 |
| b. | Contour slope including stream channel | D-7 | 50 | 4,000 |
| c. | Compact | Loader | 15 | 1,200 |
| d. | Replace topsoil | Loader | 22 | 1,760 |
| e. | Grade topsoil | Grader | 15 | 1,050 |
| f. | Revegetate | Drill | 7 | 350 |
| g. | Stake slope | Engineer | 14 | 700 |
| | Total Stockpile Area: | | | $13,060 |

Office Site

Restoration to pre-mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Office Site | | | |
| a. Remove structures | 5 man crew | 50 | $ 3,750 |
| b. Recontour | D-7 | 8 | 640 |
| c. Compact | Loader | 4 | 320 |
| d. Replace topsoil | Loader | 4 | 320 |
| e. Grade topsoil | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| g. Stake slope | Engineer | 4 | 200 |
| Total Office Site: | | | $ 5,610 |
| 2. Seal Well (1) | | | |
| a. Fill, cement | | 4 | $ 400 |
| Total Well: | | | $ 400 |
| 3. Roads 1/4 Mile | | | |
| a. Recontour | D-7 | 5 | $ 400 |
| b. Compact | Loader | 3 | 240 |
| c. Replace topsoil | Loader | 2 | 160 |
| d. Grade topsoil | Grader | 2 | 140 |
| e. Revegetate | Drill | 1 | 50 |
| Total Roads: | | | $ 990 |

Total Projected Reclamation Costs:

| | |
|---|---|
| Lower Sunnyside Mine | $ 29,410 |
| Gilson (Pinnacle) Mine | 43,420 |
| Aberdeen Mine | 19,660 |
| Office Site | 7,000 |
| Monitoring (5 years) | 10,000 |
| Total Reclamation, 1987 $ | $109,490 |
| Contingency 10% | 10,950 |
| Grand Total* | $120,440 |

* Please note that as no reclamation is required for the Centennial Seam Mine no costs for reclamation are described above.

As Constructed Earthwork Volume (Aberdeen Mine)

| | | |
|---|---|---|
| Cut | 63,506 yds.$^3$ | |
| Fill | 66,625 yds.$^3$ | |
| Topsoil | 3,500 yds.$^3$ | (Piles H & J) |

As Constructed Earthwork Volumes
(including Aberdeen Site)

| | |
|---|---|
| Cut | 117,273 yds.$^3$ |
| Fill | 112,969 yds.$^3$ |
| Topsoil | 8,500 yds.$^3$ |

For purposes of reclamation costs for earthwork, the following estimates can be used. Please keep in mind that as built cross sections for the Aberdeen Mine will aid in the final earthwork estimates.

~~Open Grading (including 10% swell factor)~~
~~66,625 + 6663 = 73,288 @ $2.22~~
~~112,969 + 11,297 = 124,266 @ $2.25~~
~~197,554 @ $2.25 = $444,500~~
~~Topsoil Hauling and Placement~~
~~22,000 + 2200 = 24,200 @ $5.71 = $138,000~~
~~Compaction~~
~~158,294 @ $.21 = $33,242~~
~~Total Earthwork: $615,742~~

There is a 8,000 yd.$^3$ topsoil deficit. The topsoil substitutes will make up this deficit.

The test plots previously discussed regarding the topsoil deficit is further discussed here.

Two test plot locations were decided upon based on certain known parameters. The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the ~~rEVEGATATION~~revegetation test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the deficit problem.

## R645-301-241. GENERAL REQUIREMENTS

## R645-301-242. SOIL REDISTRIBUTION

Soil is to be redistributed to a depth of 6-inches across the entire ~~34~~47.~~2~~19 acre disturbed area.

## R645-301-242.100. CRITERIA FOR REDISTRIBUTION

The only criteria is that it will be redistributed to a depth of 6 inches.

## R645-301-242.110. UNIFORMITY AND CONSISTENCY

The soil will be redistributed uniformly and consistent with the regraded contours.

## R645-301-242.120. PREVENTION OF COMPACTION

Once redistributed, unnecessary compaction from equipment will be avoided.

## R645-301-242.130. PROTECTION FROM WIND AND WATER EROSION

The topsoil will be protected from wind and water erosion through mulching.

## R645-301-242.200. REGRADING AND TREATMENT

Not applicable, unless unacceptable rills and gullies are observed.

## R645-301-242.300. EMBANKMENTS OF PERMANENT IMPOUNDMENTS OR ROADS

N/A

## R645-301-242.310. PREVENTION OF SEDIMENTATION

Pond E will be in place until the release of Phase I reclamation.

## R645-301-242.320. OTHER METHODS OF STABILIZATION

## R645-301-243. SOIL NUTRIENTS AND AMENDMENTS

As needed to be determined through Phase I monitoring.

## R645-301-244. SOIL STABILIZATION

See R645-301-242.

## R645-301-244.100. EROSION CONTROL AND AIR POLLUTION

See R645-301-242.

## R645-301-244.200. SOIL STABILIZING PRACTICES

See R645-301-242.

## R645-301-244.300. RILLS AND GULLIES

See R645-301-242.

## R645-301-244.310. DISRUPTION OF POSTMINING LAND USE OR ESTABLISHMENT OF VEGETATIVE COVER

Vegetative cover will be in accordance with ~~rEVEGATATION~~revegetation practices found in R645-301-331.

## R645-301-244.320. CAUSE OR CONTRIBUTE TO A VIOLATION OF WATER QUALITY STANDARDS

Andalex will not violate water quality standards. This will be demonstrated through monitoring practices.

## R645-301-250. PERFORMANCE STANDARDS

All performance standards will be adhered to.

## R645-301-251. SOIL REMOVAL

See R645-301-212.

## R645-301-252. SOIL STORAGE AND REDISTRIBUTION

See R645-301-212.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 2

**Soils**

**C/007/019**

(Revised)
July, 2014

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## R645-301-200. SOILS

## R645-301-210. INTRODUCTION

The Kenilworth Lease (UTU-81893)Boundary Change is simply an extension to the Aberdeen Mine workings and will in no way involve any new surface facilities or otherwise have any affect on the surface. It does not involve any new hydrologic basins. It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which was approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 1986 through the normal LBA process after an application by Andalex Resources. Refer to R645-301-200 through R645-301-800 for additional information.

Mining operations at the Pinnacle Mine began in the Gilson Seam on October 3, 1980, according to the Mining and Reclamation Plan approved by the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. The mining began on the Zion's fee lease and extended onto Andalex's federal leases according to federal approval granted in 1982. Andalex also opened the Apex Mine in the Lower Sunnyside Seam late in 1982. Mining commenced in the Aberdeen Mine in the Aberdeen Seam in mid 1988. The Pinnacle Mine, Apex Mine, and most recently the Aberdeen Mine are essentially worked out. With the addition of the Kenilworth lease the Aberdeen could possibly reopen depending upon market conditions. The restart date of the Aberdeen mine has yet to be determined. The coal is classified as High Volatile B bituminous in the Lower Sunnyside and Gilson Seams and as High-volatile A bituminous in the Aberdeen Seam. The mine plan area is located approximately 10 miles north-northeast of Price, Utah in Carbon County.(See Plate 1).

The Operator relinquished portions of the mined out Federal coal leases in two separate lease relinquishments. The first lease relinquishment approved 3/12/2012 reduced the Federal coal leased acreage from 5,436.24 down to 2,813.48. The second coal relinquishment reduced the Federal coal lease even further down to 894.55 acres. UEI retained all areas of surface disturbance conducted in association with the underground mining and surface access to the gob-vent holes was retained through surface use agreements.

With the relinquishments the permit acreage dropped from 6,516.91 down to 2,274.77 acres. When Kenilworth lease is added the permit acreage goes back up to 4,035.90 which is the new permit acreage. The disturbed area has not changed and remains at 47.19 acres. Since the disturbed area has not changed and the

disturbed legal description stays the same the bond does not change with the addition of the Kenilworth lease.

As the Kenilworth Tract is simply an extension of underground mine workings under roughly 2,000 to 3,000 feet of cover there will be absolutely no effect on soils.

## R645-301-211. PREMINING SOIL RESOURCES

The Regional Soils Map, shown as Plate 18 in Volume II. EEC performed the work on the north and south one-thirds of the disturbed area and the SCS performed the work on the one-third in the middle. This was for the original Pinnacle Mine approval on the Zion's Fee area (please see second half of Appendix M.

The acreages given by EEC in their soils report does not include the entire disturbed area since we know that the SCS surveyed roughly one-third of the disturbed or "to be" disturbed area. The correct acreages as planimetered by Andalex staff is 47.19 acres including the GVH holes. This of course includes the area where the Aberdeen Mine has been developed. The area of disturbed Brycan is approximately 8 acres and the Datino is 4 acres within the SCS survey. EarthFax Engineering has performed the Order 1 soil survey for the left fork fan installation. (See Appendix M.)

## R645-301-212. STOCKPILING AND REDISTRIBUTION

### Topsoil Handling During Operations

Removal

The area from which topsoil was projected to be removed is 47.19 acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site near the facility location. The topsoil was removed as a separate operation from areas to be disturbed by surface installations such as roads and areas upon which support facilities are sited. The left fork topsoil will be salvaged according to EarthFax.

Storage

The topsoil storage areas are shown on Plate 6. The topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation and the use of berms.

Surveys conducted on the topsoil piles which were drawn into

plans and profiles are now included in the plan in Volume II, Plates 37 and 36. This shows volumes stored currently.

The completed disturbance which reports to sedimentation Pond E is 9.96 acres. Please review the top soil summaries which show totals.

The new substitute topsoil pile plan and profile is included.

The new substitute topsoil will be protected by the use of vegetation.

Disturbed areas no longer required for the conduct of mining operations have been revegetated. Upon completion of mining activities, topsoil will be distributed and reclamation will commence as outlined. Andalex will adhere to all UDOGM guidelines.

## R645-301-220. ENVIRONMENTAL DESCRIPTION

Regional soils information for the Kenilworth Tract is taken from the approved Willow Creek permit 007/0038, and is presented herein verbatim:

> **3.1.1.3 Regional Soils Information**
>
> The USDA-SCS General Soils Map - Carbon County Area, Utah, shows the following three general soils types as occurring within the boundaries of the permit area:
>
> * Type 7 - Strych-Gerst-Travessilla: Shallow to very deep, well drained, nearly level to moderately steep soils, on outwash plains, benches and mesas
>
> * Type 10 - Travessilla-Rock Outcrop-Midfork Family: Shallow to very deep, well drained, steep and very steep, soils; and rock outcrop, on mountain slopes and canyonsides
>
> * Type 14 - Beje-Trag-Senchert: Shallow to very deep, well drained, gently sloping to moderately steep soils, on plateaus and mountain valley floors
>
> Type 10 is found over approximately 85 percent of the permit area and is found in nearly all areas except a portion of the extreme northeast comer of the permit area and a narrow tier along the southern edge of the permit area. Descriptions of each of these primary soil types as contained in the USDA-SCS Soils Survey are as follows:

Additional information can be found in Appendix M.

## R645-301-221. PRIME FARMLAND INVESTIGATION

The land within the Kenilworth lease area has not been historically used as cropland, contains steep slopes, and the area is not conducive to intensive agricultural uses and no surface disturbance. The Permittee does not believe that any Prime Farmland exists with the permit revision area, Kenilworth lease, being added to the Mine and Reclamation Plan. The Kenilworth lease has been previously permitted under the Willow Creek Mine Permit ACT/007/0038. Since Kenilworth lease is found in T12S R10E Section 26, the Willow Creek Permit information found below is pertinent. Prime farmland information for the Kenilworth Tract is taken from the Willow Creek permit presented herein verbatim:

#### 3.1.1.6 Prime Farm Land

Several previous investigations have been conducted for the permit area to determine whether any prime farmlands exist in the area. Each of these investigations involved formal consultation with the USDA-SCS. The initial determination, included in PRCCs Mining and Reclamation Permit application, was provided by Mr. George D. McMillan, USDA-SCS State Conservationist in a letter dated July 16, 1979. This letter concluded that, based upon the absence of any irrigation, and excessive slopes, no prime farmlands existed in the area corresponding to Townships 12 & 13 South, Ranges 8, 9 and 10 East. A second negative determination for prime farmlands in the permit area was issued in connection with the permitting efforts for the CGCC Permit submitted to UDOGM in February 1991. The CGCC permit application contains a letter dated May 21, 1991 from Mr. Ferris P. Allgood, USDA-SCS State Soil Scientist, stating that due to the excessive amount of rock fragments, high erodibility and lack of a reliable source of irrigation waters for lands within the CGCC Mine Permit area, the soils within this area are excluded from consideration as important farmlands. Confirmation of these negative determinations was included in the findings documents issued by UDOGM for both permit applications and documentation is provided in Exhibit 5, Soils Information. Since the limitations which exclude these soils for consideration as prime farmlands still exist, and all surface disturbance associated with the mining and reclamation activities will occur on either previously disturbed areas or on slopes greater than ten percent, UDOGM is requested to reaffirm the negative determination regarding the presence of prime farmland soils in the permit area.

Additional information can be found in Appendix M.

## R645-301-222. SOIL SURVEY

Appendix M

## R645-301-222.100. SOIL MAP

Plate 18

## R645-301-222.200. SOIL IDENTIFICATION

Appendix M

## R645-301-222.300. SOIL DESCRIPTION

Appendix M

## R645-301-222.400. SOIL PRODUCTIVITY

Appendix M

## R645-301-223. SOIL CHARACTERIZATION

Appendix M

## R645-301.224. SUBSTITUTE TOPSOIL

Two test plot locations were decided upon based on certain known parameters. The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the revegetation test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the deficit problem.

These pads were constructed in 1982 during the construction of the Apex Mine. The Shop pad and the Apex truck loadout pad both have out-slopes which we currently feel contain suitable topsoil substitute material. In 1982 these slopes were groomed with heavy equipment and graded prior to being hydroseeded with the interim seed mixture and then hydromulched. Mulch in the amount of one ton per acre was used at the time. In 1990 the approved seed mixture was hand broadcasted onto these same slopes which were already fairly heavily vegetated. The seed was raked in to the extent possible and no additional mulch was used because of the vegetative cover in place. Also, samples have been taken of this substitute material (three separate locations at each site) and have been sent in to a qualified soil testing laboratory. These samples will be tested for parameters outlined in Table 6 "Guidelines for Overburden and Topsoil Management", 1988. Results of these tests will be included in the permit as soon as they are available.

Topsoil Pile Summary, Existing
(See Plates 6 and 37)

| | |
|---|---|
| Topsoil Pile A | 35,731 cubic feet |
| Topsoil Pile C | 6,829 cubic feet |
| Topsoil Pile F | 60,290 cubic feet |
| Topsoil Pile G | 167,980 cubic feet |
| Topsoil Pile J | 94,500 cubic feet |

Topsoil Pile Summary, Proposed
(See Plates 6 and 38)

Topsoil Piles J contains 94,500 cubic feet which includes the original Topsoil Pile B which was moved during the construction of the Aberdeen Mine.

Based on the size of the disturbed area and the amount of topsoil required (6"), we have calculated that there is a 8,000 $yd.^3$ topsoil deficit. The topsoil substitutes will make up this deficit.

The test plots previously discussed regarding the topsoil deficit is further discussed here.

Two test plot locations were decided upon based on certain known parameters. The first location is south of the shop building and contains 5,240 cubic yards. The second location is southwest of the Apex Mine truck loadout and contains 1,700 cubic yards (see Plate 6). The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the revegetation test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the deficit problem. The first quantitative monitoring study will take place in the summer of 1992.

Topsoil substitute storage area signs have been placed strategically at the two substitute storage areas at the minesite. They will clearly mark the location of these storage area.

## R645-301-230. OPERATION PLAN

**Topsoil Handling During Operations**

Removal

The area from which topsoil has been removed is 47.19 acres and includes poorly developed soils. Using dozers and front end loaders, the soil was scraped from the surface and dumped at a site near the facility location. The topsoil was removed as a separate operation from areas to be disturbed by surface installations such as roads and areas upon which support facilities are sited. Approximately 750 cubic yards of topsoil will be stored in the left hand fork of Deadman Canyon for use during reclamation of the left fork fan installation. (See Plate LF-1.)

Storage

The topsoil storage areas are shown on Plate 6. The topsoil has been segregated, stockpiled, and protected from wind and water erosion and contaminants through revegetation and the use of berms.

Surveys conducted on the topsoil piles which were drawn into plans and profiles are now included in the plan in Volume II, Plates 37 and 36. This shows volumes stored currently.

The completed disturbance which reports to sedimentation Pond E is 9.96 acres. Please review the top soil summaries which show totals and deficiencies in R645-301-224.

The new substitute topsoil pile plan and profile is included.

The new substitute topsoil will be protected by the use of vegetation.

## R645-301-231. GENERAL REQUIREMENTS

## R645-301-231.100 REMOVAL AND STORAGE

See R645-301-212.

## R645-301-231.200. SUITABILITY OF TOPSOIL SUBSTITUTES

See R645-301-224.

**R645-301-231.300. TESTING PLAN**

See R645-301-224.

**R645-301-231.400. TOPSOIL HANDLING AND STORAGE AREAS**

See R645-301-212.

**R645-301-232. TOPSOIL AND SUBSOIL REMOVAL**

See R645-301-212.

**R645-301-232.100. TOPSOIL SEGREGATION**

See R645-301-212.

**R645-301-232.200. INSUFFICIENT QUANTITY OR POOR QUALITY**

See R645-301-224.

**R645-301-232.300. TOPSOIL LESS THAN SIX INCHES THICK**

N/A

**R645-301-232.400. TOPSOIL REMOVAL FOR MINOR DISTURBANCES**

N/A

**R645-301-232.410. SMALL STRUCTURES**

N/A

**R645-301-232.420. PROTECTION OF EXISTING VEGETATION AND EROSION PROTECTION**

Disturbed areas no longer required for the conduct of mining operations have been revegetated. Upon completion of mining activities, topsoil will be distributed and reclamation will commence as outlined in re Reclamation. Andalex will adhere to all UDOGM guidelines.

**R645-301-232.500. SUBSOIL SEGREGATION**

N/A

**R645-301-232.600. TIMING**

All soils have been removed.

**R645-301-232.700. TOPSOIL AND SUBSOIL REMOVAL UNDER ADVERSE CONDITIONS**

N/A

**R645-301-232.710. IMPRACTICABILITY**

N/A

**R645-301-232.720. IMPORTING TOPSOIL MATERIAL**

N/A

**R645-301-233. TOPSOIL SUBSTITUTES AND SUPPLEMENTS**

See R645-301-224.

**R645-301-233.100. SELECTED OVERBURDEN MATERIALS**

See R645-301-224.

**R645-301-233.200. SUITABILITY OF TOPSOIL SUBSTITUTES AND SUPPLEMENTS**

See R645-301-224.

**R645-301-233.300. PHYSICAL AND CHEMICAL ANALYSES**

Appendix M

**R645-301-233.310. SCS PUBLISHED DATA**

Appendix M

**R645-301-233.320. SCS TECHNICAL GUIDES**

Appendix M

**R645-301-233.330. OTHER PUBLISHED DATA**

Appendix M

**R645-301-233.340. RESULTS OF FIELD-SITE TRAILS OR GREENHOUSE TESTS**

Appendix M

**R645-301-233.400. DEMONSTRATION OF INSUFFICIENT TOPSOIL AND SUITABILITY OF SUBSTITUTE MATERIALS**

See R645-301-224.

**R645-301-234. TOPSOIL STORAGE**

See R645-301-212,224.

**R645-301-234.100. STOCKPILING AND REDISTRIBUTION**

See R645-301-212.

**R645-301-234.200. STOCKPILING REQUIREMENTS**

See R645-301-212.

**R645-301-234.210. PLACEMENT**

See R645-301-212.

**R645-301-234.220. PROTECTION**

See R645-301-212.

**R645-301-234.230. VEGETATIVE COVER**

Appendix M

**R645-301-234.240. REHANDLING**

N/A

**R645-301-234.300. LONG-TERM STORAGE AND DISTRIBUTION**

See R645-301-212.

## R645-301-234.310. CAPABILITY OF HOST SITE

## R645-301-234.320. SUITABILITY FOR REDISTRIBUTION

See R645-301-212.

## R645-301-240. RECLAMATION PLAN

**Timetable of Major Reclamation Steps**

Introduction

As this is an underground mine, there will be a limited amount of surface disturbance, consequently, reclamation will be uncomplicated.

All disturbed areas no longer required for the conduct of mining operations were immediately revegetated. In the future, any areas no longer required for operations will also be immediately reclaimed and revegetated. The only new surface disturbance required at this time will be for a mine-fan break-out in the left fork of Deadman Canyon.

When buildings and final site preparation had been completed, the soil was revegetated to prevent erosion.

When the project is expired, all buildings and extraneous material will be removed, all mine openings will be covered and sealed, roads will be regraded and using the most advanced technology at the time, Andalex will re-establish the terrain to as nearly the original as practical. The area will be reseeded and vegetation re-established in accordance with recommendations from the regulatory authorities.

Reclamation Timetable

This timetable represents the general sequence which will be used for final reclamation. The bond estimate has the costs broken down on a site by site basis; however, actual work will be performed simultaneously at all the sites. For example, all structures and buildings will be removed prior to any recontouring. This will allow us to have certain equipment for certain jobs the shortest time possible. Detail of work involved in various jobs (portal seals, revegetation, etc.) can be found in Appendix C. The addition of the Kenilworth Lease will have no impact on the reclamation schedule or cost.

Phase I

Job 1. Portal Seals (include fan removal)
- a. 4 Apex
- b. 7 Pinnacle
- c. 7 Aberdeen (includes left fork)
- d. 5 Wells

Job 2. Building Removal
- a. 1 Shop
- b. 1 Main Office
- c. 3 Trailers (2 warehouse, 1 lab)
- d. 3 Lamphouses
- e. 3 Bathhouses

Job 3. Structure Removal
- a. 3 Mine Conveyor Structures
- b. 3 Truck Loadouts
- c. 1 Substation
- d. Power distribution lines
- e. 4 Water Tanks
- f. 5 Fuel Tanks
- g. Main and Side Culverts *

Job 4. Recontouring & Regrading*
- a. 105,500 $yds.^3$ fill material
- b. Enlarge Pond E, Remove B and C

Job 5. Compaction, Scarification
- a. 33.5 acres (not including Pond E)
- b. Additional sediment measures, i.e., check dams

Job 6. Topsoil Redistribution
- a. 47.19 acres (additional approved substitute hauled in if necessary)

* Culverts will be removed starting at the north end so that natural drainage may be re-established as the culvert is removed.

Job 7. REVEGATATION
- a. 2.15 acres shrubs
- b. 14.32 acres drainage (except Pond E)
- c. 17.03 acres slopes

Job 8. Commence Monitoring
- a. REVEGATATION
  1. Woody plants will be quantitatively

monitored in years 4 and 8

2. Success for woody plants will be based on a minimum 2,000 plants-per-acre in stream bottoms and on east-facing slopes; 1,500 plants-per-acre on west-facing slopes.

b. Slope Stability

c. Water Monitoring including inlet and discharge at Pond E**

** Sampling of this water will consist of grab samples taken quarterly if any runoff occurs. Andalex's experience with this drainage is that runoff may occur every several years so that monitoring of this runoff will take place infrequently. Quarterly reports will indicate whether or not any runoff has occurred. The samples will be tested to assure that state and federal water quality requirements are being met.

Phase II

Starts When Phase I Monitoring Allows. Sedimentation Pond E will not be removed until the revegetation requirements of 817.111-.117 are met. This includes the revegetation of the entire disturbed area with the exception of Pond E. Also, Pond E will not be removed until the drainage entering the ponds meets applicable state and federal limitations. When Pond E is removed and revegetated, additional sediment control measures will be placed downstream from the revegetated area such as straw dikes until revegetation has been deemed complete by Phase II Monitoring.

Job 1. Done Simultaneously
- a. Remove (recontour) Pond E
- b. Remove remaining culvert

Job 2. Compact & Scarify Location

Job 3. Distribute Remaining Topsoil

Job 4. Revegetate

Job 5. Continue Monitoring until Bond is released

Please note that the earthwork involved will be done during the dry season to avoid unnecessary erosion of regraded areas. Water will be implemented if dust becomes a problem.

## Reclamation Cost and Bonding

Introduction

An estimate for the reclamation costs is provided in appendix B. Andalex has provided, as Plate 15, accurate as built versus reclaimed cross sections which show the mass balance for earthwork. The approximate original contours will be achieved using the material cut out to create the fill areas. No material will be hauled in. Maps depicting accurately the surface facilities including topsoil areas, structures and facilities are included in Volume II and also specific topsoil maps and cross sections are included. Andalex expects to return topsoil to a depth of up to 6" around the surface area of 47.19 acres.

Phase I of the reclamation will include, chronologically, structure removal including culverts, portal sealing, well sealing, regrading, recontouring, distribution of topsoil and revegetation. Additional sediment control during Phase I such as straw dikes and rock check dams will be implemented as shown on Plate 16. Once Phase I is adequately achieved, Phase II will commence which includes the removal of sediment structure E and revegetation of this area. This is followed by monitoring, noting that monitoring had begun during Phase I. See 5.8 re Monitoring. This section discusses the extended period of liability as being ten years if necessary. The entire permit area receives less than 26 inches of annual precipitation; therefore, it is generally accepted that Andalex is subject to an extended period of liability. Obviously if revegetation is deemed successful prior to this ten year period, Andalex will request bond release. Andalex has not proposed any selective husbandry practices.

## Cost of Reclamation

Detailed Estimate

A detailed cost projection is included in Appendices B and C.

Calculations

Calculations of the estimate reclamation costs are included in Appendices A and B. Calculations for cuts and fills were made and are included. This summary shows the mass balance for the entire disturbed area, as taken from Plates 14 and 15. Station numbers are referenced on Plate 14 and cross sections are shown on Plates 15-1, 2, and 3. Similarly, topsoil piles have been surveyed for the existing minesite and are summarized following the cut and fill summary. Because of deficits Andalex has committed to testing topsoil substitute areas.

**Bond or Surety Arrangement**

Andalex currently holds a bond, approved by UDOGM in the amount shown in Appendix B.

Regarding the left hand fork fan installation, the specific time table for this project will coincide with the reclamation of the right hand fork minesite. The specific schedule for reclamation of the fan will begin with the cut slope backfill, followed by removal of the culvert from the left fork drainage and, finally, by streambed reclamation the same as will be performed in the right hand fork. According to comments received by the majority of the surface lands managers, the access road to the left hand fork fan installation will be reclaimed by recontouring to the extent possible (this road has been in existence for over 50 years) and revegetated. One of the surface owners (Gladys Artman) has specifically indicated her desire to leave the road in place, therefore, her permission will be required to reclaim the road. Topsoil redistribution and revegetation will follow the culvert removal. During both construction and reclamation phases, Andalex will provide adequate supplementary sediment control in the form of silt fences and/or straw berms to prevent additional sediment loads to the drainage.

Andalex has supplied the Division with a Drawing entitled "Left Hand Fork Cut/Fill". This drawing has a notation which indicates that the existing contours will reflect the reclamation contours (post-mining).

## MASS BALANCE SUMMARY

| Station | CUT | | FILL | |
|---|---|---|---|---|
| | $ft^2$ | $yds^3$ | $ft^2$ | $yds^3$ |
| -1 + 00 | 520 | 963 | 160 | 2148 |
| 0 + 00 | 0 | 815 | 1000 | 1889 |
| 1 + 00 | 440 | 1000 | 20 | 407 |
| 2 + 00 | 100 | 1074 | 200 | 1259 |
| 3 + 00 | 480 | 3333 | 480 | 1519 |
| 4 + 00 | 1320 | 2593 | 340 | 2259 |
| 5 + 00 | 80 | 2889 | 880 | 1852 |
| 6 + 00 | 1480 | 6778 | 120 | 2704 |
| 7 + 00 | 2180 | 9037 | 1340 | 4074 |
| 8 + 00 | 2700 | 8259 | 860 | 2556 |
| 9 + 00 | 1760 | 6000 | 520 | 4297 |
| 10 + 00 | 1480 | 6444 | 1800 | 6519 |
| 11 + 00 | 2000 | 6259 | 1720 | 5593 |
| 12 + 00 | 1380 | 9222 | 1300 | 5074 |
| 13 + 00 | 3600 | 7037 | 1440 | 6148 |
| 14 + 00 | 200 | 370 | 1880 | 8852 |
| 15 + 00 | 0 | 370 | 2900 | 5815 |
| 16 + 00 | 200 | 407 | 240 | 2111 |
| 17 + 00 | 20 | 1889 | 900 | 5593 |
| 18 + 00 | 1000 | 2889 | 2120 | 8185 |
| 19 + 00 | 560 | 2000 | 2300 | 5319 |
| 20 + 00 | 520 | 4444 | 572 | 3059 |
| 21 + 00 | 1880 | 8704 | 1080 | 3185 |
| 22 + 00 | 2820 | 8556 | 640 | 3037 |
| 23 + 00 | 1800 | 3741 | 1000 | 3370 |
| 24 + 00 | 220 | 1148 | 820 | 2963 |
| 25 + 00 | 400 | 926 | 780 | 4519 |
| 26 + 00 | 100 | 2630 | 1660 | 10222 |
| 27 + 00 | 1320 | 4444 | 3860 | 7407 |
| 28 + 00 | 1080 | 3111 | 140 | 1741 |
| 29 + 00 | 600 | 2222 | 800 | 2815 |
| 30 + 00 | 600 | 2074 | 720 | 2222 |
| 31 + 00 | 520 | 1889 | 480 | 1741 |
| 32 + 00 | 500 | 1482 | 460 | 2185 |
| 33 + 00 | 300 | 2037 | 720 | 1815 |
| 34 + 00 | 800 | 3111 | 260 | 852 |
| 35 + 00 | 880 | 3185 | 200 | 1630 |
| 36 + 00 | 840 | 1963 | 680 | 3482 |
| 37 + 00 | 220 | 1741 | 1200 | 5407 |
| 38 + 00 | 720 | 2741 | 1720 | 4037 |
| 39 + 00 | 760 | 3000 | 460 | 6111 |
| 40 + 00 | 860 | 2704 | 2840 | 5593 |
| 41 + 00 | 600 | 1444 | 180 | 1148 |
| 42 + 00 | 180 | 482 | 440 | 963 |
| 43 + 00 | 80 | 148 | 80 | 148 |

* Total Cut = 147,555 $yds^3$; * Total Fill = 163,825 $yds^3$

* Ratio of fill to cut = 1.11:1.00. This allows for an expansion factor of 1.11 or 11% on the cut material.

As Constructed Earthwork Volume (Aberdeen Mine)

| | | |
|---|---|---|
| Cut | 63,506 yds.$^3$ | |
| Fill | 66,625 yds.$^3$ | |
| Topsoil | 3,500 yds.$^3$ | (Piles H & J) |

As Constructed Earthwork Volumes
(including Aberdeen Site)

| | |
|---|---|
| Cut | 117,273 yds.$^3$ |
| Fill | 112,969 yds.$^3$ |
| Topsoil | 8,500 yds.$^3$ |

For purposes of reclamation costs for earthwork, the following estimates can be used. Please keep in mind that as built cross sections for the Aberdeen Mine will aid in the final earthwork estimates.

There is a 8,000 yd.$^3$ topsoil deficit. The topsoil substitutes will make up this deficit.

The test plots previously discussed regarding the topsoil deficit is further discussed here.

Two test plot locations were decided upon based on certain known parameters. The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the revegetation test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the deficit problem.

## R645-301-241. GENERAL REQUIREMENTS

## R645-301-242. SOIL REDISTRIBUTION

Soil is to be redistributed to a depth of 6-inches across the entire 47.19 acre disturbed area.

## R645-301-242.100. CRITERIA FOR REDISTRIBUTION

The only criteria is that it will be redistributed to a depth of 6 inches.

## R645-301-242.110. UNIFORMITY AND CONSISTENCY

The soil will be redistributed uniformly and consistent with the regraded contours.

## R645-301-242.120. PREVENTION OF COMPACTION

Once redistributed, unnecessary compaction from equipment will be avoided.

## R645-301-242.130. PROTECTION FROM WIND AND WATER EROSION

The topsoil will be protected from wind and water erosion through mulching.

## R645-301-242.200. REGRADING AND TREATMENT

Not applicable, unless unacceptable rills and gullies are observed.

## R645-301-242.300. EMBANKMENTS OF PERMANENT IMPOUNDMENTS OR ROADS

N/A

## R645-301-242.310. PREVENTION OF SEDIMENTATION

Pond E will be in place until the release of Phase I reclamation.

## R645-301-242.320. OTHER METHODS OF STABILIZATION

Other methods may include excelsior matting on steep slopes and rip-rap.

## R645-301-243. SOIL NUTRIENTS AND AMENDMENTS

As needed to be determined through Phase I monitoring.

## R645-301-244. SOIL STABILIZATION

See R645-301-242.

## R645-301-244.100. EROSION CONTROL AND AIR POLLUTION

See R645-301-242.

## R645-301-244.200. SOIL STABILIZING PRACTICES

See R645-301-242.

## R645-301-244.300. RILLS AND GULLIES

See R645-301-242.

## R645-301-244.310. DISRUPTION OF POSTMINING LAND USE OR ESTABLISHMENT OF VEGETATIVE COVER

Vegetative cover will be in accordance with revegetation practices found in R645-301-331.

## R645-301-244.320. CAUSE OR CONTRIBUTE TO A VIOLATION OF WATER QUALITY STANDARDS

Andalex will not violate water quality standards. This will be demonstrated through monitoring practices.

## R645-301-250. PERFORMANCE STANDARDS

All performance standards will be adhered to.

## R645-301-251. SOIL REMOVAL

See R645-301-212.

## R645-301-252. SOIL STORAGE AND REDISTRIBUTION

See R645-301-212.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 3

## Biology

## C/007/019

(Revised)
June, 2014

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## R645-301-300. BIOLOGY

## R645-301-310. INTRODUCTION

~~Vegetation Information~~

**Introduction**

At present the Mining and Reclamation Plan for the Centennial Project includes 2,274.77 acres under permit (see Plate 3). This permit is now being amended to include the Kenilworth Federal Lease UTU-81893 (1760.0 acres), bringing the total permit area to 4,034.77 acres (see Plate 3). Lease UTU-81893 was acquired in 2006. Mining activity within the Kenilworth lease area will be an extension of the underground workings of the existing Aberdeen Mine. Therefore there will be no new surface facilities associated with mining in the new lease areas (other than additional Gob Gas Vent holes, if needed, which will be permitted on a site-specific basis in the future). It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which has been previously approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 2006 through the normal LBA process after an application by Andalex Resources.

Since the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,000 to 3,000 feet of cover there will be absolutely no effect on vegetation, fish or wildlife. Because there will be no additional surface disturbance on the lease area, a First Order Survey is not deemed necessary.

Mountain-Brush, Desert Shrub, Pinion-Juniper Woodland, Sagebrush-Grass, Conifer-Aspen, and minor stream-side vegetative types cover the total mine plan area. Most of the area is covered by the Mountain-Brush type while the Pinion-Juniper Woodland type is predominant in the mine mouth area as well as the access routes and utility corridors; this area has been reseeded with a mixture as recommended by the U.S.D.A. S.C.S. (please see Soil Survey and Vegetation Inventory in Appendix M). ~~Appendix M now also includes soils and vegetation information pertaining to the newly acquired AEP Lease. Because there will be no additional surface disturbance on the lease area, a First Order Survey is not deemed necessary.~~

~~As the Mathis Tract and New Federal Summit Creek Lease boundary change is simply an extension of underground mine workings under roughly 2,600 to 3,000 feet of cover there will be absolutely no effect on vegetation, fish or wildlife.~~

Andalex has selected and marked three reference areas in the

field for vegetation. The Division has reviewed and approved these reference areas. Areas chosen include all types of vegetation conditions such as drainage areas, shallow slopes and steep slopes. Andalex contacted the SCS to help evaluate the condition of these sites. Please see SCS letter in Appendix M. It should be noted that Andalex does have the benefit of a revegetation test plot located on one of the topsoil piles. The drainage area reference area is the most adaptable to the left fork fan installation.

The revegetation map now shows the original permit acreages for the three range types. Shrub clumps make up 2.15 acres, drainage areas make up 15.02 acres and steep slopes make up 17.03 acres. Total disturbed area, including the Aberdeen Mine left fork fan and road is ~~35~~47.~~34~~19 acres.

New vegetation mapping has been created for the entire permit area of the Centennial Mine~~ including the Mathis Tract and New Federal Summit Creek Lease and area~~. The mapping was done by Mt. Nebo Scientific, Inc. Springville, Utah. ~~See Plate 19A.~~

EarthFax Engineering did the Vegetation mapping for the Kenilworth Lease. See Plate 19 for vegetation mapping for the permit area.

The vegetation map ~~will be~~was created by using new and/or current available aerial photography with field work accomplished as a means for ground-truthing. ~~Aerial photography used will be from appropriate periods of the growing season.~~ Field verification work ~~will be~~was conducted during the growing season of 2002. ~~The final~~Vegetation maps were consolidated and expanded and a new total permit vegetation map ~~will be provided to the State of Utah, Division of Oil, Gas & Mining in December 2002~~was created in 2014 as Plate 19.

It should be noted that no wetland or riparian areas are known to exist on the ~~Mathis/Summit Creek I.B.C a~~current permit or on the Kenilworth Lease Area, based on vegetation mapping and site visits by company and Division personnel.

## Source of Data

Department of the Interior, 1979. Final Environmental Statement, Development of Coal Resources in Central Utah; Part 1 Regional Analysis; Part 2 Site Specific Analysis.

United States Department of Agriculture, Soil Conservation Service, May, 1980. Soil Survey and Interpretations, Vegetation Survey.

Centennial Coal Associates, May, 1976 Mining Application. Submitted to the United States Geologic Survey, Conservation Branch.

A.M.C.A. Coal Leasing, June, 1978 Mining and Reclamation Plan (Zion's fee). Submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining. Revised 8/8/95

~~Earth Environmental Consultants~~
~~September, 1981~~
~~Soil Survey and Vegetation Inventory~~
~~(Appendix M)~~
(Appendix M)

Plateau Mining Corporation
Willow Creek Permit #007/0038
Map #5

## Description

Vegetative Types: Please see Soil Survey and Vegetation Inventory in Appendix M.

The vegetative types include Mountain Brush, Pinion-Juniper Woodland, Sagebrush-Grass, and Conifer-Aspen. The ~~new~~ Sunedco Lease as well as the ~~new~~ Graves Lease are located primarily in the Mountain Brush and Conifer-Aspen communities.

## Threatened or Endangered Species

A listing of threatened or endangered plant species known to occur in Carbon County is included in Appendix M.

There have been no known threatened or endangered species observed in the lease area (Welsh 1977). A study was conducted in the Left Hand Fork for both the access road and the fan installation site to determine the presence of Canyon Sweetvetch. None was found. Additionally, the surveyor does not believe the habitat exists for this plant.

Plant Communities: Please see Soil Survey and Vegetation Inventory in Appendix M.

The Mountain Brush type is the largest in the area. It is found predominately at elevations of about 7,500 feet. This community consists of sage, mountain mahogany, serviceberry, snowberry, squaw apple, gambels oak, and maple. Minor amounts of rabbitbrush, cliffrose, and bitterbrush can be found. Associated

## Extent of Cover

Since the elevations and terrain varies drastically from steep walled canyons to high ridges, vegetation density also varies. Percent cover is greater at the higher elevations and on the gentler topography. The Bureau of Land Management estimates cover of 25 to 30 percent at the higher elevations and 10 to 12 percent on the lower canyon sides and bottoms.

## Shrub Height

Shrub height varies over the lease area. Topography, aspect, elevation, and soil cause these modifications.

## Area to be Disturbed

The surface area disturbed is very minimal, ~~34~~47.~~2~~19 acres as shown on Plate 7. It should be again stressed that there will be no additional surface disturbances and no additional surface facility construction on the new ~~AEP~~Kenilworth Lease area. Mining on the ~~AEP~~Kenilworth Lease will simply be an extension of existing underground workings. Site of the present surface facilities is located in an area that has been previously impacted by mining activities. Actual plant communities which have been disturbed are the Pinion-Juniper and associated species and similar impact is foreseen on vegetation overlying the remainder of the lease area at the proposed surface facilities' sites. Extreme care will be taken however, to disturb as little vegetation as possible and ~~rEVEGATATION~~revegetation has been immediately carried out on all disturbed areas no longer needed for the mining operation.

# Fish and Wildlife Resources and Plan

## Introduction

The mine plan area is located in the West Tavaputs Plateau, a region which supports about 360 vertebrate wildlife species. The abundance and distribution of wildlife in the lease area is directly related to present land use activities and capabilities. Use of this area by certain species is limited to lack of perennial water. Mammal and bird species possibly occurring in the lease area are listed in Table III-11. Please refer to Plates 34, 34A, 34B, 34C, and 34D, which ha~~s~~ve been revised to include the ~~AEP~~Kenilworth Lease. A "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah", compiled by the Utah State Division of Wildlife Resources, can now be found in Appendix A.

## Source of Data

Department of the Interior, 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Parts 1 and 2.

Utah Department of Natural Resources, Division of Wildlife Resources.

## Habitats

Previously described vegetation provides fair to excellent habitat for a variety of wildlife species.

**Animal Species (See Table III-11)**

## Mammals

Mammals occurring in the area can be divided into two groups, game species and non-game species.

The main game species include mule deer, mountain lion, black bear, elk, and cottontail rabbits. Mule deer, however, are the most important wildlife resources in the area. Mountain lion are present but little information is available due to their ranging habits. Generally, their movement coincides with the migration of deer. Black bear may occasionally be found in the vegetated canyons, usually along the cliff face. They normally inhabit the Book Cliffs to the north but little data is available on their populations. The permit area is within the lower limits of the elk range, however, elk are generally found north of the mine plan area at higher elevations. Cottontail rabbits are distributed throughout the area.

Non-game mammals include several species of small animals inhabiting the area. Predator species such as coyote and bobcat occasionally are found in the area and depend on small rodents and rabbits for their source of food. Information on non-game species is generally unavailable.

Additional information on species, habitat, and status, can be found in Appendix A. New habitat maps have been completed and can be found as Plates 34A, 34B, 34C and 34D.

## Birds

### Raptors

The turkey vulture and red-tailed hawk frequent the area. A variety of other raptors breed in the Price area; however there is a poor density of raptors throughout the mine plan area. A raptor survey performed for Andalex Resources of the proposed permit area by Clayton M. White of Brigham Young University is attached as Appendix D. Please see Plate ~~34~~34A in the confidential binder for the raptor survey done in 2007 on the Kenilworth Lease. ~~This~~These Plates now include~~s~~ information from the raptor survey performed in May, 1994, by the Utah DWR and the Utah DOGM. Also refer to letter from USFWS found in Appendix J indicating clearance for our powerline distribution regarding raptors.

### Other

Sage grouse inhabit the sagebrush flats at the foot of the cliffs (Plate 34D). Blue and ruffed grouse may occasionally be found in the vegetated canyons of the area. Chukkers can be found around the cliffs. Mourning doves are generally distributed throughout the area, however, the lack of perennial water limits dove nesting habitat in the area. Other representative birds include the magpie, bluebird, robin, and several species of sparrow.

### Reptiles and Amphibians

The most prominent species of reptiles include the rattlesnake and sagebrush lizard. No aquatic fauna are present in the area.

### Fish

There are no active fisheries as there are no permanent bodies of water or perennial streams in the area. No aquatic fauna are found.

### Threatened or Endangered Species

There have been no known threatened or endangered species on or near the lease area according to a survey conducted by the Utah Division of Wildlife Resources (Boner 1977).

## Impacts of Operation

Construction of all roads, powerlines, and surface facilities has been completed. The earthwork and surface facilities for the Aberdeen Mine are complete. The fish and wildlife information contained in this MRP pertains to the entire permit area ~~which includes~~including the ~~Aberdeen minesite~~Kenilworth Lease. The only potential impact to wildlife as a result of construction (golden eagle nests) has been addressed thoroughly and a negative impact determination was made. Regarding temporary interruption of wildlife habitat, this has also been addressed in the Fish and Wildlife Plan and the Reclamation Plan. Therefore, no additional impact of operations on wildlife is anticipated. Wildlife education has been implemented through the training department. All new employees will receive wildlife education training.

**Fish & Wildlife Plan (please see Appendix A).**

There will be no additional surface disturbance required on ~~any~~the new Kenilworth coal lease~~s~~. Consequently, there will be no additional disturbance or adverse impacts on fish and wildlife or related environmental values. ~~Please refer to Plate 34, Revised Wildlife Distribution Map included with this submittal.~~

New habitat maps have been completed and can be found as Plates 34A (Confidential binder) 34B, 34C and 34D.

Andalex will make every possible effort to minimize disturbances to wildlife habitat in the area and where possible enhance that habitat during reclamation. It should be noted that there is no aquatic life in the permit area as these canyons are dry except as a result of direct precipitation (ephemeral streams). ~~Please note that the Hoffman Creek drainage is also ephemeral.~~ Straight, Mathis and Alrad Canyons are ~~also~~ ephemeral drainages. Andalex has performed numerous mitigative measures including extensive ~~rEVEGATATION~~revegetation. Andalex has performed all mitigative measures outlined in the Fish and Wildlife Plan (Appendix A) with the exception of the use of swareflex reflectors.

Andalex has advised and encouraged employees to avoid unnecessary disturbances to all wildlife regardless of the season, but especially the depleted winter season or the breeding season. Hunting and all wildlife regulations are adhered to.

The largest part of Andalex's road is screened from view by vegetative cover. During ~~rEVEGATATION~~Revegetation, Andalex will use seed mixtures which are favorable for wildlife enhancement.

Andalex has maintained small islands of natural vegetation within the site, but upon final reclamation, we do not intend to remove natural ~~rEVEGATATION~~vegetation from other sites and transplant it. Andalex does not intend to encapsulate seed and fertilizer for release over several years. All disturbed slopes have been revegetated.

Snake dens will be reported to the DWR.

Berry producing shrubs have naturally re-occurred within the disturbed area for avifauna species. No avifauna will be disturbed within Andalex's minesite and in particular, raptors and their nests. Andalex's powerline was constructed under the guidance of the Utah DWR.

Lodges, nests, and dens for all mammals will be protected from disturbance. Andalex has reduced speed limits posted within the minesite and the entire length of the haulroad year-round (20 mph and 40 mph). Swareflex reflectors will not be implemented.

There are no unpaved sections of the haul road and swareflex reflectors are not being used. Andalex has demonstrated mitigation of impacted habitat through ~~rEVEGATATION~~revegetation efforts on areas in and outside the permit area. We have had employee wildlife education sessions in the past and may perhaps in the future. A description of the values of wildlife as well as methods for avoiding impacts to wildlife could be written into a form which could be passed out during annual employee training. The Division of Wildlife Resources may be able to assist Andalex with this idea. The powerline was constructed under strict guidelines and has been thoroughly checked by both the Utah DWR and the U.S. Fish and Wildlife Service. Both agencies are pleased with the design and the as-built facilities. Andalex is willing to adhere to reasonable and practical recommendations given by any agency and has for the most part taken the advice of the DWR on most all occasions as outlined in the Wildlife Resources, Appendix A. Special condition #7 was answered by posting 40 mph speed limits, year round.

To the extent possible, Andalex will commit to prevent, control, and suppress range, forest, and coal fires within the permit area. The control of range and forest fires may very well be out of Andalex's hands and it may only be possible for Andalex to report these incidences to organizations such as the BLM who are equipped to handle these situations.

Andalex has committed to continuing wildlife education as part of its employee training. This will be coordinated with the local office of UDWR through the use of videos and possibly guest

speakers. ~~All new employees will review our wildlife education tape.~~

Andalex, through raptor surveys conducted, has identified Golden Eagle nests which could be impacted by subsidence. Andalex is committed to acquiring necessary take permits prior to longwall mining under these sites. Andalex is also committed to additional mitigation which might include measures to prevent nesting on those nests which could be affected by subsidence or removal of nests for scientific study. Please refer to Plate 34 for the most current raptor nesting information including the raptor survey conducted in May, 1994, ~~with the Utah Division of Wildlife Resources and the Utah Division of Oil, Gas and Mining.~~ and Plate 34A in the Confidential Binder for the Kenilworth lease. Three nests have been identified as being located within potential subsidence impact zones. They are identified on Plate 34 and a take permit application for these nests is on file with the U.S. Fish and Wildlife Service. The longwall panel affecting these nests will not be removed prior to the acquisition of this permit. There are no known raptor nests located on the Kenilworth Lease Area. (See Plate 34A in the Confidential File)

Andalex has committed to compensation for livestock lost as a result of subsidence which in turn is a direct result of underground mining activities. Also, major cracks caused by subsidence which are demonstrated to be a direct result of underground mining will be repaired.

## R645-301-311. VEGETATIVE, FISH AND WILDLIFE RESOURCES

See R645-301-310.

## R645-301-312. POTENTIAL IMPACTS

See R645-301-310 "Area to be Disturbed".

## R645-301-313. RESTORATION OR ENHANCEMENT

See R645-301-240.

## R645-301-320. ENVIRONMENTAL DESCRIPTION

See R645-301-310, Appendices A, D and M.

## R645-301-321. VEGETATION INFORMATION

## R645-301-323.300. ENHANCEMENT FACILITIES

N/A

## R645-301-323.400. PLANT COMMUNITIES

See R645-301-310.

## R645-301-330. OPERATION PLAN

### Maps and Plans

Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the addition of new leases and rights-of-ways and the revisions are indicated in this submittal ~~in Volume II~~.

1) All necessary maps and plans to complete this section are found in Volume II of the submittal and also in the appendices, specifically,

   a) Underground coal mining activities to be conducted and lands to be affected by surface facilities are shown on Plates 6, 29, 30, 31 and 41.

   b-1) Buildings, utilities, and facilities are depicted on Plates 6 and 7.

2) The area to be affected is shown on several plates, including 4, 5, 6, and 41. These last four plates show the sequence of mining in the four seams over the five year term of the permit. Plate 29, 30, 31, 41 has been revised to show immediate development in the Gilson Seam as soon as approval is achieved. Reclamation will not take place until after all four seams are mined out. This activity is depicted on Plates 15, 16, 17, and 20.

3) Plate 6 depicts the entire disturbed area for which a performance bond is posted. The acreage is shown on Plate 5.

4) Coal storage and loading areas are shown on Plate 6. No cleaning takes place.

5) Plate 6 shows a non-coal waste storage area as well as

topsoil storage areas. Plates 36 and 37 show the topsoil piles in detail.

6) All water diversions and other water facilities are shown on Plates 6, 8, 9, 11, 12, and 13. Also, typical diversions for disturbed area and undisturbed areas are shown in the Sedimentation and Drainage Control.

Diversion ditches as they exist are shown on Revised Plate 6. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area. Plate 16 has been revised to show drainage during the reclamation period before and after removal of sediment ponds (Phase I).

Plate 17 shows final drainage details.

Plate 9 shows delineations of watershed areas.

The main culvert will be removed entirely during the reclamation/earthwork phase except under Pond E. Pond "E" will be enlarged, and the entire drainage area above will flow into the restored channel RC-1 and through Pond "E-PM". Once ~~rEVEGATATION~~Revegetation and water quality standards have been met, Pond "E-PM" will be removed and reclaimed.

7) There is no coal processing waste at the Centennial facility. There are no pollution control facilities other than sedimentation ponds on the permit area. Waste rock from the Centennial Mine rock tunnels has been disposed of underground in the Pinnacle Mine.

8) Specific facilities are not used to protect or enhance wildlife with the exception of the powerline which was built according to strict guidelines issued by the Division of Wildlife Resources and the U.S. Fish and Wildlife Service regarding raptor protection. The powerline design is included in Volume I as Appendix I (powerline design). Also, speed limits are posted within the permit area.

9) The two powder magazines are shown on Plates 6 and 7.

10) Plates 6, 7, 8, and 9 show these facilities associated with protection of the hydrologic balance including sedimentation ponds and storage of non-coal waste. There are no permanent impoundments, coal processing wastes or underground

development wastes. Any underground development waste or excess spoil which was generated while putting in the Aberdeen portals, has been used as stock pile pad material at the Aberdeen Minesite. The volume of this material is minimal.

11) Plates 16 and 17 show the final reclamation contours and configuration of the surface for Phases I and II respectively.

12) Subsidence monitoring points are shown on Plate 25. ~~An additional station was added to Plate 25 to cover pillar extraction on the new AEP Lease. Also new stations were added under the Graves and Hoffman Creek Leases.~~ Water monitoring location~~s~~ are shown on Figure IV-11~~. Additional water monitoring will be added as station 12-1 in Alrad Canyon below the AEP lease.~~ and on Plates found in Chapter 7.

13) There will be no facilities left on the permit area permanently with the exception of the roads through the right fork of Deadman Canyon. The left hand fork road will be reclaimed. After the completion of underground mining, all facilities will be removed with the exception of one downstream sedimentation pond. This pond will be removed upon final reclamation.

c) Maps, plans, and cross sections required under

b) (5),(6),(10), and (11) have been prepared under the direction of, and certified by a registered professional engineer. Assistance has come from a registered land surveyor. ~~Revised 8/8/95~~

1) Detailed maps, plans, and cross sections for our sediment ponds, Plates 11, 12, and 13 have been certified by a registered professional engineer.

2) Andalex has not used any excess spoil or underground development waste maps or cross sections. A map depicting the location of non-coal waste storage is included as Plate 6.

## R645-301-331. MINIMIZING IMPACT AND SURFACE EROSION

## REVEGATATION Plan

### REVEGATATION and Interim ~~REVEGATATION~~Revegetation

~~REVEGATATION~~ Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authority (see Plates 19 and 20).

Interim ~~rEVEGATATION~~Revegetation for stabilization of disturbed areas will take place on all disturbed slopes within the disturbed area. These slopes will be hydroseeded using the approved final reclamation seed mixture and rate of application along with hydromulch at the rate of one-and-one-half tons per acre. The vegetation cover will be maintained as necessary and slope stability will be measured by visual inspection.

### Schedule of ~~REVEGATATION~~Revegetation

The seeding of native flora (consisting where possible of deer browse species), will commence as soon as is practical following shutdown and abandonment to stabilize erosion. Agencies such as the B.L.M., O.S.M., and Utah Department of Natural Resources will be consulted at the time for recommendations on recontouring, soil reconditioning, and ~~rEVEGATATION~~Revegetation. ~~REVEGATATION~~Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authorities.

The first normal planting season will be used for ~~rEVEGATATION~~Revegetation following the removal of all structures and regrading. The season for normal planting of seed mixtures is the fall, prior to snowfall and after October 1st. The normal season for shrub plantings is the spring after thawing while moisture is available.

## Soil Testing Plan and Soil Preparation

Where possible the soil will be distributed along the contour. The thickness of the re-established soil will be sufficient to support vegetation equal to or superior to pre-mining history (6"). Soils will be tested according to the most advanced technology. Samples will be taken to determine any deficiencies which would affect the growth of newly revegetated areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority. Preparation techniques

such as disking will be incorporated.—

=

## Species and Amounts of Seeds and Seedlings

The seed mixtures outlined for steep slopes and drainage areas developed by UDOGM (12-10-86) will be used. Shrub clumps will be planted as shown on Plate 20. This constitutes an area of 2.15 acres (Drainage areas are 15.02 and Slopes are 17.03). Species shall include serviceberry, mountain big sagebrush, squawbush, blue elderberry, mountain snowberry, and mountain mahogany. They will be planted at a rate of 1,000 containerized plants per acre using fertilizer and crimped straw for stabilization. Drainage area seed mix will be used around and among the shrub clumps beneath the straw stabilization. Re Reference Areas. Plate 20 in Volume II shows that Andalex will plant the drainage mixture around and beneath the shrub clumps (transplants). These transplants listed above will be used in the drainage areas as depicted on Plate 20.

## Planting and Seeding Methods

Where possible the areas will be disked using conventional farm equipment. Andalex will make every effort to leave surfaces to be reseeded as rough as possible (one method could be gouging by a trackhoe). The seed will be spread using a rangeland drill where possible. Areas which cannot be seeded mechanically will be hand seeded or hydroseeded. Steeper slopes will be raked to provide a slight soil cover for the seed. Steep slopes may also be hydroseeded and hydromulched.—

=

## Mulching Techniques

Vegetative cover will be promptly re-established following cessation of mining activities to stabilize erosion. Mulch will be used and re-seeding will occur during the first normal period for favorable growth following regrading. Mulch will be applied to all reseeded areas. Where hydromulching cannot be used, straw mulch (at the rate of 1-1/2 to 2 tons/acre) will be crimped either mechanically or by hand. Hydromulch will be used on steep slopes and straw will be used wherever possible.

Andalex would plan on using organic mulch (wood fiber). It will be used wherever seeds are planted. These areas are shown on Plate 20 and constitute ~~34~~47.~~2~~19 acres. The rate of application will be one ton per acre. The remaining acres are shrub plantings which will be stabilized with the drainage area seed mix and

crimped straw.

## Management Practices, e.g., Irrigation, Pest, and Disease Control

Andalex does not anticipate irrigation will be used because of the lack of water in the area. Vegetative growth will be subject to normal rainfall and winter snowfall. As a contingency irrigation by mechanical methods could be used if ~~rEVEGATATION~~Revegetation of the transplants is unsuccessful. Vegetation will be protected from both wildlife and livestock by drift-fences until the reclaimed areas have been adequately re-established. Upon approval, the fences will be removed. Pesticides and herbicides will be used as necessary. Should any persistent pesticides be needed, the Division's approval will be obtained prior to their use.

## Measures to Determine Success

~~REVEGATATION~~ Revegetation will be closely monitored. Areas which fail to support sufficient growth to stabilize conditions will be tested and reseeded until a proper cover is established. Vegetation reference areas will be consulted to determine success. Physical examinations will be conducted to note any species which are not thriving or regenerating. If this occurs, species will be substituted at the recommendation of the regulatory authority. Any other species will be added at the time of reclamation upon recommendation of the regulatory authority. The company will maintain close contact with the Bureau of Land Management in all of its ~~rEVEGATATION~~Revegetation efforts, and incorporate their suggestions into its over all plan. All reclaimed areas will be monitored and maintained by the constant observation of Andalex until the surety release is granted.

~~REVEGATATION~~ Revegetation monitoring parameters to be measured are growth rate, plant density and percent cover. We would expect to monitor or supervise monitoring at least monthly during the first two growing seasons. From experience with interim ~~rEVEGATATION~~Revegetation at the minesite, we have learned that two growing seasons are needed to establish any success. After this we would know whether reclamation was progressing successfully.

Monitoring will take place during years 1, 2, 5, 9, and 10. Years 9 and 10 will include estimates of cover, wood density, productivity, and composition, both on reclaimed areas and on reference areas. Parameters sampled on reclaimed areas will meet or exceed 90% of the reference area standard with a 90% confidence

level. Andalex will use approved sampling methods and will use the same method for both reclaimed and reference areas. In 1983, Andalex planted several shrub species which are part of our approved transplant mixture on topsoil pile F. These plantings were not performed under the direction of the Division and were merely for Andalex's reference. Andalex will attempt a new test plot with our approved transplant mixture in 1992 in the same area. Monitoring, both qualitative and quantitative, will be performed in years 1, 2, 5, 9, and 10. Data will be submitted to the Division as part of the annual report starting in 1993.

## Reference Areas

The reference areas to be used by Andalex Resources in ~~rEVEGATATION~~Revegetation are shown on Plate 9 which is a Watershed and ~~REVEGATATION~~Revegetation Reference Areas Map. These reference areas have been described by the Soil Conservation Service with regard to condition and production. This description can be found in Appendix M following EEC's soils and vegetation survey.

There are three reference areas, each one acre in size, two of which are located on slopes and one in a drainage area. Reference area R-1 will be used in conjunction with the seed mixture for drainage areas. Areas R-3 and R-4 will be used in conjunction with the seed mixture for slopes and will also be used in conjunction with drainage areas to establish the success of Gamble's Oak. See plate 9. Additionally, a "**Reference Area**" for the GVH's with the same plant community was sampled. The Reference Area was used for comparisons of the proposed disturbed site at that time and will also be used at the time of final reclamation of the GVH's for standards of final revegetation success.

Each reference area established will be re-evaluated every five years prior to permitting.

The new Left Hand Fork fan installation will have its own separate topsoil storage area. Andalex will utilize this topsoil storage area to test shrub species in the coming years beginning in the fall of 1995.

Standards for success for woody species is 2000 woody plants-per-acre for stream bottom areas and east-facing slopes; 1500 woody plants-per-acre for west-facing slopes.

Sediment Pond E - PM will be maintained until removal is authorized by the Division and the disturbed area has been stabilized and revegetated. In no case will the structure be

## R645-301-332. ——IMPACTS OF SUBSIDENCE ON RENEWABLE RESOURCE LANDS

### Subsidence

### Survey of Structures and Renewable Resource Lands

There are no structures present other than those constructed for mining operations, on the permit area. The land is presently used for grazing and wildlife habitat which constitutes a renewable resource area. It should be noted that geographic areas above Andalex's 5 year mine plan do not include any area suitable for grazing, nor do they contribute significantly to the long-range productivity of water, food or fiber products. Andalex commits to mitigate all subsidence related damage to renewable resources including, but not limited to water, grazing, and wildlife habitat including raptor nests.

## R645-301-333. ——USING THE BEST TECHNOLOGY CURRENTLY AVAILABLE TO MINIMIZE DISTURBANCE AND IMPACT

As the ~~Mathis/Summit Creek Incidental Boundary Change~~Kenilworth Lease is simply an extension of our underground mine workings under roughly 2,600 to 3,000 of cover, there will be likely be no effect to the surface biology of the area.

### Preventive Measures

Subsidence due to mining on the Andalex property will not occur outside of the approved permit area. Stations have been set up as required for constant monitoring of subsidence movements. (See 6., Monitoring.) The only absolute preventive measure possible is to leave coal in place. This is in direct contrast to maximum economic coal recovery.

Resources on the lands above Andalex's mining plan consist only of wildlife habitat with very limited grazing access.

Subsidence monitoring stations will be established as necessary along the first proposed longwall mining. (See 6., Monitoring and Plate 2~~8~~5.) The results of this monitoring program

discharged, resulting in the addition to ~~streamflow~~stream flow.

## Table III-13
Recommended Seed Mix for Steep Slope Areas
Andalex Resources, Inc.

| SPECIES | # PLS/Acre |
|---|---|
| Grasses : | |
| *Agropyron smithii* | |
| Western Wheatgrass | 3.0 |
| *Agropyron spicatum* | |
| Bluebunch Wheatgrass | 2.0 |
| *Agropyron trachycaulum* | |
| Slender Wheatgrass | 2.0 |
| *Bromus marginatus* | |
| Mountain Brome | 3.0 |
| *Oryzopsis hymenoides* | |
| Indian ricegrass | 2.0 |
| *Poa sandbergii (secunda)* | |
| Sandberg bluegrass | 0.25 |
| Forbs: | |
| *Artemisia ludoviciana* | |
| Louisiana sagebrush | 0.1 |
| *Hedysarum borealis* | |
| Northern sweetvetch | 1.0 |
| *Linum lewisii* | |
| Lewis flax | 1.0 |
| *Melilotus officinalis* | |
| Yellow sweetclover | 0.5 |
| *Penstemon strictus* | |
| 'Bandera' Rocky Mtn. penstemon | 0.25 |
| Shrubs: | |
| *Amelanchier alnifolia* | |
| Serviceberry | 1.0 |
| *Artemisia tridentara vaseyana* | |
| Mountain big sagebrush | 0.2 |
| *Cercocarpus ledifolius* | |
| Curlleaf mountain mahogany | 1.0 |
| *Cercopcarpus montanus* | |
| True mountain mahogany | 1.0 |
| *Chrysothamnus nauseosus albicaulis* | |
| Whitestem rubber rabbitbrush | 1.0 |
| *Purshia tridentata* | |
| Bitterbrush | 3.0 |
| *Symphoricarpos oreophilus* | |
| Mountain snowberry | 1.0 |
| Total | 23.3 |

Rate is pounds Pure Live Seed/Acre for drill seeding. Broadcast seeding is double the drill rate.
12-10-86

## Table III-14
## Recommended Seed Mix for Drainage Areas
## Andalex Resources, Inc.

| SPECIES (DRAINAGE AREAS) | # PLS/acre |
|---|---|
| Grasses: | |
| Agropyron riparium<br>Western wheatgrass | 2.0 |
| Agropyron trachycaulum<br>Slender wheatgrass | 2.0 |
| Bromus marginatus<br>Mountain brome | 3.0 |
| Elymus cinereus<br>Great Basin wildrye | 2.0 |
| Phalaris arundinacea<br>Reed canarygrass | 0.5 |
| Poa pratensis<br>Sandberg bluegrass** | 0.1 |
| Forbs: | |
| Achillea millifolum<br>Yarrow | 0.1 |
| Artemisia ludoviciana<br>Louisiana sagebrush** | 0.1 |
| Hedysarum borealis<br>Northern sweetvetch | 1.0 |
| Melilotus officinalis<br>Yellow sweetclover | 0.5 |
| Osmorhiza occidentalis<br>Sweet anise | 2.0 |
| Shrubs: | |
| Amelanchier alnifolia<br>Serviceberry | 1.0 |
| Artemisia tridentata vaseyana<br>Mountain big sagebrush** | 0.1 |
| Rhus trilobata<br>Squawbush | 1.0 |
| Sambucus cerulea<br>Blue elderberry | 1.0 |
| Symphoricarpos oreophilus<br>Mountain snowberry | 1.0 |
| Total | 17.4 |
| Trees (transplants): | #/Acre |
| Populus angustifolia (Narrowleaf cottonwood) | 250 |
| Acer negundo (Box Elder) | 250 |
| Prunus virginiana (Chokecherry) | 250 |
| Quercus gambelii (Gambel oak) | 250 |
| Total | 1000 |

Rate is pounds Pure Live Seed/Acre for drill seeding. Broadcast seeding is double the drill rate.
*This seed mixture and shrub list will be used for interim reclamation in the left hand fork fan installation and on the new topsoil pile. This seed mixture and shrub list will also be used for final reclamation. Also, this shrub list will be attempted on the new topsoil pile in the left hand fork.
**Big sage, Louisiana sage, rabbit brush and bluegrass will be broadcast behind the drill where possible.

**R645-301-342.210. NUTRITIONAL VALUE**

Appendix A

**R645-301-342.220. COVER AND PROTECTION**

Appendix A

**R645-301-342.230. ABILITY TO SUPPORT AND ENHANCE HABITAT**

Appendix A

**R645-301-342.300. CROPLAND**

N/A

**R645-301-350 PERFORMANCE STANDARDS**

**R645-301-351 General**

**R645-301-352 Contemporaneous Reclamation**

See R645-301-331

**R645-301-353. REVEGATATION: GENERAL REQUIREMENTS**

**R645-301-353.100. VEGETATIVE COVER**

The vegetative cover will be as stated in the following categories.—

=

**R645-301-353.110. DIVERSITY, EFFECTIVENESS AND PERMANENCE**

The vegetative cover will be diverse, effective and permanent. Standards for reclamation success will be evaluated accordance with DOGM's "Vegetation Information and Monitoring Guidelines", Appendix A. The success of final reclamation will be judged on the effectiveness of the vegetation for the postmining land use and the extent of cover compared to the extent of cover for the reference area. Ground cover, production or stocking will be considered equal to the approved success standard when it reaches 90% of the success standard. Statistical adequacy of all statistical sampling will be determined using the following

formula:

$$N_{min} = \frac{t^2 S^2}{(dx)^2}$$

where:
- t = the value from appropriate t-table*, (2-tail test for pre-mine studies, 1-tail test for success studies)
- s = the sample standard deviation,
- d = the desired change in the mean,
- x = the sample mean of the parameter in question
- * = All parameters are to be tested at the 90% confidence level with a 10% change in the mean (d = .1).

Ground cover will be estimated by using one of the methods listed in "Vegetation Information Guidelines" Appendix A.

Andalex does not propose to stock shrubs or trees during interim or final ~~rEVEGATATION~~Revegetation.

Production measurements will be made in accordance with DOGM's "Vegetation Information Guidelines" Appendix A. Estimates may be made by the methodology which the vegetation consultant feels is the most suitable method to used for the work being performed.

An evaluation of species composition will be made, including species present, form and diversity.

For a postmining land use of grazing and wildlife habitat, the ground cover and production will be equal to or greater that a reference area. The Division's "Vegetation Information Guidelines", Appendix A will be utilized for the evaluation of the success of ~~rEVEGATATION~~Revegetation. Appendix B will be references for calculating diversity.

Siltation structures will be maintained until the disturbed area is revegetated and stabilized. They will remain in place at least two years after the last augmented seeding. Siltation structures may include straw bales, silt fences or filter baskets. Removal will be contingent upon ~~rEVEGATATION~~Revegetation and stabilization of the area as well as DOGM concurrence. Following removal, the area will be revegetated in accordance with the reclamation plan.

plant and animal species of the area.

## R645-301-353.250. COMPLIANCE WITH OTHER APPLICABLE LAWS OR REGULATIONS

The reestablished plant species will meet the requirements of applicable Utah and federal seed, poisonous and noxious plant; and introduced species laws or regulations.

## R645-301-353.250 Vegetative Exception

Andalex Resources, Inc. does not require vegetative exception at this time.

## R645-301-353.400 Cropland

The permit area contains no land designated as cropland.

## R645-301-354 Revegetation: Timing

Andalex Resources, Inc. will follow the recommended guidelines for revegetation and planting during the first normal period for favorable planting conditions after replacement of the topsoil. In Utah the planting period is usually Fall due to the precipitation events.

## R645-301-355 Revegetation: Mulching and Other Soil Stabilizing Practices

Mulch and/or other soil stabilizing practices (roughing, etc.) Will be used on all areas that have been regraded and covered by topsoil (Section 341.200). Andalex, Resources, Inc. will exercise care to guard against erosion during and after application of topsoil.

## R645-301-356 Revegetation: Standards for Success

### R645-301-356.100 Success of Revegetation

The success of revegetation will be judged on the effectiveness of the vegetation for postmining land use, the

extent of cover on each degassification well site compared to their respective reference areas as described in Section 321 and in Attachment 3-1.

**Sampling Techniques** - Andalex Resources, Inc. will comply with the standards for success, statistically valid sampling techniques for measuring success, and the approved methods outline in the Division's "Vegetation Information Guidelines, Appendix A" for sampling.

The sampling methods to be used during reclamation will be specific to the requirements at the time of reclamation. Nonetheless, according to the currently approved UDOGM guidelines, these sampling methods would be used: sample adequacy, cover (line interception), density (belt transects or plots) and productivity (clipping). The Jaccard's Community Coefficient will be used to calculate acceptable plant similarity and diversity.

## R645-356.200 Standards for Success

Standards of success will be applied in accordance with the approved postmining land use as described in this section.

**Grazing Land and Pasture Land** - The ground cover and production of living plants on the revegetated area will be at least equal to the reference area.

**Fish and Wildlife Habitat** - The postmining land use for the degas well sites will be wildlife habitat on pre-existing roads. Pre-existing roads will be returned to their approximate original contour and compacted.

**Industrial, Commercial or Residential** - The postmining land use for the permit area is not designated for industrial, commercial, or residential use.

**Previously Disturbed Areas** - N/A

## R645-356.300 Siltation Structures

Siltation structures will be maintained until the disturbed areas have been stabilized and revegetated. For additional details on siltation structures, see Sections 542 and 763.

## R645-356.400 Removal of Siltation Structures

The land on which siltation structures are located will be revegetated in accordance with the reclamation plan discussed in Section 353 and 357. Refer to Section 763 for additional information pertaining to the removal of siltation structures.

## R645-357 Revegetation: Extended Responsibility Period

Andalex Resources, Inc. will be responsible for the success of revegetation for a period of 10 years following seeding of the reclaimed area or upon Diviison bond release.

## R645-357.100 Extended Period Begins

The period of extended responsibility will begin after disturbed areas have been reseeded.

## R645-357.200 Vegetation Parameters

Vegetation parameters will equal or exceed the approved success standard during the last 2 years of the responsibility period. The success standards are outlined in Section 356 of this application.

## R645-357.300 Husbandry Practices

The use of husbandry practices are not being requested.

## R645-358 Protection of Fish, Wildlife, and Related Environmental Values

Andalex Resources, Inc. will minimize disturbances and adverse impacts on wildlife and their related environments as outlined in Section 333 of the approved M&RP and Section 342 of this submittal. See Chapter 7, Section 731.100 of the approved M&RP for methods to protect water sources in the area.

## R645-358.100 Existence of Endangered or Threatened Species

A listing of threatened or endangered plant species known to

occur in Carbon County is included in Appendix M.

There have been no known threatened or endangered species observed in the lease area (Welsh 1977). A study was conducted in the Left Hand Fork for both the access road and the fan installation site to determine the presence of Canyon Sweetvetch. None was found. Additionally, the surveyor does not believe the habitat exists for this plant.

State or federally listed endangered or threatened species will be reported to the Division upon its discovery.

## R645-358.200 Bald and Golden Eagles

Andalex Resources, Inc. understands that there is no permission implied by these regulations for taking of bald or golden eagles, their nest, or eggs. If found, nests will be reported to the Division.

## R645-358.300 Taking of Endangered or Threatened Species

Andalex Resources, Inc. understands that there is no permission implied by these regulations for taking of endangered or threatened species, their nest, or eggs.

## R645-358.400 Replacement of Wetland or Riparian Vegetation

The sites contain no wetland or riparian vegetation.

## R645-358.500 Manmade Wildlife Protection Measure

**Electric Power Lines** - No utilities will exist at the well sites.

**Potential Barriers** - No potential barriers will exist in the permit area.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 3

**Biology**

**C/007/019**

(Revised)
July, 2014

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## R645-301-300. BIOLOGY

## R645-301-310. INTRODUCTION

### Introduction

At present the Mining and Reclamation Plan for the Centennial Project includes 2,274.77 acres under permit (see Plate 3). This permit is now being amended to include the Kenilworth Federal Lease UTU-81893 (1760.0 acres), bringing the total permit area to 4,034.77 acres (see Plate 3). Lease UTU-81893 was acquired in 2006. Mining activity within the Kenilworth lease area will be an extension of the underground workings of the existing Aberdeen Mine. Therefore there will be no new surface facilities associated with mining in the new lease areas (other than additional Gob Gas Vent holes, if needed, which will be permitted on a site-specific basis in the future). It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which has been previously approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 2006 through the normal LBA process after an application by Andalex Resources.

Since the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,000 to 3,000 feet of cover there will be absolutely no effect on vegetation, fish or wildlife. Because there will be no additional surface disturbance on the lease area, a First Order Survey is not deemed necessary.

Mountain-Brush, Desert Shrub, Pinion-Juniper Woodland, Sagebrush-Grass, Conifer-Aspen, and minor stream-side vegetative types cover the total mine plan area. Most of the area is covered by the Mountain-Brush type while the Pinion-Juniper Woodland type is predominant in the mine mouth area as well as the access routes and utility corridors; this area has been reseeded with a mixture as recommended by the U.S.D.A. S.C.S. (please see Soil Survey and Vegetation Inventory in Appendix M).

Andalex has selected and marked three reference areas in the field for vegetation. The Division has reviewed and approved these reference areas. Areas chosen include all types of vegetation conditions such as drainage areas, shallow slopes and steep slopes. Andalex contacted the SCS to help evaluate the condition of these sites. Please see SCS letter in Appendix M. It should be noted that Andalex does have the benefit of a revegetation test plot located on one of the topsoil piles. The drainage area reference area is the most adaptable to the left

fork fan installation.

The revegetation map now shows the original permit acreages for the three range types. Shrub clumps make up 2.15 acres, drainage areas make up 15.02 acres and steep slopes make up 17.03 acres. Total disturbed area, including the Aberdeen Mine left fork fan and road is 47.19 acres.

New vegetation mapping has been created for the entire permit area of the Centennial Mine. The mapping was done by Mt. Nebo Scientific, Inc. Springville, Utah. EarthFax Engineering did the Vegetation mapping for the Kenilworth Lease. See Plate 19 for vegetation mapping for the permit area.

The vegetation map was created by using new and/or current available aerial photography with field work accomplished as a means for ground-truthing. Field verification work was conducted during the growing season of 2002. Vegetation maps were consolidated and expanded and a new total permit vegetation map was created in 2014 as Plate 19.

It should be noted that no wetland or riparian areas are known to exist on the current permit or on the Kenilworth Lease Area, based on vegetation mapping and site visits by company and Division personnel.

## Source of Data

Department of the Interior, 1979. Final Environmental Statement, Development of Coal Resources in Central Utah; Part 1 Regional Analysis; Part 2 Site Specific Analysis.

United States Department of Agriculture, Soil Conservation Service, May, 1980. Soil Survey and Interpretations, Vegetation Survey.

Centennial Coal Associates, May, 1976 Mining Application. Submitted to the United States Geologic Survey, Conservation Branch.

A.M.C.A. Coal Leasing, June, 1978 Mining and Reclamation Plan (Zion's fee). Submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and Mining.
Revised 8/8/95

Earth Environmental Consultants
September, 1981
Soil Survey and Vegetation Inventory
(Appendix M)

Plateau Mining Corporation
Willow Creek Permit #007/0038
Map #5

## Description

Vegetative Types: Please see Soil Survey and Vegetation Inventory in Appendix M.

The vegetative types include Mountain Brush, Pinion-Juniper Woodland, Sagebrush-Grass, and Conifer-Aspen. The Sunedco Lease as well as the Graves Lease are located primarily in the Mountain Brush and Conifer-Aspen communities.

## Threatened or Endangered Species

A listing of threatened or endangered plant species known to occur in Carbon County is included in Appendix M.

There have been no known threatened or endangered species observed in the lease area (Welsh 1977). A study was conducted in the Left Hand Fork for both the access road and the fan installation site to determine the presence of Canyon Sweetvetch. None was found. Additionally, the surveyor does not believe the habitat exists for this plant.

Plant Communities: Please see Soil Survey and Vegetation Inventory in Appendix M.

The Mountain Brush type is the largest in the area. It is found predominately at elevations of about 7,500 feet. This community consists of sage, mountain mahogany, serviceberry, snowberry, squaw apple, gambels oak, and maple. Minor amounts of rabbitbrush, cliffrose, and bitterbrush can be found. Associated grass species are wildrye, Indian ricegrass, wheat grass, bull grass, and blue grass.

The Sagebrush-Grass group is present from 7,200 to 9,000 feet on and in the low benches below the cliffs. Sage and rabbit brush appear associated with the common grasses occurring in other communities such as curly grass, indian rice grass, and bull grass. Fourwing and saltbrush is found on better drained soils. Shad scale and curly grass associations are found on the heavier clay soils.

The Pinion-Juniper Woodland community occurs in the area from an elevation of 5,600 to 8,000 feet and dominates the area

below the escarpment of the Book Cliffs. Pinion pine and Utah juniper are the dominant species with bull grass, indian rice grass, and birch leaf mahogany as associated species.

The Conifer-Aspen becomes fairly extensive in the more moist sites and at higher elevations. Elevations range from about 7,000 to 9,000 feet. Aspen predominates at the lower elevations with associated species being serviceberry, snowberry, Oregon grape, mountain brome, and peavine. Douglas fir is scattered throughout the area above 7,500 feet elevation. A few big red pine, white pine, and fir are found in the upper canyon bottoms. Understory grasses present include curly grass, indian rice grass, shadscale, black sage, and crested wheatgrass.

Identified species of noxious or poisonous weeds in the area are halogeton, cockleburr, loco, and copperweed. There are no concentrated areas or serious problems from these poisonous plants.

Some of the most important vegetation species are listed in Table III-10 following this page.

TABLE III-10

Vegetation Possibly Occurring in Area

| Common Name | Scientific Name |
|---|---|
| **Grasses**: | |
| curly grass | Hilaria jamesii |
| indian rice grass | Oryzopsis hymenoides |
| squirreltail | Sitanian hystix |
| needle and thread grass | Stipa commata |
| no eatum grass | Aristida fendleriana |
| western wheat grass | Agropyron smithii |
| bull grass | Elymus salinus |
| **Shrubs**: | |
| nuttal saltbush | Atriplex nuttallii |
| mat saltbush | Atriplex corrugata |
| shadscale | Atriplex confertifoldia |
| fourwing saltbush | Atriplex canecens |
| big sagebrush | Artemisia tridentate |
| black sagebrush | Artemisia arbuscula nova |
| greasewood | Sarobatus vermiculatus |
| small rabbitbrush | Chrysothamnus viscidiflorus |
| big rabbitbrush | Chrysothamnus nauseosus |
| mountain-mahogany | Cercocarpus montanus |
| serviceberry | Amelanchief alnifolia |
| curlleaf mahogany | Cercocarpus ledifolius |
| squaw apple | Peraphyllum ramosissimum |
| snowberry | Symphoricarpos oreophilus |
| **Trees**: | |
| juniper | Juniperus osteosperma |
| pinion | Pinus edulis |
| ponderosa pine | Pinus ponderosa |
| aspen | Populus temuloides |
| limber pine | Pinus flexilis |
| douglas fir | Pseudotsuga menziesii |
| gambel oak | Quercus gambelii |

## Extent of Cover

Since the elevations and terrain varies drastically from steep walled canyons to high ridges, vegetation density also varies. Percent cover is greater at the higher elevations and on the gentler topography. The Bureau of Land Management estimates cover of 25 to 30 percent at the higher elevations and 10 to 12 percent on the lower canyon sides and bottoms.

## Shrub Height

Shrub height varies over the lease area. Topography, aspect, elevation, and soil cause these modifications.

## Area to be Disturbed

The surface area disturbed is very minimal, 47.19 acres as shown on Plate 7. It should be again stressed that there will be no additional surface disturbances and no additional surface facility construction on the new Kenilworth Lease area. Mining on the Kenilworth Lease will simply be an extension of existing underground workings. Site of the present surface facilities is located in an area that has been previously impacted by mining activities. Actual plant communities which have been disturbed are the Pinion-Juniper and associated species and similar impact is foreseen on vegetation overlying the remainder of the lease area at the proposed surface facilities' sites. Extreme care will be taken however, to disturb as little vegetation as possible and revegetation has been immediately carried out on all disturbed areas no longer needed for the mining operation.

# Fish and Wildlife Resources and Plan

## Introduction

The mine plan area is located in the West Tavaputs Plateau, a region which supports about 360 vertebrate wildlife species. The abundance and distribution of wildlife in the lease area is directly related to present land use activities and capabilities. Use of this area by certain species is limited to lack of perennial water. Mammal and bird species possibly occurring in the lease area are listed in Table III-11. Please refer to Plates 34, 34A, 34B, 34C, and 34D, which have been revised to include the Kenilworth Lease. A "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah", compiled by the Utah State Division of Wildlife Resources, can now be found in

Appendix A.

## Source of Data

Department of the Interior, 1979. Final Environmental Statement - Development of Coal Resources in Central Utah, Parts 1 and 2.

Utah Department of Natural Resources, Division of Wildlife Resources.

## Habitats

Previously described vegetation provides fair to excellent habitat for a variety of wildlife species.

**Animal Species (See Table III-11)**

## Mammals

Mammals occurring in the area can be divided into two groups, game species and non-game species.

The main game species include mule deer, mountain lion, black bear, elk, and cottontail rabbits. Mule deer, however, are the most important wildlife resources in the area. Mountain lion are present but little information is available due to their ranging habits. Generally, their movement coincides with the migration of deer. Black bear may occasionally be found in the vegetated canyons, usually along the cliff face. They normally inhabit the Book Cliffs to the north but little data is available on their populations. The permit area is within the lower limits of the elk range, however, elk are generally found north of the mine plan area at higher elevations. Cottontail rabbits are distributed throughout the area.

Non-game mammals include several species of small animals inhabiting the area. Predator species such as coyote and bobcat occasionally are found in the area and depend on small rodents and rabbits for their source of food. Information on non-game species is generally unavailable.

Additional information on species, habitat, and status, can be found in Appendix A. New habitat maps have been completed and can be found as Plates 34A, 34B, 34C and 34D.

TABLE III-11

List of Animals Possibly Occurring in Lease Area

| Common Name | Scientific Name |
|---|---|
| **Mammals:** | |
| Badger | Taxidea taxus |
| Black Bear | Ursus americanus |
| Bobcat | Lynx rufus |
| Coyote | Canis latrans |
| Deer mouse | Peromyscus maniculatus |
| Desert Cottontail | Sylvilagus audubonni |
| Elk | Cervus elaphus |
| Ground Squirrel | Spermophillus tridecelineatus |
| Least Chipmunk | Eutomias minimus |
| Mountain Lion | Felis concolor |
| Mule Deer | Odocoileus hemionus |
| Porcupine | Evethizon dorsatum |
| Striped Skunk | Mephitus mephitus |
| White-tailed Jackrabbit | Lepus townsendii |
| **Birds:** | |
| Brewers Sparrow | Spizella breweri |
| Blue Grouse | Dendragapus obscurus |
| Common Nighhawk | Chordeiles minor |
| House Sparrow | Passer Domesticus |
| Lark Sparrow | Chondestes grammacus |
| Magpie | Pica pica |
| Mourning Dove | Zenaidura macroura |
| Pinion Jay | Gymnorhinus cyanocephala |
| Red-tailed Hawk | Buteo jamaicenis |
| Robin | Turdus migratorius |
| Ruffed Grouse | Bonasa umbellus |
| Sage Grouse | Centrocercus urophasianus |
| Sparrow Hawk | Falco sparverius |
| Turkey Vulture | Cathartes aura |
| Vesper Sparrow | Pooecetes gromineus |

## Birds

### Raptors

The turkey vulture and red-tailed hawk frequent the area. A variety of other raptors breed in the Price area; however there is a poor density of raptors throughout the mine plan area. A raptor survey performed for Andalex Resources of the proposed permit area by Clayton M. White of Brigham Young University is attached as Appendix D. Please see Plate 34A in the confidential binder for the raptor survey done in 2007 on the Kenilworth Lease. These Plates now include information from the raptor survey performed in May, 1994, by the Utah DWR and the Utah DOGM. Also refer to letter from USFWS found in Appendix J indicating clearance for our powerline distribution regarding raptors.

### Other

Sage grouse inhabit the sagebrush flats at the foot of the cliffs (Plate 34D). Blue and ruffed grouse may occasionally be found in the vegetated canyons of the area. Chukkers can be found around the cliffs. Mourning doves are generally distributed throughout the area, however, the lack of perennial water limits dove nesting habitat in the area. Other representative birds include the magpie, bluebird, robin, and several species of sparrow.

### Reptiles and Amphibians

The most prominent species of reptiles include the rattlesnake and sagebrush lizard. No aquatic fauna are present in the area.

### Fish

There are no active fisheries as there are no permanent bodies of water or perennial streams in the area. No aquatic fauna are found.

### Threatened or Endangered Species

There have been no known threatened or endangered species on or near the lease area according to a survey conducted by the Utah Division of Wildlife Resources (Boner 1977).

## Impacts of Operation

Construction of all roads, powerlines, and surface facilities has been completed. The earthwork and surface facilities for the Aberdeen Mine are complete. The fish and wildlife information contained in this MRP pertains to the entire permit area including the Kenilworth Lease. The only potential impact to wildlife as a result of construction (golden eagle nests) has been addressed thoroughly and a negative impact determination was made. Regarding temporary interruption of wildlife habitat, this has also been addressed in the Fish and Wildlife Plan and the Reclamation Plan. Therefore, no additional impact of operations on wildlife is anticipated. Wildlife education has been implemented through the training department. All new employees will receive wildlife education training.

**Fish & Wildlife Plan (please see Appendix A).**

There will be no additional surface disturbance required on the new Kenilworth coal lease. Consequently, there will be no additional disturbance or adverse impacts on fish and wildlife or related environmental values. New habitat maps have been completed and can be found as Plates 34A (Confidential binder) 34B, 34C and 34D.

Andalex will make every possible effort to minimize disturbances to wildlife habitat in the area and where possible enhance that habitat during reclamation. It should be noted that there is no aquatic life in the permit area as these canyons are dry except as a result of direct precipitation (ephemeral streams). Straight, Mathis and Alrad Canyons are ephemeral drainages. Andalex has performed numerous mitigative measures including extensive revegetation. Andalex has performed all mitigative measures outlined in the Fish and Wildlife Plan (Appendix A) with the exception of the use of swareflex reflectors.

Andalex has advised and encouraged employees to avoid unnecessary disturbances to all wildlife regardless of the season, but especially the depleted winter season or the breeding season. Hunting and all wildlife regulations are adhered to.

The largest part of Andalex's road is screened from view by vegetative cover. During Revegetation, Andalex will use seed mixtures which are favorable for wildlife enhancement.

To date, Andalex has had no use for poisons for rodent control or any other use.

Andalex has maintained small islands of natural vegetation within the site, but upon final reclamation, we do not intend to remove natural vegetation from other sites and transplant it. Andalex does not intend to encapsulate seed and fertilizer for release over several years. All disturbed slopes have been revegetated.

Snake dens will be reported to the DWR.

Berry producing shrubs have naturally re-occurred within the disturbed area for avifauna species. No avifauna will be disturbed within Andalex's minesite and in particular, raptors and their nests. Andalex's powerline was constructed under the guidance of the Utah DWR.

Lodges, nests, and dens for all mammals will be protected from disturbance. Andalex has reduced speed limits posted within the minesite and the entire length of the haulroad year-round (20 mph and 40 mph). Swareflex reflectors will not be implemented.

There are no unpaved sections of the haul road and swareflex reflectors are not being used. Andalex has demonstrated mitigation of impacted habitat through revegetation efforts on areas in and outside the permit area. We have had employee wildlife education sessions in the past and may perhaps in the future. A description of the values of wildlife as well as methods for avoiding impacts to wildlife could be written into a form which could be passed out during annual employee training. The Division of Wildlife Resources may be able to assist Andalex with this idea. The powerline was constructed under strict guidelines and has been thoroughly checked by both the Utah DWR and the U.S. Fish and Wildlife Service. Both agencies are pleased with the design and the as-built facilities. Andalex is willing to adhere to reasonable and practical recommendations given by any agency and has for the most part taken the advice of the DWR on most all occasions as outlined in the Wildlife Resources, Appendix A. Special condition #7 was answered by posting 40 mph speed limits, year round.

To the extent possible, Andalex will commit to prevent, control, and suppress range, forest, and coal fires within the permit area. The control of range and forest fires may very well be out of Andalex's hands and it may only be possible for Andalex to report these incidences to organizations such as the BLM who are equipped to handle these situations.

Andalex has committed to continuing wildlife education as part of its employee training. This will be coordinated with the local office of UDWR through the use of videos and possibly guest

speakers.

Andalex, through raptor surveys conducted, has identified Golden Eagle nests which could be impacted by subsidence. Andalex is committed to acquiring necessary take permits prior to longwall mining under these sites. Andalex is also committed to additional mitigation which might include measures to prevent nesting on those nests which could be affected by subsidence or removal of nests for scientific study. Please refer to Plate 34 for the most current raptor nesting information including the raptor survey conducted in May, 1994, and Plate 34A in the Confidential Binder for the Kenilworth lease. Three nests have been identified as being located within potential subsidence impact zones. They are identified on Plate 34 and a take permit application for these nests is on file with the U.S. Fish and Wildlife Service. The longwall panel affecting these nests will not be removed prior to the acquisition of this permit. There are no known raptor nests located on the Kenilworth Lease Area. (See Plate 34A in the Confidential File)

Andalex has committed to compensation for livestock lost as a result of subsidence which in turn is a direct result of underground mining activities. Also, major cracks caused by subsidence which are demonstrated to be a direct result of underground mining will be repaired.

## R645-301-311. VEGETATIVE, FISH AND WILDLIFE RESOURCES

See R645-301-310.

## R645-301-312. POTENTIAL IMPACTS

See R645-301-310 "Area to be Disturbed".

## R645-301-313. RESTORATION OR ENHANCEMENT

See R645-301-240.

## R645-301-320. ENVIRONMENTAL DESCRIPTION

See R645-301-310, Appendices A, D and M.

## R645-301-321. VEGETATION INFORMATION

See R645-301-310, Appendix M.

## R645-301-321.100. POTENTIAL FOR REESTABLISHING VEGETATION

Appendix M

## R645-301-321.200. PREMINING PRODUCTIVITY

Appendix M

## R645-301-322. FISH AND WILDLIFE INFORMATION

See R645-301-310,and Appendices A, D, and M.

## R645-301-322.100. PROTECTION AND ENHANCEMENT PLAN

Appendix A

## R645-301-322.200. SITE-SPECIFIC RESOURCE INFORMATION

Appendix A

## R645-301-322.210. THREATENED OR ENDANGERED SPECIES

See R645-301-310.

## R645-301-322.220. HABITATS OF UNUSUALLY HIGH VALUE FOR FISH AND WILDLIFE

See R645-301-310.

## R645-301-322.230. OTHER SPECIES OR HABITATS REQUIRING SPECIAL PROTECTION

N/A

## R645-301-322.300. FISH AND WILDLIFE SERVICE REVIEW

Appendix A

## R645-301-323. MAPS AND AERIAL PHOTOGRAPHS

Appendix A

## R645-301-323.100. REFERENCE AREAS

See R645-301-331 "Reference Areas".

## R645-301-323.200. MONITORING STATIONS

N/A

## R645-301-323.300. ENHANCEMENT FACILITIES

N/A

## R645-301-323.400. PLANT COMMUNITIES

See R645-301-310.

## R645-301-330. OPERATION PLAN

### Maps and Plans

Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the addition of new leases and rights-of-ways and the revisions are indicated in this submittal.

1) All necessary maps and plans to complete this section are found in Volume II of the submittal and also in the appendices, specifically,

   a) Underground coal mining activities to be conducted and lands to be affected by surface facilities are shown on Plates 6, 29, 30, 31 and 41.

   b-1) Buildings, utilities, and facilities are depicted on Plates 6 and 7.

2) The area to be affected is shown on several plates, including 4, 5, 6, and 41. These last four plates show the sequence of mining in the four seams over the five year term of the permit. Plate 29, 30, 31, 41 has been revised to show immediate development in the Gilson Seam as soon as approval is achieved. Reclamation will not take place until after all four seams are mined out. This activity is depicted on Plates 15, 16, 17, and 20.

3) Plate 6 depicts the entire disturbed area for which a performance bond is posted. The acreage is shown on Plate 5.

4) Coal storage and loading areas are shown on Plate 6. No cleaning takes place.

5) Plate 6 shows a non-coal waste storage area as well as topsoil storage areas. Plates 36 and 37 show the topsoil piles in detail.

6) All water diversions and other water facilities are shown on Plates 6, 8, 9, 11, 12, and 13. Also, typical diversions for disturbed area and undisturbed areas are shown in the Sedimentation and Drainage Control.

   Diversion ditches as they exist are shown on Revised Plate 6. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

   Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area. Plate 16 has been revised to show drainage during the reclamation period before and after removal of sediment ponds (Phase I).

   Plate 17 shows final drainage details.

   Plate 9 shows delineations of watershed areas.

   The main culvert will be removed entirely during the reclamation/earthwork phase except under Pond E. Pond "E" will be enlarged, and the entire drainage area above will flow into the restored channel RC-1 and through Pond "E-PM". Once Revegetation and water quality standards have been met, Pond "E-PM" will be removed and reclaimed.

7) There is no coal processing waste at the Centennial facility. There are no pollution control facilities other than sedimentation ponds on the permit area. Waste rock from the Centennial Mine rock tunnels has been disposed of underground in the Pinnacle Mine.

8) Specific facilities are not used to protect or enhance wildlife with the exception of the powerline which was built according to strict guidelines issued by the Division of Wildlife Resources and the U.S. Fish and Wildlife Service regarding raptor protection. The powerline design is included in Volume I as Appendix I (powerline design).

Also, speed limits are posted within the permit area.

9) The two powder magazines are shown on Plates 6 and 7.

10) Plates 6, 7, 8, and 9 show these facilities associated with protection of the hydrologic balance including sedimentation ponds and storage of non-coal waste. There are no permanent impoundments, coal processing wastes or underground development wastes. Any underground development waste or excess spoil which was generated while putting in the Aberdeen portals, has been used as stock pile pad material at the Aberdeen Minesite. The volume of this material is minimal.

11) Plates 16 and 17 show the final reclamation contours and configuration of the surface for Phases I and II respectively.

12) Subsidence monitoring points are shown on Plate 25. Water monitoring locations are shown on Figure IV-11 and on Plates found in Chapter 7.

13) There will be no facilities left on the permit area permanently with the exception of the roads through the right fork of Deadman Canyon. The left hand fork road will be reclaimed. After the completion of underground mining, all facilities will be removed with the exception of one downstream sedimentation pond. This pond will be removed upon final reclamation.

c) Maps, plans, and cross sections required under

b) (5),(6),(10), and (11) have been prepared under the direction of, and certified by a registered professional engineer. Assistance has come from a registered land surveyor.

1) Detailed maps, plans, and cross sections for our sediment ponds, Plates 11, 12, and 13 have been certified by a registered professional engineer.

2) Andalex has not used any excess spoil or underground development waste maps or cross sections. A map depicting the location of non-coal waste storage is included as Plate 6.

## R645-301-331. MINIMIZING IMPACT AND SURFACE EROSION

**REVEGATATION Plan**

## REVEGATATION and Interim Revegetation

Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authority (see Plates 19 and 20).

Interim Revegetation for stabilization of disturbed areas will take place on all disturbed slopes within the disturbed area. These slopes will be hydroseeded using the approved final reclamation seed mixture and rate of application along with hydromulch at the rate of one-and-one-half tons per acre. The vegetation cover will be maintained as necessary and slope stability will be measured by visual inspection.

### Schedule of Revegetation

The seeding of native flora (consisting where possible of deer browse species), will commence as soon as is practical following shutdown and abandonment to stabilize erosion. Agencies such as the B.L.M., O.S.M., and Utah Department of Natural Resources will be consulted at the time for recommendations on recontouring, soil reconditioning, and Revegetation. Revegetation will be accomplished by Andalex or under Andalex's direct supervision and under the recommendations of the regulatory authorities.

The first normal planting season will be used for Revegetation following the removal of all structures and regrading. The season for normal planting of seed mixtures is the fall, prior to snowfall and after October 1st. The normal season for shrub plantings is the spring after thawing while moisture is available.

## Soil Testing Plan and Soil Preparation

Where possible the soil will be distributed along the contour. The thickness of the re-established soil will be sufficient to support vegetation equal to or superior to pre-mining history (6"). Soils will be tested according to the most advanced technology. Samples will be taken to determine any deficiencies which would affect the growth of newly revegetated

areas. Any deficiencies will be corrected by adding to the soil chemical fertilizers, organic mulch, or any other substances recommended by the regulatory authority. Preparation techniques such as disking will be incorporated.

## Species and Amounts of Seeds and Seedlings

The seed mixtures outlined for steep slopes and drainage areas developed by UDOGM (12-10-86) will be used. Shrub clumps will be planted as shown on Plate 20. This constitutes an area of 2.15 acres (Drainage areas are 15.02 and Slopes are 17.03). Species shall include serviceberry, mountain big sagebrush, squawbush, blue elderberry, mountain snowberry, and mountain mahogany. They will be planted at a rate of 1,000 containerized plants per acre using fertilizer and crimped straw for stabilization. Drainage area seed mix will be used around and among the shrub clumps beneath the straw stabilization. Re Reference Areas. Plate 20 in Volume II shows that Andalex will plant the drainage mixture around and beneath the shrub clumps (transplants). These transplants listed above will be used in the drainage areas as depicted on Plate 20.

## Planting and Seeding Methods

Where possible the areas will be disked using conventional farm equipment. Andalex will make every effort to leave surfaces to be reseeded as rough as possible (one method could be gouging by a trackhoe). The seed will be spread using a rangeland drill where possible. Areas which cannot be seeded mechanically will be hand seeded or hydroseeded. Steeper slopes will be raked to provide a slight soil cover for the seed. Steep slopes may also be hydroseeded and hydromulched.

## Mulching Techniques

Vegetative cover will be promptly re-established following cessation of mining activities to stabilize erosion. Mulch will be used and re-seeding will occur during the first normal period for favorable growth following regrading. Mulch will be applied to all reseeded areas. Where hydromulching cannot be used, straw mulch (at the rate of 1-1/2 to 2 tons/acre) will be crimped either mechanically or by hand. Hydromulch will be used on steep slopes and straw will be used wherever possible.

Andalex would plan on using organic mulch (wood fiber). It will be used wherever seeds are planted. These areas are shown

on Plate 20 and constitute 47.19 acres. The rate of application will be one ton per acre. The remaining acres are shrub plantings which will be stabilized with the drainage area seed mix and crimped straw.

## Management Practices, e.g., Irrigation, Pest, and Disease Control

Andalex does not anticipate irrigation will be used because of the lack of water in the area. Vegetative growth will be subject to normal rainfall and winter snowfall. As a contingency irrigation by mechanical methods could be used if Revegetation of the transplants is unsuccessful. Vegetation will be protected from both wildlife and livestock by drift-fences until the reclaimed areas have been adequately re-established. Upon approval, the fences will be removed. Pesticides and herbicides will be used as necessary. Should any persistent pesticides be needed, the Division's approval will be obtained prior to their use.

## Measures to Determine Success

Revegetation will be closely monitored. Areas which fail to support sufficient growth to stabilize conditions will be tested and reseeded until a proper cover is established. Vegetation reference areas will be consulted to determine success. Physical examinations will be conducted to note any species which are not thriving or regenerating. If this occurs, species will be substituted at the recommendation of the regulatory authority. Any other species will be added at the time of reclamation upon recommendation of the regulatory authority. The company will maintain close contact with the Bureau of Land Management in all of its Revegetation efforts, and incorporate their suggestions into its over all plan. All reclaimed areas will be monitored and maintained by the constant observation of Andalex until the surety release is granted.

Revegetation monitoring parameters to be measured are growth rate, plant density and percent cover. We would expect to monitor or supervise monitoring at least monthly during the first two growing seasons. From experience with interim Revegetation at the minesite, we have learned that two growing seasons are needed to establish any success. After this we would know whether reclamation was progressing successfully.

Monitoring will take place during years 1, 2, 5, 9, and 10. Years 9 and 10 will include estimates of cover, wood density,

productivity, and composition, both on reclaimed areas and on reference areas. Parameters sampled on reclaimed areas will meet or exceed 90% of the reference area standard with a 90% confidence level. Andalex will use approved sampling methods and will use the same method for both reclaimed and reference areas. In 1983, Andalex planted several shrub species which are part of our approved transplant mixture on topsoil pile F. These plantings were not performed under the direction of the Division and were merely for Andalex's reference. Andalex will attempt a new test plot with our approved transplant mixture in 1992 in the same area. Monitoring, both qualitative and quantitative, will be performed in years 1, 2, 5, 9, and 10. Data will be submitted to the Division as part of the annual report starting in 1993.

## Reference Areas

The reference areas to be used by Andalex Resources in Revegetation are shown on Plate 9 which is a Watershed and Revegetation Reference Areas Map. These reference areas have been described by the Soil Conservation Service with regard to condition and production. This description can be found in Appendix M following EEC's soils and vegetation survey.

There are three reference areas, each one acre in size, two of which are located on slopes and one in a drainage area. Reference area R-1 will be used in conjunction with the seed mixture for drainage areas. Areas R-3 and R-4 will be used in conjunction with the seed mixture for slopes and will also be used in conjunction with drainage areas to establish the success of Gamble's Oak. See plate 9. Additionally, a "**Reference Area**" for the GVH's with the same plant community was sampled. The Reference Area was used for comparisons of the proposed disturbed site at that time and will also be used at the time of final reclamation of the GVH's for standards of final revegetation success.

Each reference area established will be re-evaluated every five years prior to permitting.

The new Left Hand Fork fan installation will have its own separate topsoil storage area. Andalex will utilize this topsoil storage area to test shrub species in the coming years beginning in the fall of 1995.

Standards for success for woody species is 2000 woody plants-per-acre for stream bottom areas and east-facing slopes; 1500 woody plants-per-acre for west-facing slopes.

Sediment Pond E - PM will be maintained until removal is

authorized by the Division and the disturbed area has been stabilized and revegetated. In no case will the structure be removed sooner than two years after the last augmented seeding.

## R645-301-332. IMPACTS OF SUBSIDENCE ON RENEWABLE RESOURCE LANDS

### Subsidence

### Survey of Structures and Renewable Resource Lands

There are no structures present other than those constructed for mining operations, on the permit area. The land is presently used for grazing and wildlife habitat which constitutes a renewable resource area. It should be noted that geographic areas above Andalex's 5 year mine plan do not include any area suitable for grazing, nor do they contribute significantly to the long-range productivity of water, food or fiber products. Andalex commits to mitigate all subsidence related damage to renewable resources including, but not limited to water, grazing, and wildlife habitat including raptor nests.

## R645-301-333. USING THE BEST TECHNOLOGY CURRENTLY AVAILABLE TO MINIMIZE DISTURBANCE AND IMPACT

As the Kenilworth Lease is simply an extension of our underground mine workings under roughly 2,600 to 3,000 of cover, there will be likely be no effect to the surface biology of the area.

### Preventive Measures

Subsidence due to mining on the Andalex property will not occur outside of the approved permit area. Stations have been set up as required for constant monitoring of subsidence movements. (See 6., Monitoring.) The only absolute preventive measure possible is to leave coal in place. This is in direct contrast to maximum economic coal recovery.

Resources on the lands above Andalex's mining plan consist only of wildlife habitat with very limited grazing access.

Subsidence monitoring stations will be established as necessary along the first proposed longwall mining. (See 6., Monitoring and Plate 25.) The results of this monitoring program will define monitoring and permitting needs in the future.

In the event problems should occur, which are verified by the company and the Division to be the result of mining, the company will develop a mitigation plan with the Division of Wildlife Resources.

## R645-301-333.100. PROTECTION OF THREATENED AND ENDANGERED SPECIES

There have been no known threatened or endangered species on or near the lease area according to a survey conducted by the Utah Division of Wildlife Resources (Boner 1977).

Calculations have been performed to evaluate the potential water depletion to the Colorado River system as a result of the mining at this site. The calculations are shown on Table III-12, and indicate a net increase of approximately 47.61 acre-feet of water per year to the Colorado River.

## R645-301-333.200. SITE-SPECIFIC PROTECTION OF THREATENED AND ENDANGERED SPECIES

See R645-301-310.

## R645-301-333.300. PROTECTIVE MEASURES DURING ACTIVE PHASES OF MINING OPERATIONS

Appendix A

## R645-301-340. RECLAMATION PLAN

See R645-301-240.

## R645-301-341. REVEGATATION

See R645-301-240.

## R645-301-341.100 SCHEDULE AND TIMETABLE

See R645-301-240.

## R645-301-341.200. DESCRIPTION

See R645-301-240.

Table III-12
Potential Water Depletion
to
Colorado River Drainage

The following calculations are intended to define the potential depletion or addition of water to the Colorado River Drainage System, as a result of mining at this operation. It should be noted that the criteria is based on the U.S. Fish and Wildlife Service Windy Gap Process, and only those parameters that apply to this operation have been calculated.

Projected Water Depletion

1- Bathhouse/Office
   a. 140 people @ 35 ngpd/ea x 240 days/yr = 1,176,000,gal/yr

2- Ventilation
   a. Evaporation
      1) 450,000 cfm = 236,520 M cf/yr
      2) 2.5 gallon/M cf = 591,300 gal/yr

Total Loss = 1,767,300 gal/yr
5.424 ac ft/yr

Projected Water Addition

1- Mine Discharge
   a. 100gpm x 120 days/yr = 17,280,000 gal/yr

Total Gain = 17,280,000 gal/yr
53.034 ac ft/yr

Summary

Projected Depletion = -5.424 ac ft/yr
Projected Addition = +53.034 ac ft/yr

Total Addition = + 47.61 ac ft/yr

Note: Moisture loss from mined coal and yse of sprays have not been included, since the spray water is derived from perched aquifers and is recycled within the mine. Any excess water from the perched aquifers is eventually discharged, resulting in the addition to stream flow.

Table III-13
Recommended Seed Mix for Steep Slope Areas
Andalex Resources, Inc.

| SPECIES | # PLS/Acre |
|---|---|
| Grasses : | |
| Agropyron smithii | |
| Western Wheatgrass | 3.0 |
| Agropyron spicatum | |
| Bluebunch Wheatgrass | 2.0 |
| Agropyron trachycaulum | |
| Slender Wheatgrass | 2.0 |
| Bromus marginatus | |
| Mountain Brome | 3.0 |
| Oryzopsis hymenoides | |
| Indian ricegrass | 2.0 |
| Poa sandbergii (secunda) | |
| Sandberg bluegrass | 0.25 |
| Forbs: | |
| Artemisia ludoviciana | |
| Louisiana sagebrush | 0.1 |
| Hedysarum borealis | |
| Northern sweetvetch | 1.0 |
| Linum lewisii | |
| Lewis flax | 1.0 |
| Melilotus officinalis | |
| Yellow sweetclover | 0.5 |
| Penstemon strictus | |
| ‘Bandera’ Rocky Mtn. penstemon | 0.25 |
| Shrubs: | |
| Amelanchier alnifolia | |
| Serviceberry | 1.0 |
| Artemisia tridentara vaseyana | |
| Mountain big sagebrush | 0.2 |
| Cercocarpus ledifolius | |
| Curlleaf mountain mahogany | 1.0 |
| Cercopcarpus montanus | |
| True mountain mahogany | 1.0 |
| Chrysothamnus nauseosus albicaulis | |
| Whitestem rubber rabbitbrush | 1.0 |
| Purshia tridentata | |
| Bitterbrush | 3.0 |
| Symphoricarpos oreophilus | |
| Mountain snowberry | 1.0 |
| Total | 23.3 |

Rate is pounds Pure Live Seed/Acre for drill seeding. Broadcast seeding is double the drill rate.
12-10-86

Table III-14
Recommended Seed Mix for Drainage Areas
Andalex Resources, Inc.

| SPECIES (DRAINAGE AREAS) | # PLS/acre |
|---|---|
| Grasses: | |
| Agropyron riparium<br>Western wheatgrass | 2.0 |
| Agropyron trachycaulum<br>Slender wheatgrass | 2.0 |
| Bromus marginatus<br>Mountain brome | 3.0 |
| Elymus cinereus<br>Great Basin wildrye | 2.0 |
| Phalaris arundinacea<br>Reed canarygrass | 0.5 |
| Poa pratensis<br>Sandberg bluegrass** | 0.1 |
| Forbs: | |
| Achillea millifolum<br>Yarrow | 0.1 |
| Artemisia ludoviciana<br>Louisiana sagebrush** | 0.1 |
| Hedysarum borealis<br>Northern sweetvetch | 1.0 |
| Melilotus officinalis<br>Yellow sweetclover | 0.5 |
| Osmorhiza occidentalis<br>Sweet anise | 2.0 |
| Shrubs: | |
| Amelanchier alnifolia<br>Serviceberry | 1.0 |
| Artemisia tridentata vaseyana<br>Mountain big sagebrush** | 0.1 |
| Rhus trilobata<br>Squawbush | 1.0 |
| Sambucus cerulea<br>Blue elderberry | 1.0 |
| Symphoricarpos oreophilus<br>Mountain snowberry | 1.0 |
| Total | 17.4 |
| Trees (transplants): | #/Acre |
| Populus angustifolia (Narrowleaf cottonwood) | 250 |
| Acer negundo (Box Elder) | 250 |
| Prunus virginiana (Chokecherry) | 250 |
| Quercus gambelii (Gambel oak) | 250 |
| Total | 1000 |

Rate is pounds Pure Live Seed/Acre for drill seeding. Broadcast seeding is double the drill rate.
*This seed mixture and shrub list will be used for interim reclamation in the left hand fork fan installation and on the new topsoil pile. This seed mixture and shrub list will also be used for final reclamation. Also, this shrub list will be attempted on the new topsoil pile in the left hand fork.
**Big sage, Louisiana sage, rabbit brush and bluegrass will be broadcast behind the drill where possible.

## R645-301-341.220. METHODS USED IN PLANTING AND SEEDING

See R645-301-240.

## R645-301-341.230. MULCHING TECHNIQUES

See R645-301-240.

## R645-301-341.240. IRRIGATION AND PEST CONTROL MEASURES

See R645-301-240.

## R645-301-341.250. METHODS USED TO DETERMINE REVEGATATION SUCCESS

See R645-301-240.

## R645-301-341.300. STUDIES AND TESTING TO DEMONSTRATE FEASIBILITY OF REVEGATATION PLAN

See R645-301-240.

## R645-301-342. FISH AND WILDLIFE

See R645-301-310, Appendices A and D.

## R645-301-342.100. ENHANCEMENT MEASURES

Appendix A. Andalex will endeavor to use the best technology current available to enhance wildlife habitat during the reclamation phase of its operation. This will include, but not be limited to water sources (if available), thermal cover, escapeways, hiding and loafing places, and travelways. ANDALEX will consult with the Division of Wildlife Resources, at the time of final reclamation, to determine exactly what reclamation designs, planting arrangements, and artificial structures would best enhance a wildlife habitat.

## R645-301-342.200. PLANT SPECIES SELECTION

See R645-301-341.210.

## R645-301-342.210. NUTRITIONAL VALUE

Appendix A

## R645-301-342.220. COVER AND PROTECTION

Appendix A

## R645-301-342.230. ABILITY TO SUPPORT AND ENHANCE HABITAT

Appendix A

## R645-301-342.300. CROPLAND

N/A

## R645-301-350 PERFORMANCE STANDARDS

## R645-301-351 General

## R645-301-352 Contemporaneous Reclamation

See R645-301-331

## R645-301-353. REVEGATATION: GENERAL REQUIREMENTS

## R645-301-353.100. VEGETATIVE COVER

The vegetative cover will be as stated in the following categories.

## R645-301-353.110. DIVERSITY, EFFECTIVENESS AND PERMANENCE

The vegetative cover will be diverse, effective and permanent. Standards for reclamation success will be evaluated accordance with DOGM's "Vegetation Information and Monitoring Guidelines", Appendix A. The success of final reclamation will be judged on the effectiveness of the vegetation for the postmining land use and the extent of cover compared to the extent of cover for the reference area. Ground cover, production or stocking will be considered equal to the approved success standard when it reaches 90% of the success standard. Statistical adequacy of all statistical sampling will be

determined using the following formula:

$$N_{min} - \frac{t^2 S^2}{(dx)^2}$$

where: t = the value from appropriate t-table*, (2-tail test for pre-mine studies, 1-tail test for success studies)
s = the sample standard deviation,
d = the desired change in the mean,
x = the sample mean of the parameter in question
* = All parameters are to be tested at the 90% confidence level with a 10% change in the mean (d = .1).

Ground cover will be estimated by using one of the methods listed in "Vegetation Information Guidelines" Appendix A.

Andalex does not propose to stock shrubs or trees during interim or final Revegetation.

Production measurements will be made in accordance with DOGM's "Vegetation Information Guidelines" Appendix A. Estimates may be made by the methodology which the vegetation consultant feels is the most suitable method to used for the work being performed.

An evaluation of species composition will be made, including species present, form and diversity.

For a postmining land use of grazing and wildlife habitat, the ground cover and production will be equal to or greater that a reference area. The Division's "Vegetation Information Guidelines", Appendix A will be utilized for the evaluation of the success of Revegetation. Appendix B will be references for calculating diversity.

Siltation structures will be maintained until the disturbed area is revegetated and stabilized. They will remain in place at least two years after the last augmented seeding. Siltation structures may include straw bales, silt fences or filter baskets. Removal will be contingent upon Revegetation and stabilization of the area as well as DOGM concurrence. Following removal, the area will be revegetated in accordance with the reclamation plan.

## R645-301-353.120. NATIVE OR DESIRABLE INTRODUCED SPECIES

The vegetative cover will be 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.

## R645-301-353.130. EXTENT OF COVER

The vegetative cover will be at least equal in extent of cover to the natural vegetation of the area.

## R645-301-353.140. STABILIZING SOIL FROM SURFACE EROSION

The vegetative cover will be capable of stabilizing the soil surface from erosion.

## R645-301-353.200. REESTABLISHED PLANT SPECIES

The reestablished plant species will:

## R645-301-353.210. COMPATIBILITY WITH APPROVED POST-MINING LAND USE

The reestablished plant species will be compatible with the approved postmining land use.

## R645-301-353.220. SEASONAL CHARACTERISTICS OF GROWTH

The reestablished plant species will have the same seasonal characteristics of growth as the original vegetation.

## R645-301-353.230. SELF-REGENERATION AND PLANT SUCCESSION

The reestablished plant species will be capable of self-regeneration and plant succession.

## R645-301-353.240. COMPATIBILITY WITH AREA PLANT AND ANIMAL SPECIES

The reestablished plant species will be compatible with the

plant and animal species of the area.

## R645-301-353.250. COMPLIANCE WITH OTHER APPLICABLE LAWS OR REGULATIONS

The reestablished plant species will meet the requirements of applicable Utah and federal seed, poisonous and noxious plant; and introduced species laws or regulations.

## R645-301-353.250 Vegetative Exception

Andalex Resources, Inc. does not require vegetative exception at this time.

## R645-301-353.400 Cropland

The permit area contains no land designated as cropland.

## R645-301-354 Revegetation: Timing

Andalex Resources, Inc. will follow the recommended guidelines for revegetation and planting during the first normal period for favorable planting conditions after replacement of the topsoil. In Utah the planting period is usually Fall due to the precipitation events.

## R645-301-355 Revegetation: Mulching and Other Soil Stabilizing Practices

Mulch and/or other soil stabilizing practices (roughing, etc.) Will be used on all areas that have been regraded and covered by topsoil (Section 341.200). Andalex, Resources, Inc. will exercise care to guard against erosion during and after application of topsoil.

## R645-301-356 Revegetation: Standards for Success

### R645-301-356.100 Success of Revegetation

The success of revegetation will be judged on the effectiveness of the vegetation for postmining land use, the extent of cover on each degassification well site compared to

their respective reference areas as described in Section 321 and in Attachment 3-1.

**Sampling Techniques -** Andalex Resources, Inc. will comply with the standards for success, statistically valid sampling techniques for measuring success, and the approved methods outline in the Division's "Vegetation Information Guidelines, Appendix A" for sampling.

The sampling methods to be used during reclamation will be specific to the requirements at the time of reclamation. Nonetheless, according to the currently approved UDOGM guidelines, these sampling methods would be used: sample adequacy, cover (line interception), density (belt transects or plots) and productivity (clipping). The Jaccard's Community Coefficient will be used to calculate acceptable plant similarity and diversity.

## R645-356.200 Standards for Success

Standards of success will be applied in accordance with the approved postmining land use as described in this section.

**Grazing Land and Pasture Land -** The ground cover and production of living plants on the revegetated area will be at least equal to the reference area.

**Fish and Wildlife Habitat -** The postmining land use for the degas well sites will be wildlife habitat on pre-existing roads. Pre-existing roads will be returned to their approximate original contour and compacted.

**Industrial, Commercial or Residential -** The postmining land use for the permit area is not designated for industrial, commercial, or residential use.

**Previously Disturbed Areas -** N/A

## R645-356.300 Siltation Structures

Siltation structures will be maintained until the disturbed areas have been stabilized and revegetated. For additional details on siltation structures, see Sections 542 and 763.

## R645-356.400 Removal of Siltation Structures

The land on which siltation structures are located will be revegetated in accordance with the reclamation plan discussed in Section 353 and 357. Refer to Section 763 for additional information pertaining to the removal of siltation structures.

## R645-357 Revegetation: Extended Responsibility Period

Andalex Resources, Inc. will be responsible for the success of revegetation for a period of 10 years following seeding of the reclaimed area or upon Diviison bond release.

## R645-357.100 Extended Period Begins

The period of extended responsibility will begin after disturbed areas have been reseeded.

## R645-357.200 Vegetation Parameters

Vegetation parameters will equal or exceed the approved success standard during the last 2 years of the responsibility period. The success standards are outlined in Section 356 of this application.

## R645-357.300 Husbandry Practices

The use of husbandry practices are not being requested.

## R645-358 Protection of Fish, Wildlife, and Related Environmental Values

Andalex Resources, Inc. will minimize disturbances and adverse impacts on wildlife and their related environments as outlined in Section 333 of the approved M&RP and Section 342 of this submittal. See Chapter 7, Section 731.100 of the approved M&RP for methods to protect water sources in the area.

## R645-358.100 Existence of Endangered or Threatened Species

A listing of threatened or endangered plant species known to occur in Carbon County is included in Appendix M.

There have been no known threatened or endangered species observed in the lease area (Welsh 1977). A study was conducted in the Left Hand Fork for both the access road and the fan installation site to determine the presence of Canyon Sweetvetch. None was found. Additionally, the surveyor does not believe the habitat exists for this plant.

State or federally listed endangered or threatened species will be reported to the Division upon its discovery.

## R645-358.200 Bald and Golden Eagles

Andalex Resources, Inc. understands that there is no permission implied by these regulations for taking of bald or golden eagles, their nest, or eggs. If found, nests will be reported to the Division.

## R645-358.300 Taking of Endangered or Threatened Species

Andalex Resources, Inc. understands that there is no permission implied by these regulations for taking of endangered or threatened species, their nest, or eggs.

## R645-358.400 Replacement of Wetland or Riparian Vegetation

The sites contain no wetland or riparian vegetation.

## R645-358.500 Manmade Wildlife Protection Measure

**Electric Power Lines -** No utilities will exist at the well sites.

**Potential Barriers -** No potential barriers will exist in the permit area.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 4

## Land Use and Air Quality

## C/007/019

(Revised)
June, 2014

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## R645-301-400. LAND USE AND AIR QUALITY

### R645-301-410. LAND USE

~~As the Mathis Tract and New Federal Summit Creek Lease boundary change~~ At present the Mining and Reclamation Plan for the Centennial Project includes 2,274.77 acres under permit (see Plate 3). This permit is now being amended to include the Kenilworth Federal Lease UTU-81893 (1760.0 acres), bringing the total permit area to 4,034.77 acres (see Plate 3). Lease UTU-81893 was acquired in 2006. Mining activity within the Kenilworth lease area will be an extension of the underground workings of the existing Aberdeen Mine. Therefore there will be no new surface facilities associated with mining in the new lease areas (other than additional Gob Gas Vent holes, if needed, which will be permitted on a site-specific basis in the future). It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which has been previously approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 2006 through the normal LBA process after an application by Andalex Resources.

Since the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,~~600~~000 to 3,000 feet of cover there will be absolutely no effect on ~~land use.~~ Land use or air quality. Because there will be no additional surface disturbance on the lease area, a First Order Survey is not deemed necessary.

### R645-301-411. ENVIRONMENTAL DESCRIPTION

Due to the rugged topography and sparse rainfall, the land area is presently used only for grazing, wildlife habitat, and outdoor recreation. Historically, the land has also been used for coal mining.

### R645-301-411.100. PREMINING LAND USE INFORMATION

The initial development of the Book Cliffs Coal Field was started in the early 1890's. By the early 1900's practically the entire field had been prospected. Mines in the lease area were not active until the 1920's because the cliffs were less accessible and the coal beds were thinner.

The Knight-Ideal mines, ~~now held~~relinquished by Andalex Resources are located adjacent to the Hoffman Creek lease area. Initial prospecting took place at this location in 1906 and extensive mining began in 1948 and ceased in 1958. During this period, 1,680,000 tons of coal were produced from the Gilson seam. The Knight-Ideal Mine is contiguous to our relinquished Sunedco leases (U-05067) in Hoffman Creek. By mining this lease, Andalex ~~will~~ recovered all minable coal between Centennial and Knight-Ideal.

Three mines on or adjacent to the lease area in Deadman Canyon were the Zion, Olsen, and Sutton (Blue Flame) mines. The Zion was located on the Zion's fee lease and the Olsen and Sutton were on SL-027304. The first two produced from the Gilson seam and the last produced from the Aberdeen or Castlegate "A" seam. Production figures are not reliable but it is estimated that between 216,000 tons and 720,000 tons may have been produced from the Sutton mines. The Olsen mines produced about 18,000 tons and the Zion mine around 240,000 tons, between 1924 and 1944.

There was also a prospect entry driven in the Lower Sunnyside Seam (the Hileman) on lease U-010581 from which production was insignificant, approximately 1,400 tons. Mining ceased in the area in 1964.

## R645-301-411.110. USES OF THE LAND AT THE TIME OF FILING APPLICATION

The Deadman Canyon area as well as the Straight and Hoffman Canyons would fall into two land use categories: 1) Fish and Wildlife habitat and recreation lands, and 2) Range Lands. County zoning regulations (1974) indicate all lands involved in the lease application area are within zone M and G1 which is for mining and grazing. Current land use consists of grazing and deer hunting. For recreational purposes the land is suitable for deer hunting. Other recreational uses for the permit area could include hiking, cross-country skiing, four wheeling, camping, and snowmobiling in winters with adequate snow cover. The lack of water prevents the establishment of a chukker/partridge population. Usually there are no elk in the area although an animal or two may occasionally wander onto the area.

There are no oil and gas wells or water wells other than those water wells drilled by Andalex for use in mining activities, on the lease area. Also, there are no oil and gas wells or water wells in adjacent areas.

The area is eight air miles from Price, but the unavailabil-

ity of water precludes any development for residential or summer homes.

See Figure 4-1 for a Regional Land Use Map.

## R645-301-411.120. LAND USE DESCRIPTION IN CONJUNCTION WITH OTHER ENVIRONMENTAL RESOURCES INFORMATION

Livestock grazing has been the most intense use of the lease area. However, due to the expansive cliff formations and the roughness of the canyon walls, grazing has been principally limited to the canyon bottoms and extreme tops to the north of the lease boundary.

Mule deer are found within the lease area as well as the usual small mammals, predators, and passerine and raptorial birds.

Outdoor recreation in the lease area is limited and usually related to enjoyment of the open space and associated scenic facilities and hunting for wild animals. The number of people using the area is small due to the rough terrain, poor roads, and lack of water.

The AEP Lease Area has the same land-use as that of the original permit area.

## R645-301-411.130. EXISTING LAND USES AND LAND USE CLASSIFICATION

## R645-301-411.140. CULTURAL AND HISTORIC RESOURCES INFORMATION

Most of the maps previously submitted as part of the Mining and Reclamation Plan are applicable. Where necessary, original maps have been revised to indicate the newly acquired lease areas and these revisions are included with this submittal as figures or as plates in Volume II. An archaeological clearance for the Left Hand Fork fan installation can be found in Appendix C along with all other previously conducted archaeological surveys. An archaeological survey for the Kenilworth Lease can be found in the confidential binder.

See R645-301-412.100.

## R645-301-412.130. ALTERNATE POSTMINING LAND USE

N/A

## R645-301-412.140. CONSISTENCY WITH SURFACE OWNER PLANS AND APPLICABLE UTAH AND LOCAL LAND USE PLANS

**Socioeconomic Impacts**

The proposed project is located in an area where coal mining is the major industry, therefore, the community is geared for coal operations. The labor supply is excellent, well-trained, and available. Most people in this area have a very favorable attitude towards the increased coal activity. They look forward to growth in the area which will increase population, home construction, and provide other facilities for community use.

The need for development of additional housing, school space, and changes in present community services would be among the greatest impacts, due to the increase in population. Positive effects of the project will be to increase the number of jobs, payroll, and taxes thus helping to build the community.

**Land Use Changes**

The nature of an underground mine of this type and size requires minimal surface disturbance. There will be no additional surface disturbance whatsoever with the addition of any new leases, except for possible GVH holes if required. There will be no change in land-use status from pre-mining to post-mining use. The limited resources both physical and scenic will dictate no future change in land status. Considering the extent and nature of similar lands in the Book Cliffs, no uses other than those previously discussed can be forecast.

Deadman Canyon has been unsightly since the earliest mining began in the 1920's, the new mine surface facility and portal site will be in the same area as the old mine tipples and waste dumps. These waste dumps are numerous and located throughout the canyon bottom and consist of coal fines which were unmarketable during the earlier mining history. This coal waste has been recovered, reprocessed, and cleaned up during the new operation. This new operation will actually be a significant reclamation phase to the canyon area.

During and after completion of mining operations, the land will continue to be used for grazing and hunting. No future change is dictated in the land status. Please refer to Appendix R for surface owner comments. Existing surface owners did not feel any change in postmining land use was dictated. Surface disturbances will be very minimal and all disturbed land will be restored in a timely manner, according to the Reclamation Plan to conditions that are capable of supporting the uses they were capable of supporting before mining.

No grazing land has been impacted by Andalex's minesite or permit area as none exists within the disturbed area. As far as wildlife habitat is concerned, two things should be pointed out. First, Andalex has successfully provided new vegetation and food sources through ~~rEVEGATATION~~revegetation within the deer winter range in acreages greatly exceeding the disturbed or "impacted" area. These areas include large acreages along the haul road and powerline corridor. Second, and perhaps more importantly, on Andalex's minesite, wildlife abounds. There are large numbers of small mammals of many varieties including, but not limited to, squirrels, chipmunks, mice and rabbits. There are large numbers of all types of birds, including large and small raptors hunting in the area. The DWR has indicated that our powerline has provided important hunting opportunities for large raptors. Deer are commonly observed within our disturbed area feeding on revegetated slopes. ~~REVEGATATION~~Revegetation within our disturbed area is mitigation in itself to the impacted area.

**R645-301-412.200. LAND OWNER OR SURFACE MANAGER COMMENTS**

Appendix R.

**R645-301-413.300. SUITABILITY AND COMPATIBILITY**

Appendix R.

**R645-301-413. PERFORMANCE STANDARDS**

**R645-301-413.100. POSTMINING LAND USE**

## R645-301-420. AIR QUALITY

As the ~~Mathis Tract and New Federal Summit Creek~~Kenilworth Lease ~~boundary change~~ is simply an extension of underground mine workings under roughly 2,600 to 3,000 feet of cover there will be absolutely no effect on air quality.

Air Pollution Control Plan and Compliance with Air Quality Laws

**Existing Environment**

The permit area is located in a Class II air quality area.

**Air Quality Impact Analysis**

Please see the following section, section 3 re Emission Estimates.

**Emission Estimates**

Emission estimates are included as Appendix F in the form of an emission inventory. This inventory has been reviewed and approved by the Utah Bureau of Air Quality and the E.P.A. It has been re-approved to increase our production restriction on the basis the haul road has been paved by Carbon County. Air quality permit in appendix F.

**Proposed Controls**

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, pavement, and other fugitive dust control practices outlined in 30 CFR 817.95.

There will be no additional fugitive emissions or air pollution associated with the newly acquired ~~AEP~~Kenilworth Lease.

**PSD Permit and Compliance with Air Quality Laws**

The Environmental Protection Agency has determined that this project does not need a PSD air quality permit. This is based on our fugitive and non fugitive dust emissions inventory which assumes facilities necessary for 1.5 mm tons per year production.

Further, the mine is not subject to the PSD regulations because of the new definition of a major source. (Refer to letter dated March 21, 1980 in Appendix J). All applicable air quality laws will be complied with and fugitive dust control practices, as required under 30 CFR 817.95, will be followed.

Andalex has been issued a new approval order for the mines and the Wildcat Loadout for 1.5 million tons per year. These were inspected and met compliance during the summers of 1989-1992.

## R645-301-421. CLEAN AIR ACT AND OTHER APPLICABLE LAWS

See R645-301-420.

## R645-301-422. UTAH BUREAU OF AIR QUALITY

See R645-301-420.

## R645-301-423. SURFACE COAL MINING AND RECLAMATION ACTIVITIES EXCEEDING 1,000,000 TONS PER YEAR

See R645-301-420.

## R645-301-423.100. COMPLIANCE WITH FEDERAL AND UTAH AIR QUALITY STANDARDS

See R645-301-420.

~~R645-301-423.200.~~

## R645-301-424 FUGITIVE DUST CONTROL PLAN

See also Appendix ~~F~~J

## R645-301-425 ADDITIONAL DIVISION REQUIREMENTS

NA

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 4

## Land Use and Air Quality

**C/007/019**

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## R645-301-411.100. PREMINING LAND USE INFORMATION

The initial development of the Book Cliffs Coal Field was started in the early 1890's. By the early 1900's practically the entire field had been prospected. Mines in the lease area were not active until the 1920's because the cliffs were less accessible and the coal beds were thinner.

The Knight-Ideal mines, relinquished by Andalex Resources are located adjacent to the Hoffman Creek lease area. Initial prospecting took place at this location in 1906 and extensive

mining began in 1948 and ceased in 1958. During this period, 1,680,000 tons of coal were produced from the Gilson seam. The Knight-Ideal Mine is contiguous to our relinquished Sunedco leases (U-05067) in Hoffman Creek. By mining this lease, Andalex recovered all minable coal between Centennial and Knight-Ideal.

Three mines on or adjacent to the lease area in Deadman Canyon were the Zion, Olsen, and Sutton (Blue Flame) mines. The Zion was located on the Zion's fee lease and the Olsen and Sutton were on SL-027304. The first two produced from the Gilson seam and the last produced from the Aberdeen or Castlegate "A" seam. Production figures are not reliable but it is estimated that between 216,000 tons and 720,000 tons may have been produced from the Sutton mines. The Olsen mines produced about 18,000 tons and the Zion mine around 240,000 tons, between 1924 and 1944.

There was also a prospect entry driven in the Lower Sunnyside Seam (the Hileman) on lease U-010581 from which production was insignificant, approximately 1,400 tons. Mining ceased in the area in 1964.

## R645-301-411.110. USES OF THE LAND AT THE TIME OF FILING APPLICATION

The Deadman Canyon area as well as the Straight and Hoffman Canyons would fall into two land use categories: 1) Fish and Wildlife habitat and recreation lands, and 2) Range Lands. County zoning regulations (1974) indicate all lands involved in the lease application area are within zone M and G1 which is for mining and grazing. Current land use consists of grazing and deer hunting. For recreational purposes the land is suitable for deer hunting. Other recreational uses for the permit area could include hiking, cross-country skiing, four wheeling, camping, and snowmobiling in winters with adequate snow cover. The lack of water prevents the establishment of a chukker/partridge population. Usually there are no elk in the area although an animal or two may occasionally wander onto the area.

There are no oil and gas wells or water wells other than those water wells drilled by Andalex for use in mining activities, on the lease area. Also, there are no oil and gas wells or water wells in adjacent areas.

The area is eight air miles from Price, but the unavailability of water precludes any development for residential or summer homes.

See Figure 4-1 for a Regional Land Use Map.

## R645-301-411.120. LAND USE DESCRIPTION IN CONJUNCTION WITH OTHER ENVIRONMENTAL RESOURCES INFORMATION

Livestock grazing has been the most intense use of the lease area. However, due to the expansive cliff formations and the roughness of the canyon walls, grazing has been principally limited to the canyon bottoms and extreme tops to the north of the lease boundary.

Mule deer are found within the lease area as well as the usual small mammals, predators, and passerine and raptorial birds.

Outdoor recreation in the lease area is limited and usually related to enjoyment of the open space and associated scenic facilities and hunting for wild animals. The number of people using the area is small due to the rough terrain, poor roads, and lack of water.

The AEP Lease Area has the same land-use as that of the original permit area.

## R645-301-411.130. EXISTING LAND USES AND LAND USE CLASSIFICATION

## R645-301-411.140. CULTURAL AND HISTORIC RESOURCES INFORMATION

Most of the maps previously submitted as part of the Mining and Reclamation Plan are applicable. Where necessary, original maps have been revised to indicate the newly acquired lease areas and these revisions are included with this submittal as figures or as plates in Volume II. An archaeological clearance for the Left Hand Fork fan installation can be found in Appendix C along with all other previously conducted archaeological surveys. An archaeological survey for the Kenilworth Lease can be found in the confidential binder.

## R645-301-411.141. CULTURAL AND HISTORIC RESOURCES MAPS

See Appendix C.

## R645-301-411.141.1 PUBLIC PARKS AND LOCATIONS OF ANY CULTURAL OR HISTORICAL RESOURCES

N/A

## R645-301-411.141.2 CEMETERIES

There are no cemeteries or burial grounds in or within 100 feet of the permit area.

## R645-301-411.141.3 NATIONAL SYSTEM OF TRAILS OR THE WILD AND SCENIC RIVERS SYSTEM

N/A

## R645-301-411.142. COORDINATION WITH THE STATE HISTORIC PRESERVATION OFFICER (SHPO)

Appendix C.

## R645-301-411.142.1 PREVENTION OF ADVERSE IMPACTS

Appendix C.

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Appendix C.

## R645-301-411.143. IMPORTANT HISTORIC AND ARCHAEOLOGICAL RESOURCES THAT MAY BE ELIGIBLE FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES

Appendix C.

## R645-301-411.143.1 COLLECTION OF ADDITIONAL INFORMATION

Appendix C.

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Appendix C.

## R645-301-411.143.3 OTHER APPROPRIATE ANALYSES

Appendix C.

## R645-301-411.144. APPROPRIATE MITIGATION AND TREATMENT MEASURES

Appendix C.

## R645-301-411.145. EXCEPTIONS

Appendix C.

## R645-301-411.200. PREVIOUS MINING ACTIVITY

Previous activity consisted of small "dog hole" punch mines used for domestic coal in the 1930's, 1940's and 1950's.

## R645-301-411.210. TYPE OF MINING METHOD USED

Previous mining was using conventional sections.

## R645-301-411.220. COAL SEAMS OR OTHER MINERAL STRATA MINED

The coal seams previously mined were Lower Sunnyside, Gilson and Aberdeen.

## R645-301-411.230. EXTENT OF COAL OR OTHER MINERALS REMOVED

The extent of removed coal was not significant, roughly 2,000,000 tons over 30 years.

## R645-301-411.240. APPROXIMATE DATES OF PAST MINING

Approximately 1930-1960.

## R645-301-411.250. USES OF LAND PRECEDING MINING

See R645-301-411.140.

## R645-301-412. RECLAMATION PLAN

See R645-301-240.

## R645-301-412.100. POSTMINING LAND USE PLAN

The post-mining land use will consist of livestock grazing with wildlife habitat and some recreation.

## R645-301-412.110. ACHIEVEMENT OF PROPOSED POSTMINING LAND USE

See R645-301-412.100.

## R645-301-412.120. RANGE OR GRAZING LAND USE

See R645-301-412.100.

## R645-301-412.130. ALTERNATE POSTMINING LAND USE

N/A

## R645-301-412.140. CONSISTENCY WITH SURFACE OWNER PLANS AND APPLICABLE UTAH AND LOCAL LAND USE PLANS

**Socioeconomic Impacts**

The proposed project is located in an area where coal mining is the major industry, therefore, the community is geared for coal operations. The labor supply is excellent, well-trained, and available. Most people in this area have a very favorable attitude towards the increased coal activity. They look forward to growth in the area which will increase population, home construction, and provide other facilities for community use.

The need for development of additional housing, school space, and changes in present community services would be among the greatest impacts, due to the increase in population. Positive effects of the project will be to increase the number of jobs, payroll, and taxes thus helping to build the community.

**Land Use Changes**

The nature of an underground mine of this type and size requires minimal surface disturbance. There will be no additional surface disturbance whatsoever with the addition of any new leases, except for possible GVH holes if required. There will be no change in land-use status from pre-mining to post-mining use. The limited resources both physical and scenic will dictate no future change in land status. Considering the extent and nature of similar lands in the Book Cliffs, no uses other than those previously discussed can be forecast.

Deadman Canyon has been unsightly since the earliest mining began in the 1920's, the new mine surface facility and portal site will be in the same area as the old mine tipples and waste dumps. These waste dumps are numerous and located throughout the canyon bottom and consist of coal fines which were unmarketable during the earlier mining history. This coal waste has been recovered, reprocessed, and cleaned up during the new operation. This new operation will actually be a significant reclamation phase to the canyon area.

During and after completion of mining operations, the land will continue to be used for grazing and hunting. No future change is dictated in the land status. Please refer to Appendix R for surface owner comments. Existing surface owners did not feel any change in postmining land use was dictated. Surface disturbances will be very minimal and all disturbed land will be restored in a timely manner, according to the Reclamation Plan to

conditions that are capable of supporting the uses they were capable of supporting before mining.

No grazing land has been impacted by Andalex's minesite or permit area as none exists within the disturbed area. As far as wildlife habitat is concerned, two things should be pointed out. First, Andalex has successfully provided new vegetation and food sources through revegetation within the deer winter range in acreages greatly exceeding the disturbed or "impacted" area. These areas include large acreages along the haul road and powerline corridor. Second, and perhaps more importantly, on Andalex's minesite, wildlife abounds. There are large numbers of small mammals of many varieties including, but not limited to, squirrels, chipmunks, mice and rabbits. There are large numbers of all types of birds, including large and small raptors hunting in the area. The DWR has indicated that our powerline has provided important hunting opportunities for large raptors. Deer are commonly observed within our disturbed area feeding on revegetated slopes. Revegetation within our disturbed area is mitigation in itself to the impacted area.

## R645-301-412.200. LAND OWNER OR SURFACE MANAGER COMMENTS

Appendix R.

## R645-301-413.300. SUITABILITY AND COMPATIBILITY

Appendix R.

## R645-301-413. PERFORMANCE STANDARDS

## R645-301-413.100. POSTMINING LAND USE

See R645-301-412.100.

## R645-301-413.110. CAPABILITY OF SUPPORTING POSTMINING LAND USE

See R645-301-412.100.

## R645-301-413.120. HIGHER OR BETTER USES

See R645-301-412.100.

## R645-301-413.200. DETERMINING PREMINING USES OF LAND

See R645-301-412.100.

## R645-301-413.210. PREMINING USES OF LAND NOT PREVIOUSLY MINED

See R645-301-412.100.

## R645-301-413.220. POSTMINING LAND USE FOR LAND THAT HAS BEEN PREVIOUSLY MINED AND NOT RECLAIMED

See R645-301-412.100.

## R645-301-413.300. CRITERIA FOR ALTERNATIVE POSTMINING LAND USES

N/A

## R645-301-413.310. LIKELIHOOD FOR ACHIEVEMENT LAND USE

Post-mining land use as proposed shall be achieved.

## R645-301-413.320. HAZARDS TO PUBLIC HEALTH OR SAFETY, OR THREAT OF WATER DIMINUTION OR POLLUTION

This section deleted as instructed in the Technical Analysis.

## R645-301-413.330. PROHIBITED LAND USES

N/A

## R645-301-413.331. IMPRACTICAL OR UNREASONABLE

N/A

## R645-301-413.332. INCONSISTENT WITH APPLICABLE LAND USE POLICIES

N/A

## R645-301-413.333. UNREASONABLE DELAY IN IMPLEMENTATION

N/A

## R645-301-413.334. VIOLATION OF FEDERAL, UTAH OR LOCAL LAW

N/A

## R645-301-414. PERMIT REVISIONS REQUESTING APPROVAL OF ALTERNATE POSTMINING LAND USE

N/A

## R645-301-414.100. FILING DEADLINES

N/A

## R645-301-414.200. SIGNIFICANT ALTERATION FROM MINING OPERATIONS IN THE ORIGINAL PERMIT

N/A

## R645-301-414.300. OTHER REQUIREMENTS

N/A

## R645-301-420. AIR QUALITY

As the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,600 to 3,000 feet of cover there will be absolutely no effect on air quality.

Air Pollution Control Plan and Compliance with Air Quality Laws

**Existing Environment**

The permit area is located in a Class II air quality area.

**Air Quality Impact Analysis**

Please see the following section, section 3 re Emission Estimates.

**Emission Estimates**

Emission estimates are included as Appendix F in the form of an emission inventory. This inventory has been reviewed and approved by the Utah Bureau of Air Quality and the E.P.A. It has been re-approved to increase our production restriction on the basis the haul road has been paved by Carbon County. Air quality permit in appendix F.

**Proposed Controls**

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, pavement, and other fugitive dust control practices outlined in 30 CFR 817.95.

There will be no additional fugitive emissions or air pollution associated with the newly acquired Kenilworth Lease.

**PSD Permit and Compliance with Air Quality Laws**

The Environmental Protection Agency has determined that this project does not need a PSD air quality permit. This is based on our fugitive and non fugitive dust emissions inventory which assumes facilities necessary for 1.5 mm tons per year production. Further, the mine is not subject to the PSD regulations because of the new definition of a major source. (Refer to letter dated March 21, 1980 in Appendix J). All applicable air quality laws will be complied with and fugitive dust control practices, as required under 30 CFR 817.95, will be followed.

Andalex has been issued a new approval order for the mines and the Wildcat Loadout for 1.5 million tons per year. These were inspected and met compliance during the summers of 1989-1992.

## R645-301-421. CLEAN AIR ACT AND OTHER APPLICABLE LAWS

See R645-301-420.

## R645-301-422. UTAH BUREAU OF AIR QUALITY

See R645-301-420.

## R645-301-423. SURFACE COAL MINING AND RECLAMATION ACTIVITIES EXCEEDING 1,000,000 TONS PER YEAR

See R645-301-420.

## R645-301-423.100. COMPLIANCE WITH FEDERAL AND UTAH AIR QUALITY STANDARDS

See R645-301-420.

## R645-301-424 FUGITIVE DUST CONTROL PLAN

See also Appendix J

## R645-301-425 ADDITIONAL DIVISION REQUIREMENTS

NA

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 5

## Engineering

## C/007/019

(Revised)
June, 2014

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## R645-301-500. ENGINEERING

The ~~Mathis~~Kenilworth Tract ~~and New Federal Summit Creek Lease boundary change~~ will not require any changes to engineering practices currently employed at the Aberdeen Mine. The change simply involves an extension of underground mine workings and does not involve the surface in any way. See 301-522 and 301-525 for additional comments on subsidence. ~~See also IBC PHC, Appendix L.~~

## R645-301-510. INTRODUCTION

At present the Mining and Reclamation Plan for the Centennial Project includes 2,274.77 acres under permit (see Plate 3). This permit is now being amended to include the Kenilworth Federal Lease UTU-81893 (1760.0 acres), bringing the total permit area to 4,034.77 acres (see Plate 3). Lease UTU-81893 was acquired in 2006. Mining activity within the Kenilworth lease area will be an extension of the underground workings of the existing Aberdeen Mine. Therefore there will be no new surface facilities associated with mining in the new lease areas (other than additional Gob Gas Vent holes, if needed, which will be permitted on a site-specific basis in the future). It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which has been previously approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 2006 through the normal LBA process after an application by Andalex Resources.

Since the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,000 to 3,000 feet of cover there will be absolutely no effect on Engineering except for additional subsidence points. (Plate 25)

Most of the maps previously submitted as part of the Mining and Reclamation Plan are applicable. Where necessary, original maps have been revised to indicate the newly acquired lease area and these revisions are included with this submittal as figures or as plates in Volume II. Plates which have been changed to show the location of the incidental boundary change are included.

It should be noted that no man made ~~surface or subsurface~~surface features are located in or around the ~~Mathis Tract I.B.C. or on adjacent proposed Federal~~Kenilworth Lease ~~Applications~~UTU 81893 shown on Plate ~~I-A~~25 and others.

All categories within this section have been addressed, primarily in Volume II of the MRP which contains most of the plates.

a) Surface and subsurface ownership of lands contiguous to the permit area are shown on Plates 2 and 3.

b) The leases for which we have the legal right of entry are shown on Plate 4.

c) Andalex has submitted a permit modification to include the new ~~AEP~~Kenilworth Lease recently acquired. Also, a permit ~~will be~~was sought in 1993 for a ~~new~~ fan installation immediately adjacent to Andalex's leases in the left hand fork in Deadman Canyon.~~-~~

d) There are no buildings within 1,000 feet of the permit area except those used as part of the mining operation. They are shown on Plates 6 and 7.

e) There are no surface or subsurface man-made features within, passing through or passing over the permit area except the powerline, telephone cables, culverts, and etc., installed for the operation of this mine. See Plate 6 for their locations.

f) ~~These r~~Reference areas are shown on Plate 9 as~~———~~ R-1, R-3 and R-4. They are each 200 feet square approximately.

g) ~~The only user of s~~Surface water users within this immediate hydrologic area ~~is Andalex~~are shown on (Refer to Figure 5, Appendix L, which shows additional water use on Emma Park in the form of stock watering). Water rights for this area are found in Appendix L Tables 1 and 5 and Figure 5. The intake location for this water into the mine is located on Plate 6. Disturbed area runoff is collected in a culvert and taken directly into the mine. Andalex controls this water right. If a discharge were to occur from any sediment pond (this has yet to occur), it would discharge into the Deadman Canyon drainage (Plate 21) which is ephemeral.

h) County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' ~~minesite~~mine site (Plate 1).

i) There are no public parks nor any cultural or historical sites eligible for listing in the National Register in or adjacent to the mine plan area.

j) There are no cemeteries or burial grounds in or within 100 feet of the permit area.

k) There is no land which is within the boundaries of any units of the National System of Trails or the Wild and Scenic Rivers System including study rivers.

Cross Sections, Maps, and Plans

Most of the cross sections, maps, and plans of the approved plan remain applicable. Where necessary, original maps have been revised to indicate the addition of the newly acquired lease area and are included in this submittal, primarily in Volume II.

All categories within this section have been addressed. Specifically,

a) Plates 26, 27, and 28 show all the test borings locations and elevations. Specific information relating to these drill holes and the strata encountered can be found in Appendix E (coal quality, description of other strata). Into regarding roof & floor analyses is in Appendix E.

b) Monitoring stations for water quality are shown on Figure ~~IV-11~~7-1. Fish and wildlife monitoring stations were not set up for this application. However, refer to Plate ~~34~~s 34A, 34B, 34C, and 34D, which depicts wildlife distribution. Air quality monitoring was not required for this application. Figure 6 in Appendix L shows proposed monitoring stations. Andalex has adhered to the locations shown on Figure IV-11 which is included in Andalex's operating plan.

c) Refer to Appendix E for specific drill hole lithologies as well as data on quality and chemical characteristics.

d) Crop lines and strikes and dips can be found on the coal thickness isopachs in Volume II, Plates 26, 27, 28, and 40.

e) All old workings in the three coal seams to be mined are shown on Plates 29, 30, and 31. There are no old workings in the Centennial Seam. (plate 41)

f) All subsurface water on the permit area exists in perched aquifers. The Aberdeen sandstone is the lowest water bearing unit within the permit area and is discussed in this chapter, Geology. The only water well drilled on the

property which has been used with any frequency (well #1) has not depicted any seasonal variation. It is always a low producer.

g) There are no surface waters within the permit area. All drainages (natural) are shown on the topography on Plate 21. All constructed drainages are shown on Plates 6 and 7. There are no irrigation ditches. Appendix L, which is the Hydrologic Inventory, contains Figure 4 which clearly depicts the location of springs in the permit area and adjacent areas. This figure, along with Figures 5 and 6, depict the areal extent of the inventory. See Plate 1 for other spring locations in the adjacent area ~~(Emma Park)~~and 1A for Kenilworth Lease Area.

h) N/A

i) Plate 6 shows the location of temporary storage for underground development waste and excess spoil which can be stored in an area which was previously used as a sediment pond. Plate 6 now also shows the location of a new area above the Apex Mine which can be used for temporary and permanent storage of coal mine development waste such as sediment pond material. All dams and impoundments are shown on Plates 6 and 7, and detailed on Plates 11, 12, and 13. There are no other water treatment or air pollution control facilities on the permit area.

j) There are no oil or gas wells within the permit area. Three water wells are shown on Plate 6. Well number 1 is 220 feet deep; number 2 is 100 feet deep, and number 3 is 120 feet deep. Also, there are no oil or gas wells located in the adjacent areas.

k) Plates 14 and 15 accurately depict the area currently affected by mining as well as the area to be affected. They show the slopes as they exist as well as after construction and upon final reclamation.

## R645-301-511. GENERAL REQUIREMENTS

See R645-301-510.

## R645-301-511.100. PROPOSED COAL MINING AND RECLAMATION OPERATIONS

See R645-301-510.

## R645-301-511.200. POTENTIAL IMPACTS TO THE ENVIRONMENT

See R645-301-510.

## R645-301-511.300. RECLAMATION

See R645-301-240.

## R645-301-512. CERTIFICATION

See Volume II and R645-301-510.

## R645-301-512.100. CROSS SECTIONS AND MAPS

See R645-301-510.

## R645-301-512.110. MINE WORKINGS TO THE EXTENT KNOWN

Introduction

**Mine Property**

The coal leases owned by Andalex Resources are located in the Deadman Canyon area of the Book Cliffs coal field. The property is located about 10 miles north-northeast of Price, Utah in Carbon County. Mining has progressed onto all of Andalex's federal leases except the ~~AEP~~Kenilworth Lease ~~which will occur immediately upon approval~~. As is shown on the enclosed Plate 6, development into all seams involves separate surface facilities which are located adjacent to each other in Deadman. The ~~newly discovered~~ Centennial coal seam which is an isolated pocket of recoverable coal ~~will be~~was accessed from the Pinnacle Mine via rock slopes. ~~There will be~~The three rock slopes constructed each of which ~~will~~was be approximately 500' in length. The three tunnels ~~will be~~are for intake air, return air, and belt line. No

waste rock ~~will be~~was removed from the Pinnacle Mine either during or after construction. All waste rock will be disposed of underground.

**Economic Geology**

This project is located in a region where coal mining has historically been the only industry. The main coal-bearing rocks occur in the Blackhawk Formation of the Upper Cretaceous Mesa Verde Group. Several small operations have mined coal in the Deadman Canyon area over the past 70 years. These mines, however, merely scratched the surface of the estimated reserve. There are no other economically recoverable, replenishible or non-replenishible resources within this property.

**Exploration**

All exploration and drilling programs have been completed. The drilling and exploration activities were supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the lease area. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Zion's, Star Point, and Blue Flame No. 1 mines. Samples have been taken from the Centennial Seam at 89-1-CP and underground. See appendix E.

A five hole drilling program was conducted by Centennial Coal Associates in 1971. A seven hole drilling program was conducted by Andalex in 1977. These programs were supplemented by two holes drilled west of the property by North American Coal Company in 1948 and one drilled by Pacific, Gas and Electric in 1980. All drill sites are shown on Plates 26, 27, and 28. Refer to Appendix E.

**Reserves**

By U.S. Geological Survey definition, approximately 30% of the entire reserve is classified as "measured". The remainder is classified as indicated, based on all available measurements.

Total coal reserves in the four seams have been estimated at 50.8 million tons. Recoverable coal has been estimated at 30.5 million tons ~~(9.3 million has been mined to date)~~. Andalex expects an initial recovery rate of about 35 percent and upon final pillar extraction, total recovery is expected to be more

than 65 percent. Cover ranges from 0 feet to more than ~~2~~3,~~700~~000 feet on the northern end of the property.

## Underground Operation and Facilities

### Mine Layout(Refer to Plates 26, 27, 28 and 29). Multiple Seam Considerations

There ~~are~~were four economic seams present on the property. The uppermost seam is the Lower Sunnyside which varies from four to six feet thick. The second highest seam is the Centennial Seam which varies from four to eight feet thick. The third seam is the Gilson Seam which also varies from 4' to 8' thick. The lowermost seam is the Aberdeen which varies from four to thirteen feet in thickness. The bottom two seams are separated by a 200 foot interval which includes a massive sandstone. The Gilson and the Centennial Seams are separated by approximately 130' and the Centennial and Lower Sunnyside Seams are separated by 80' including a massive sandstone. It should be noted that the area in which the Centennial Seam is to mined does not contain any reserves in either the Lower Sunnyside nor the Gilson Seams. Only the Aberdeen Seam is present where the Centennial Seam is to be mined. The mine plans for each seam are shown on Plates 26, 27, 28 and 29.

### Portals

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine. ~~The portal mine pads consist of approximately~~ The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

**Mains, Submains, and Slopes**

A five entry system is being used (two intake portals) and using a continuous miner, the entries are being driven to the property line. Generally, entries on 80 foot centers with crosscuts every 80 feet are being driven on the strike and dip of the coal seam. Development mining for the longwall panels are on 5th entry and 3rd entry systems. Refer to Plates 26 through 29. There exists only one return air portal on the surface, however, two exist underground making the five entry system.

**Shafts and Interconnecting of Slopes**

Mining plans called for rock tunnels to be constructed from the existing Pinnacle Mine up to the Centennial Seam mining area. These rock slopes are each approximately 500' in length. The three tunnels consist of an intake air tunnel, a return air tunnel, and a belt tunnel. Coal is transported via the belt tunnel and transferred on to the existing Pinnacle Mine conveyor belts. These tunnels were constructed in the Spring of 1990 and mining has commenced.

**Longwall Panels**

The mining sequence calls for the development of panels longwall using 2, 3 and 5 entry systems. These panels will be generally 650 to 800 feet in width and up to 800 feet in length.

**Barrier Pillars**

A barrier pillar will be left between the bleeders and the longwall panels. A barrier will also be left wherever old mine workings are skirted such as the Olsen Mine on the east side of Deadman Canyon in the Gilson Seam. Due to resent MSHA requirements a barrier pillar will be left between longwall panels at depths deeper than 1,500 feet.

**Bleeder System**

A bleeder system will be maintained and pillars left to provide for ventilation, eventually extending around all mined out areas.

**Ventilation**

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and

As mining progresses, the following equipment ~~will be~~was added to start up additional mining areas and increase production (currently four units have been employed):

4th Mining Unit - January, 1990
Longwall - August, 1994

As there ~~are~~was four coal seams of minable thickness on the leases, a systematic plan of mining will be followed to assure maximum recovery of the coal reserves. When mining is progressing concurrently in two seams, the room and pillar design and layout will be columnized to assure maximum roof support.

## Underground Equipment

### Production Units

In each mine, the longwall development entry systems, will be mined with a drum-type continuous miner similar to the Joy 12 CM. Presently, Joy 12 CM-11's and 14 CM's are being used in the operation. Coal is transported by shuttle car (Joy) to a loading point consisting of a Long Airdox Feeder Breaker or similar machine, which will discharge onto a 42" panel conveyor or a 42" main conveyor. Roofbolting is and will be accomplished by a Lee Norse Roof Bolter or a similar type machine. The longwall panels will employ a Joy, 4-LS or similar shearer. Coal will be discharged into a pan face conveyor which will carry the coal to a crusher 1 stage loader for transportation by belt conveyor to the surface. Roof support will be by hydraulic shields. Additional production units will be added as previously outlined.

### Belt Conveyors

The feeder breaker or state loader will discharge the coal onto either a 48" panel conveyor or a 42" main conveyor. The conveyor will transport the coal to the outside, where it will be discharged to a live stockpile, (see Plate 6). Currently, Long Airdox conveyor belt drives are being used. For the longwall installations, the same, or similar drives will be employed.

### Water System

Water for mining use, such as for providing face fire protection and dust suppression, will be obtained from Water Well No. 1, shown on Plate 6. Water is also collected from the disturbed area via a system of culverts to underground workings connected to the Pinnacle Mine. This water will be pumped to the Mine Water Storage Tank and from there into the mine using a high

mining is completed making a mine life of approximately 15-20 years.

| Year | Estimated Production | Recoverable Tons Remaining |
|---|---|---|
| 1993 | 1,200,000 | 21.2 million |
| 1994 | 1,200,000 | 20.0 |
| 1995 | 1,500,000 | 18.5 |
| 1996 | 1,500,000 | 17.0 |
| 1997 | 2,000,000 | 15.5 |
| Duration | 2,000,000 | 10 years |

To date, Andalex has mined approximately 20% of its Lower Sunnyside Reserve, 80% of its Gilson Reserve, 5% of its Aberdeen Reserve and 20% of its Centennial Reserve (The Centennial Reserve consisted originally of approximately 2.5 million recoverable tons). All seams within the current leases have been mined out. The addition of the Kenilworth lease will provide some coal for future recovery.

~~PAGE 5-13 OF DOCUMENT~~

~~ORGANIZATION CHART~~

~~insert chart~~

**Support Structures and Buildings**

Support structures and buildings are shown on Plates 6 and 7.

**Parking Areas**

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

**Storage Areas**

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.

**Water Supply**

Water for use in the mine is described. Water for culinary use is hauled in approved water haulers from Price City. There is a sump cut in the mine from which water can be reclaimed as all available water will be needed. Since all mining is down dip from the portals, little water will exit from the mine. Information concerning the wells and water analysis is presented as Appendix L.

**Landscaping**

All disturbed areas have been graded to the most moderate slope possible to assure stability. Vegetative cover has been promptly re-established to stabilize erosion. ~~REVEGATATION~~Revegetation was accomplished by Andalex under the recommendations of the U.S. Department of Agriculture, Soil Conservation Service and the Division of Oil, Gas, and Mining.

**Signs, Markers, Fences, and Gates**

Signs of a uniform design, showing the company name, business address, and telephone number as well as the identification number of the current regulatory program permit authorizing the underground mining activities, have been placed at all access points to the permit area. These signs have been placed to be easily seen, are made of a durable material, and conform to local laws and regulations. The topsoil storage area is clearly marked.

As this is an underground mine, there will be no blasting conducted on the surface with the exception of highwall construction. When blasting for highwall construction does occur, conspicuous signs and flagging will be posted as required by 30 CFR Parts 817.11 (f) and 817.65 (e).

As the Left Hand Fork is classified as a intermittent drainage, stream buffer zone markers will be placed within 100 feet of the drainage disallowing access except for the disturbed site.

As there are no perennial streams or a stream with a biological community on the permit area, buffer zone markers will not be necessary. The perimeters of all areas affected by surface operations and facilities are clearly marked. These signs and markers shall be maintained during all activities and retained and maintained until after the release of all bonds for the permit area.

## R645-301-512.120. SURFACE FACILITIES AND OPERATIONS

See Volume II.

Support structures and buildings are shown on Plates 6 and 7 and LF-1.

### Parking Areas

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

### Storage Areas

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.

## R645-301-512.130. SURFACE CONFIGURATIONS

See Volume II, Plates 6 and 7.

## R645-301-512.140. ~~HYDROLOGY~~

### ~~Introduction~~

~~Water quality monitoring stations will be set up at the wells as shown on Figure IV-11, and also at the sedimentation pond discharge structures.~~

~~Sewage System~~

~~The nature of the overburden in the area offers excellent drainage. As a result, a septic system with drain fields conforming to the state codes has been established to handle the waste water disposal from the bathhouse and office facilities. The drain fields are located in native material (valley fill) east of the bath houses in the parking area. Enclosed as Appendix G are the two septic system plans as designed by a Utah Registered Professional Engineer and approved by the State of Utah Department of Health.~~

~~Water Treatment~~

~~Based on the State of Utah, Department of Health review of the septic systems, water treatment is not needed. (Personal communication, Mr. Gerald Story, Utah Department of Health, Price, Utah).~~

**HYDROLOGY**

See Sections R645-301-711, R645-301-722, R645-301-700 through R645-301-731.740

**Drainage Control - Diversions, etc.**

The drainage control plan is presented in this Chapter.

**Sediment Control**

The sedimentation plan is presented in this Chapter.

## R645-301-512.150. GEOLOGIC CROSS SECTIONS AND MAPS

~~Introduction~~

~~The proposed permit area is in Book Cliffs which is the major physiographic feature in the region. The cliffs rise from a base at approximately 5,500 feet in elevation, to over 8,500 feet. Numerous canyons dissect the Book Cliffs. Soldier Creek and Coal~~

Creek are the major area drainages. The permit area exhibits extreme topographic relief and is mountainous with steep cliffs and deeply incised drainages. With the exception of the Mancos Shale Formation, the Fiasco, Deadman, Straight Canyons, Hoffman Creek Canyon, Graves Lease and AEP Lease exhibit similar stratigraphic and topographic characteristics.

**Tectonic Setting**

The major coal seams of the Book Cliffs Coal Field lie within the Cretaceous Mesa Verde group which overlies the thick shales of the Cretaceous Mancos formation. The Mesa Verde group consists of the Star Point Sandstone, Blackhawk formation and Price River formation. The major coal seams lie within the Blackhawk formation.

The Tertiary Wasatch and Green River formations, along with the Price River formation, form the Roan Cliffs, the Tavaputs Plateau and the southern rim of the Uintah Basin. Lithologies present include fluvial, deltaic, and marine sandstones, mudstones, and shales.

**Geologic History**

During the Triassic and Jurassic periods, the area of the Book Cliffs was relatively stable, but gradually subsided and received sediments. The area, assumed to have been a relatively flat lowland, was occasionally covered by a shallow sea of short geologic duration. A thick red bed sequence suggests tropical conditions and the great thickness of sand accumulation suggests acid conditions. During Triassic times, the sediments probably came from all directions but, during the Jurassic time, the major source areas lay to the south and west.

During the early Cretaceous time, a trough developed in the Colorado Rockies area and the sea invaded. Gradually the sea crept westward as the trough continued to subside, reaching the east edge of the Colorado Plateau by the beginning of the Upper Cretaceous age.

Unconformities and thinning of various members indicate that volcanic activity to the west caused sediments to fill the basin faster than it could subside, causing the shoreline to be pushed eastward. When lulls in this activity developed, the incoming sediments diminished and the sea moved westward once more. With each pulse, the boundaries of the depositional environments moved eastward and then returned westward. The sandstone tongues of the Mesa Verde, which project into the Mancos, were deposited at these times.

After the sea retreated, the area continued to receive sediments under continental conditions which lasted well into Eocene time. In Oligocene time, the area began to rise in earnest. Erosion attacked the newly formed formation creating the present mountain ranges and cliffs.

**Stratigraphy**

The main coal bearing beds in the region occur in the Blackhawk formation. There are various more or less distinct coal beds or zones as listed below from top to bottom according to stratigraphic position.

Upper Sunnyside Bed
Lower Sunnyside Bed
Centennial Bed
Rock Canyon Bed
Fishcreek Bed
Gilson Bed
Kenilworth Bed
Castlegate "B" Bed

Castlegate "A" Bed

These zones are lenticular and reach minable thickness only in certain areas. The Lower Sunnyside Bed is the major bed in the area.

**Structure**

The Book Cliffs are basically a homocline (dip slope) dipping into the Uintah Basin with the cliff front roughly paralleling the strike of the feature. The strike of the beds is generally parallel to the face of the Book Cliffs. The beds are mostly uniform with dips of from 3° to 8° to the north and northeast toward the Uintah Basin.

Occasional faults cut the coal measures but are of small displacement and have been of little consequence in mining. The most serious group of faults lies in the Sunnyside area. These faults, which have a maximum separation of 200 feet, effect mining, but, fortunately, are not closely spaced.

**History of Mining**

Mining has been the major industry in the region for many years.

Coal was discovered in the Wasatch Plateau in 1874 and exploration soon spread to the Book Cliffs. Mines began operating in the area in 1889. The Castlegate and Sunnyside area was first developed, the areas in between being developed later. Coal was usually discovered away from settled areas and towns

were built for employees by the companies.
Production from mines generally increased until 1920, but began to decline in the 1920's and 1930's. World War II brought production back to the 1920 levels and production continued to increase until 1957 when production again declined.

Book Cliff mines to present have produced about 75 percent of Utah's coal annually. Well over 200 million tons of coal have been extracted from the coal measures of the area. Much coal remains and numerous mines are presently operating in the area.

**Geologic Hazard**
There are occasional faults cutting the coal measures of the area. They are of relatively small displacement. The most serious faults occur in the Sunnyside area. There is no indication of faulting within our lease area.

Faults in the Sunnyside district of the Book Cliffs field have been thought, by some, to have a causative relationship to the bounces experiences there. The outcrops on the lease premises and our own aerial photos have been carefully studied. In our judgement, no faults cut the lease area. The bulk of the tonnage to be mined is under less than 1,500 feet of cover, with only a very limited amount of coal under cover, up to 2,700 feet. Water inflows have never been a problem in the Book Cliffs field. The dip of the coal measures prevents entrapment of personnel, in any event.

**Stratigraphy**

The coal seams in the Blackhawk formation are listed stratigraphically.

- Upper Sunnyside Bed
- Lower Sunnyside Bed
- Centennial Bed
- Rock Canyon Bed
- Fishcreek Bed
- Gilson Bed
- Kenilworth Bed
- Castlegate "B" Bed
- Castlegate "A" Bed (Aberdeen)

Only the Lower Sunnyside, Centennial, Gilson, and Castlegate "A" beds are formed in commercial thickness on the Centennial Property. Andalex has discovered a new coal seam which is referred to as the Centennial Seam. This coal was originally thought to have been in the Lower Sunnyside Seam. This coal has been accessed through rock tunnels from the existing Pinnacle Mine. Waste from these rock tunnels was disposed of in the Pinnacle Mine. The Mine in the Centennial Seam as well as the Mine in the Aberdeen Seam will both progress onto the Graves Lease. Andalex is applying for approval for the new AEP Lease in the Centennial and Aberdeen Seams only.
Stratigraphic sections of the coal beds are shown in Figures III-1, III-2, and III-3. Seam thicknesses are shown on Plates 26, 27, 28, and 29.

**Structure**

The structure between Deadman and Soldier Canyons is relatively simple. Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are thought to exist in the Deadman Canyon area.

**History of Mining**

Several small operations have mined a considerable amount of coal over the past 70 years in the Deadman Canyon Area. Mining ceased in the area in 1964. These mines, however, merely scratched the surface of the reserve. The remaining recoverable reserve is estimated to be greater than twenty-eight million tons and ranging in cover from 0 to 2,700 feet.

**Identification of Strata**

Strata disturbed by surface operations consist of sandstone and siltstone of a colluvial nature.

**Design of Boring and Sampling Program**

Sites - Numbers, Location and Relationship to the Disturbed Area

The number, locations, and relationship of drill holes and sampling are indicated on Plates 26, 27, and 28.

Methodology - Sample Collection, Compositing of Samples for Each Strata, Laboratory Analyses

Samples of the immediate floor and roof below and above each seam were sampled using conventional core drilling equipment. Also, samples of the overburden which was disturbed in surface operation has been sampled by "grab" methods, as well as auger drilling.

**Data**

Field Log and Description of Samples - Lithologic Classification, Description, and Hydrologic Aspects

In November and December, 1971, a five-hole drilling program was conducted by Centennial Coal Associates, supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the leases. Pertinent information on these drill holes is given in Table III-1 and Appendix E. Complete lithologic logs of each drill hole are included in Appendix E. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Olsen, Star Point, and Blue Flame No. 1 mines. Information from those samples as well as the location of the drill holes is shown on Plates 26, 27, and 28.

TABLE III-1

Centennial Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| DH-1 | NW1/4 NW1/4 SE1/4 Sec. 8 T13S, R11E, SLBM Elevation - 7,230 ft. | 516 ft. | Lower Sunnyside Gilson Aberdeen |
| DH-2 | SW1/4 NW1/4 NW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,275 ft. | 580 ft. | Lower Sunnyside Gilson Aberdeen |
| DH-2-A | SW1/4 NW1/4 SE1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,165 ft. | 303 ft. | Gilson Aberdeen |
| DH-5 | SE1/4 SW1/4 NE1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,275 ft. | 832 ft. | Lower Sunnyside Gilson Aberdeen |
| DH-6 | NW1/4 SE1/4 SW1/4 Sec. 5 T13S, R11E, SLBM Elevation - 8,558 ft. | 2,275 ft. | Lower Sunnyside Gilson Aberdeen |

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~~Figure III-2~~
~~Generalized Section~~
~~Centennial Project - Deadman Canyon~~
~~Drillhole~~

~~INSERT ORIGINAL PLOT~~

~~In October and November, 1977, a seven-hole drilling program was conducted by Andalex in order to better define the coal reserves for mine planning on the Zion's fee. Pertinent information on these drill holes is presented in Table III-2. Complete lithologic logs of each drill hole are included in Appendix E. Locations are indicated on Plates 26, 27, and 28. Andalex drilled six holes underground and one on the surface in the summer of 1989 (Drill hole numbers 89-1-AP, 89-2-AP, 89-3-AP, 89-1-PIN, 89-2-PIN, 89-3-PIN, 89-1-CP). These holes were primarily to substantiate the existence of the new Centennial Seam.~~

~~Andalex has also acquired lithologic logs of two drill holes completed by North American Coal Corp., in 1948 and one by Pacific Gas & Electric in 1980. Although these holes are not located within the permit area, but to the west and east of its boundary, the information has been utilized in estimating reserves. Pertinent information is given in Table III-3. Complete lithologic logs are included in Appendix E and their location is indicated on Plates 26, 27, 28, and 29.~~

TABLE III-2
Andalex Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 77-1-CP | NE1/4 SE1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,555 ft. | 675 ft. | Gilson Aberdeen |
| 77-2-CP | SE1/4 NE1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,520 ft. | 690 ft. | Gilson Aberdeen |
| 77-3-CP | SE1/4 SE1/4 NW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,425 ft. | 868 ft. | Lower Sunnyside Gilson Aberdeen |
| 77-4-CP | SE1/4 SE1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,070 ft. | 105 ft. | Aberdeen |
| 77-5-CP | SE1/4 SE1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,085 ft. | 85 ft. | Aberdeen |
| 77-6-CP | NE1/4 NE1/4 NW1/4 Sec. 18 T13S, R11E, SLBM Elevation - 7,080 ft. | 80 ft. | Aberdeen |
| 77-7-CP | NE1/4 NE1/4 NW1/4 Sec. 18 T13S, R11E, SLBM Elevation - 7,010 ft. | 45 ft. | Aberdeen |
| 89-1-AP | SW1/4 SE1/4 NW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,239 ft. | 460 ft. | Centennial Aberdeen |
| 89-2-AP | NE1/4 NW1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,283 ft. | 90 ft. | Centennial |
| 89-3-AP | SW1/4 SE1/4 NW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,169 ft. | 90 ft. | Centennial |
| 89-1-PIN | SE1/4 NE1/4 SE1/4 Sec. 8 T13S, R11E, SLBM Elevation - 6,951 ft. | 260 ft. | Aberdeen |

Table III-2 (Continued)

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 89-2-PIN | SW1/4 NW1/4 SW1/4 Sec. 8 T13S, R11E, SLBM Elevation - 7,014 | 250 ft. | Aberdeen |
| 89-3-PIN | NW1/4 SE1/4 SW1/4 Sec. 7 T13S, R11E, SLBM Elevation - 7,483 ft. | 240 ft. | Aberdeen |
| 89-1-CP | SE1/4 SE1/4 SW1/4 Sec. 6 T13S, R11E, SLBM Elevation - 8,307 ft. | 1,880 ft. | Centennial Aberdeen |

TABLE III-3

North American Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| DH-NACC-6 | SE1/4 SE1/4 SE1/4 Sec. 1 T13S, R10E, SLBM Elevation - 7,460 ft. | Approx. 1,020 ft. | Centennial Gilson Aberdeen |
| DH-NACC-7 | SW1/4 NE1/4 SE1/4 Sec. 12 T13S, R10E, SLBM Elevation - 7,192 ft. | | Gilson Aberdeen |

Pacific Gas and Electric Drill Hole

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| CC9-1 | NW1/4 NW1/4 NW1/4 Sec. 9 T13S, R11E, SLBM Elevation - 7,225 ft. | Approx. 930 ft. | Lower Sunnyside Gilson Aberdeen |

Laboratory Analyses - Chemical Acidity, Toxicity, Alkalinity, and Physical (Erodibility and Compaction) Properties

Complete laboratory analysis is included in Appendix E. Appendix E has been updated to include coal quality information pertaining to the Centennial Seam.

**Identification of Potential Acid, Toxic or Alkaline Producing Horizons**

Refer to Appendix E for the laboratory analyses. Andalex has committed to sampling roof and floor material in all four coal seams in the most recently mine areas. This material will be analyzed for identification of Potential Acid, Toxic or Alkaline Producing Horizons. As this material is collected it will be placed into Appendix E with the rest of the laboratory data.

**Location of Subsurface Water at Face-Up Areas**

No water was encountered at face-up areas.

**Stratigraphy**

There are four coal seams of minable thickness in the mine plan area. All four are part of the Blackhawk Formation of the Cretaceous Mesa Verde Group. The Blackhawk consists of three members. Stratigraphically, from bottom to top, they are the Aberdeen Member, the Kenilworth Member, and the Sunnyside Member (see Figure III-2).

The bottom coal seam is the Aberdeen (also known as the Castlegate "A" Seam). It is found in the Aberdeen Member of the Blackhawk. This coal seam rests directly on approximately 150 feet of basal sandstone. This sandstone is of littoral marine origin and is known as the Aberdeen Sandstone. The coal seam ranges from 4 feet to 13 feet in thickness over the property. Above the seam is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale containing coal riders.

The second seam is the Gilson Seam and ranges in thickness from 4 feet to 8 feet over the property. The Gilson is part of the Kenilworth Member of the Blackhawk. Directly below the Gilson is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale with coal riders. Below this is approximately 70 feet of barrier beach sandstone known as the Kenilworth Sandstone. Above the Gilson is approximately 100 feet of interbedded sandstone, siltstone, shale, and coal riders.

The third seam is the Centennial Seam ranging from 4' to 8' in thickness. The Centennial Seam is part of the Sunnyside member of the Blackhawk. The Centennial Seam lies approximately 40' below the Lower Sunnyside Sandstone. Below the Centennial Seam is approximately 130' of interbedded sandstone, siltstone, shale, and coal riders.

The top seam is the Lower Sunnyside Seam, ranging from 4 feet to 5 feet in thickness. The Lower Sunnyside is part of the Sunnyside Member of the Blackhawk. Below the coal seam is approximately 50 feet of barrier beach sandstone known as the Lower Sunnyside Sandstone. Above the coal seam is about 250 feet of interbedded sandstone, siltstone, shale, and coal riders.

Above the Blackhawk, the Castlegate Sandstone and Price River Formation of the Mesa Verde Group can be found over various parts of the property. The North Horn Formation is also present in certain areas of the property. Total overburden on the mine plan area ranges from 0 to 2,700 feet.

There are unleased federally owned coal reserves adjacent to the permit area. Andalex has assumed ownership on part of this coal contained in the Graves Tract which is now a part of this MRP. Andalex will access this lease from the existing underground workings as has been done in the past when Andalex has added new leases. In addition to the Graves Tract there is still some unleased federal adjacent to the Centennial property which is of questionable value. The Centennial coal seam is accessed from the existing Pinnacle Mine which is in the Gilson Seam. It is accessed via rock tunnels which are approximately 500' in length. The Centennial and Aberdeen Seams on the AEP Lease will be accessed through an extension of existing underground workings.

The Aberdeen sandstone in our vicinity is 80 to 100 feet thick. Its lateral extent is from Castlegate to well east of the Centennial property. It is a very well known geologic marker in the Book Cliffs coal field. It is a medium grained, tightly cemented, cross bedded sandstone which contains very little or no water. It has been drilled into in every exploration hole in our leases. All other aquifers or water tables within our leases are perched.

**Structure**

Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are known to exist in the mine plan area. Overburden ranges from 0 to 2,700 feet.

**Hydrologic Aspects**

All groundwater exists as perched aquifers in the mine plan area. Due to the lenticular nature of the geology in the area, any groundwater is isolated and very limited. Please see Water Quality Data in Appendix L. Also, please note that the Sunedco property recently acquired by Andalex was included in the Vaughn Hansen/Andalex Hydrologic Inventory prepared for the original PAP and the emergency lease (please see Appendix L). Also included in Appendix L are the Graves and AEP PHC's.

The occurrence the Division has referred to where Andalex intercepted groundwater was actually not groundwater per se but water which had accumulated in old mine workings over a number of years (45 to 50 years). This was a one time occurrence. Water accumulates in small burned out voids because they are down dip from the burned outcrop. Andalex uses the practice of advanced drilling to avoid these areas. This is the only water which has been or will be encountered as the Andalex permit area is free from faulting or any other means of water conveyance.

**Location of Subsurface Water**

Some of the sandstone beds of the Blackhawk Formation are water bearing in the mine plan area. Most of the beds are dry however, and partially drained of water near the cliff faces. Groundwater is perched due to the lenticular geology and any groundwater is isolated. The geology and specifically the lenticular nature of the beds on the new AEP lease are the same as what has been described in the original permit area. Also, any water bearing units are small in areal extent. The lowermost aquifer known in this area is the Aberdeen Sandstone, which is monitored below the lowermost coal seam. The newly acquired AEP Lease is included in the Andalex Hydrologic Inventory.

**Source of Data**

Analysis was performed on rib samples and core samples obtained during the exploration activities described. Results of these analyses are listed according to seam in Appendix E.

Analysis was performed by: Commercial Testing and Engineering Company, 10775 East 51st Avenue, Denver, Colorado 80239, and other commercial testing laboratories.

Coal Seams

**Total Sulfur Content**

Please see Appendix E.

**Other Characteristics**

Please see Appendix E.

Stratum Immediately Overlying each Coal Seam to be Mined

**Lithology (See Figures III-2 and III-3).**

Aberdeen Coal Seam (Castlegate "A") - overlying this seam is interbedded sandstone, siltstone, and carbonaceous shales of the Aberdeen Member of the Blackhawk.

Gilson Coal Seam - overlying this seam is interbedded sandstone, siltstone, and shale with coal riders of the Kenilworth Member of the Blackhawk.

Centennial Coal Seam - overlying is interbedded sandstone, siltstone, and shale, and coal riders of the Sunnyside Member of the Blackhawk.

Lower Sunnyside Seam - overlying this seam is interbedded sandstone, siltstone, shale and coal riders of the Sunnyside Member of the Blackhawk.

It should be noted however, that the immediate "roof" over each seam is a sandstone unit, over which is found the silts, shales, and various coal riders.

**Pyritic Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Potential Alkalinity (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

Stratum Immediately Underlying Each Coal Seam to be Mined

**Lithology (See Figure III-2 and III-3).**

Aberdeen (Castlegate "A" Seam) - underlying this seam is basal sandstone of littoral marine sandstone, the Aberdeen Sandstone of the Aberdeen Member.

Gilson Seam - underlying this seam is interbedded sandstone,

siltstone, shale, and coal riders of the Kenilworth Member.

Centennial Seam - underlying this seam is interbedded sandstone, siltstone, and shale, and coal riders of the Kenilworth Member.

Lower Sunnyside Seam - underlying this seam is barrier beach sandstone, the Lower Sunnyside Sandstone of the Sunnyside Member.

It should be noted however, that the immediate "floor" below the seams is sandstone in the case of the Lower Sunnyside and Aberdeen, and beneath the Gilson, and Centennial, siltstone.

**Pyritic Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Potential Alkalinity (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Clay Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

See R645-301-622

## R645-301-512.200. PLANS AND ENGINEERING DESIGNS

**Existing Structures**

All existing structures are situated on the Zion's fee land, on federal lease SL-027304, or on right-of-way UTU-62045 and are shown on Plate 6. There are no structures existing as part as Andalex's facility which were constructed prior to 1980. Originally it was anticipated that all buildings and structures were to be completed during the first five year permit term. Obviously this is not the case since the Aberdeen Mine has only recently been completely finished to this date. Plate 6 depicts the Aberdeen Mine with the surface facilities completed in early 1990. A new fan for the Aberdeen Mine will be constructed in the left fork of Deadman Canyon. Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4.

Existing structures include the following:

| | |
|---|---|
| Bathhouse (5) | 14' x 60' |
| Mine Water Storage Tanks (3) | 12' x 16' |

| | |
|---|---|
| Warehouse (1) | 14' x 60' |
| Lamphouse (2) | 40' x 40' |
| Substations (2) | 60' x 100' |
| Office Building | 28' x 60' |
| Mine Fans (4) | 88" |
| Portals (15) | 6' x 20' |
| Culinary Water Tanks (3) | 12' x 10' |
| Shop | 80' x 120' |
| Guard Shack | 8' x 8' |

The Aberdeen Mine surface facilities will include one additional bathhouse, and one lamphouse.

Upon completion of mining activities, the portals will be sealed according to existing state and federal regulations and all buildings and structures not being utilized as part of the reclamation sequence, will be removed.

**Construction Schedule**

All of the above structures have been completed. The earthwork for the Aberdeen Mine was completed in 1989. The surface facilities were in early 1990. Construction has been located and carried out so as to prevent and control erosion, siltation, water pollution, and damage to property. All facilities have been designed and constructed and will be maintained and used in a manner which prevents damage to wildlife and related environmental values. Any future construction will be conducted in a similar manner according to regulations regarding protection of the hydrologic system, etc. The rock tunnels for the Centennial Seam development were constructed in the spring of 1990 and completed late in 1990. As previously discussed this mining will require no new surface facilities except the left fork fan installation (1994). It should be noted that no construction activities will occur within one-half mile of the Golden Eagle nest located in the left hand fork during the nesting season, February 15 through July 15, if it is determined that the nest is active. Also, to minimize disturbance to wintering elk and deer there shall be no construction activities from December 1 through April 15. Except for snow removal, all routine maintenance will be accomplished from inside the mine.

Upon completion of construction of the left hand fork fan installation, Andalex will perform a slope stability study to ensure that all road embankments of a minimum static safety factor of 1.3. This study will also determine that the cut and fill slopes of the pad have a minimum static safety factor of 1.3. It should be noted that the construction of the pad will be consistent with common construction practices including limiting the thickness of lifts to a maximum of four (4) feet.

Reclamation of the pad, which is shown on the Cut Fill Cross Section Plates, will occur immediately after cessation of mining. Reclamation will consist of culvert removal with appropriate drainage protection, and regrading and backfilling to the original contour. Recontouring of the access road will take place following cessation of mining activities. As this road has been in place for many years sufficient fill material may not be available for complete recontouring, however, every effort will be made to achieve the approximate original contour. This will be followed by replacement of topsoil and permanent rEVEGATATION. At all times during reclamation appropriate sediment control such as straw dikes and silt fences will be employed to prevent additional sediment contributions to the drainage system.

Construction Methods

**Major Equipment**

The portal and building sites were leveled using dozers, trucks, and loaders. At the building sites, the topsoil was removed and transported to a nearby area for storage.

All surface pads have been graveled and all other disturbed areas (pond embankments, etc.) have been reseeded.

## R645-301-512.210. EXCESS SPOIL

N/A Revised 8/8/95

## R645-301-512.220. DURABLE ROCK FILLS

N/A

## R645-301-512.230. COAL MINE WASTE

There has been no development waste or excess spoil to date excepting sedimentation pond material. In the event sediment pont material were to catch fire, it would be compacted. MSHA and the Division have approved the disposal of sediment pond material (coal mine wash) underground. Therefore, inspections are not required.

**Coal Processing Waste**

N/A - Text removed as directed in Technical Analysis Requirements.

**Coal Refuse**

## R645-301-512.240. IMPOUNDMENTS

~~Three sedimentation ponds have been constructed so far as shown on Plate 6. Pond A, as its capacity was not required, is now being used for snow storage and topsoil storage. The sedimentation and drainage control plan has been designed according to OSM regulations and the design~~ See R645-301-733.

## R645-301-512.250. PRIMARY ROADS

All Primary Road Design and construction has been certified by a ~~Utah Registered~~ Professional Engineer. ~~No other embankments, or other impoundments have been built nor are any proposed.~~

~~**General Description**~~

~~The Andalex Deadman Canyon Project is comprised of three mines located closely together in Deadman Canyon. The~~

## R645-301-512.260. VARIANCE FROM APPROXIMATE ORIGINAL CONTOUR

Only cut slopes at Apex, Pinnacle and Aberdeen will vary from the AOC. Slopes will be backfilled to the extent possible.

## R645-301-513. COMPLIANCE WITH MSHA REGULATIONS AND MSHA APPROVALS

**Ventilation**

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and dust; there has been small amounts only found to date in any of the old works or new faces. The longwall faces will be ventilated with a live brattice system consisting of a line curtains. The conveyor systems will be isolated from intake and return except in 2-entrygate systems when the belt will double as

the intake. All ventilation requirements of the Coal Mine Health and Safety Act will be met. This ventilation plan will be strictly adhered to, in order to insure safety of all personnel. Please note that the Centennial Seam mining area is ventilated by the existing Pinnacle Mine fan system.

**General Safety Measures**

A great emphasis is put on assuring a safe mine operation and the mine and surface facilities will be operated within prudent standards to insure the health and safety of all employees. The facilities will be carefully inspected by company-trained safety engineers and state and federal mine inspectors.

The operation will abide by Utah State Coal Mine Regulations and the 1969 Federal Coal Mine Health and Safety Act. In addition, these regulations will be supplemented by a company safety policy. Various training programs will be utilized such as the following:

Methane Measurements
Roof and Rib Control
Oxygen Deficiency Testing
Ventilation
First Aid
Mine Rescue
Mine Electrical Certification
Self Rescue Training
Use of Personal Protective Equipment
Recognition of Electrical Hazards
General Accident Prevention
Mine Communications
Job Safety Training

Many of the training programs will run continuously, such as those involving roof control and ventilation. Other programs are held annually with many oriented toward new employees.

All Andalex Mines operate under an approved M.S.H.A. roof support plan which calls for bolting on five foot centers with a minimum 42" bolt length in our development entries. Roof control

in the longwall faces will be accomplished using hydraulic shields. The roof in all four seams is a massive sandstone (60'+) and offers excellent support in itself. The old mine workings which were rehabilitated for the Pinnacle Mine~~, Apex Mine, and~~ main entries had stood unsupported for 40 years. This roof control plan will be strictly adhered to, in order to insure the safety of all personnel.

## R645-301-513.100. COAL PROCESSING WASTE DAMS AND EMBANKMENTS

N/A

## R645-301-513.200. IMPOUNDMENTS AND SEDIMENTATION PONDS MEETING MSHA CRITERIA

N/A

## R645-301-513.300. WASTE DISPOSED IN UNDERGROUND MINE WORKINGS

**Return of Coal Processing Waste to Abandoned Underground Workings**

As raw coal is hauled from the permit area, there will be no processing waste and no return of processing waste to underground workings. If in the future it is decided that a processing facility is to be incorporated, waste or reject would taken to an approved refuse disposal site. Please note that underground development waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

## R645-301-513.400. REFUSE PILES

There has been no development waste or excess spoil to date excepting sedimentation pond material.

**Coal Processing Waste**

The only coal processing waste to date is rock material manually separated from Andalex Resources' lump coal product at Wildcat. This is currently placed in an approved area at Wildcat Loadout. This MRP contains an Appendix Q. Appendix Q references the plan for reclamation of the waste rock pile at the Wildcat Loadout and should not be confused with the Centennial Reclamation Plan. Disposal of sediment pond material (temporary and permanent) is shown on Plate 6. Sediment pond waste has already been tested in one case to be non toxic and non acid forming and is being used currently in the Aberdeen Mine fill areas. Other material which is generated will be placed in temporary storage above the Apex Mine as shown on Plate 6 and will be disposed of permanently as back fill in high walls upon final reclamation. This material will be tested prior to final reclamation if used for final reclamation purposes. Based on previous experience, Andalex estimates that up to 3,000 yards of material at most will be generated. This material is included in the earthwork estimates. Please note that the rock tunnels constructed to the Centennial coal seam generated significant amounts of waste rock. One hundred percent of this waste rock was disposed of underground in the existing Pinnacle Mine. None of the waste rock appeared at the surface.

~~the Aberdeen Mine are all presently in operation mining the Gilson and Lower Sunnyside Seams and the A Seam. The Centennial Seam is mined via rock tunnels from the existing Pinnacle Mine. Surface runoff from the Pinnacle Mine and Apex Mine is controlled by Settling Basin B and Pond C. Engineering Design for these ponds have been presented to the Division of Oil, Gas, and Mining on 4-3-80 and 8-21-81. Surface runoff from the Aberdeen Mine is controlled by Pond E. Designs for these basins and ponds are shown on Plates 11, 12, and 13 included herein.~~

## Coal Refuse

~~The mines are located in the Right Fork of Deadman Canyon. This is an ephemeral drainage flowing only from direct runoff and eventually reaches the Price River some 12 miles to the south. The major drainages in the minesite area will be routed under the site through large culverts. The existing minesite has a disturbed area of 34.2 acres. Please note that a certain percentage of the disturbed area does not report to sedimentation ponds.~~ Please refer to ~~Plates 7 and 8 for these areas.~~

~~Actual~~Plate 6 for location of disposal areas.

~~—~~

## R645-301-513.500. MINE OPENINGS

### Portals

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine.

The portal mine pads consist of approximately The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

## R645-301-513.600. DISCHARGES INTO AN UNDERGROUND MINE

Andalex has approved water rights for collection of disturbed area ~~reporting to basins and ponds is approximately 26 acres. Sediment pond designs include undisturbed areas reporting to ponds. In order to minimize additional sediment loading to the main drainage, these ponds and basins will collect runoff from these approximately 27 acres. Berms will be placed on the lower edge of all disturbed areas to prevent runoff from reaching natural drainages before it has passed through the sedimentation~~

~~ponds except in small area exemptions. Ponds are designed for maximum runoff including the chidister water. Areas draining to Pinnacle and Apex portals are to be included.~~

~~Sedimentation Pond Specifications~~

~~**Location**~~

~~The ponds are located over the main drainage of the Right Fork of Deadman Canyon. The main canyon drainage is routed through a 36-42" culvert located under the ponds. The sites are located downslope of the disturbed areas to simplify collection of runoff water (please see Plate 8).~~

~~**Design**~~

~~The ponds are designed to fully contain the expected runoff and sediment load from a 10 year 24 hour precipitation event in this area. Pond "C" has additionally been shown to fully contain the runoff from a 100 year 6 hour storm. The design has been certified by a registered professional engineer. A certification statement for the ponds can be found at the end of Appendix N.~~

~~**Construction**~~

~~The construction~~drainage for collection in the underground workings. This is used as needed.

**R645-301-513.700. SURFACE COAL MINING CLOSER THAN 500 FEET TO AN ACTIVE UNDERGROUND MINE**

N/A

**R645-301-513.800. COAL MINE WASTE FIRES**

N/A

**R645-301-514. INSPECTIONS**

N/A

**R645-301-514.100. EXCESS SPOIL**

N/A

R645-301-514.110. QUARTERLY INSPECTIONS AND CRITICAL CONSTRUCTION PERIODS

N/A

R645-301-514.111. FOUNDATION PREPARATION, TOPSOIL REMOVAL

N/A

R645-301-514.112. UNDERDRAINS AND PROTECTIVE FILTER SYSTEMS

N/A

R645-301-514.113. FINAL SURFACE DRAINAGE SYSTEMS

N/A

R645-301-514.114. FINAL GRADED AND REVEGETATED FILL

N/A

R645-301-514.120. CERTIFIED REPORTS

N/A

R645-301-514.130. CERTIFIED REPORTS ON DRAINAGE SYSTEM AND PROTECTIVE FILTERS

N/A

R645-301-514.131. PHASES OF CERTIFICATION

N/A

R645-301-514.132. UNDERDRAINS

N/A

R645-301-514.133. PHOTOGRAPHS

N/A

## R645-301-514.140. INSPECTION REPORTS

N/A

## R645-301-514.200. REFUSE PILES

N/A

## R645-301-514.210. REGULAR INSPECTIONS

N/A

## R645-301-514.220. CRITICAL CONSTRUCTION PERIODS

Construction of the ~~ponds have been completed as per the specifications set forth in the Construction Specifications sheet (part 2.3).~~

~~**Capacity**~~

~~Each pond is designed to contain the runoff and sediment load from a 10 year 24 hour precipitation event in the area of drainage. In addition, each pond has an overflow capacity in excess of that required for a 25 year 6 hour event. Pond "C" has been designed to contain and pass the runoff from a 100 year 6 hour event.~~

left fork break-out and fan will occur during the Golden Eagle off-nesting period (January 15 through July 15).

## R645-301-514.221. FOUNDATION PREPARATION AND TOPSOIL REMOVAL

N/A

## R645-301-514.222. UNDERDRAINS

N/A

## R645-301-514.223. FINAL SURFACE DRAINAGE SYSTEMS

N/A

**R645-301-514.224. FINAL GRADING AND Revegetation**

N/A

**R645-301-514.230. CERTIFIED REPORT**

N/A

**R645-301-514.240. SEPARATE CERTIFICATION FOR EACH PHASE OF CONSTRUCTION**

N/A

**R645-301-514.250. ON-SITE COPY OF CERTIFICATION REPORTS**

N/A

**R645-301-514.300. IMPOUNDMENTS**

See R645-301-733..

**R645-301-514.310. CERTIFIED INSPECTION**

This is performed annually by a registered P.E.

**R645-301-514.311. COMPLETION OF CONSTRUCTION AND YEARLY INSPECTIONS**

See R645-301-514.310.

**R645-301-514.312. CERTIFIED REPORTS**

Certified reports are kept on-site.

**R645-301-514.313. ON-SITE COPY OF CERTIFICATION REPORTS**

See R645-301-514.312.

## R645-301-514.320. WEEKLY INSPECTIONS

N/A

## R645-301-514.330. QUARTERLY INSPECTIONS

These are conducted quarterly by on-site personnel to evaluate erosion, stability, and other items.

## R645-301-515. REPORTING AND EMERGENCY PROCEDURES

## R645-301-515.100. SLIDES AND OTHER DAMAGE

**Schedule of Construction, Mine Development, Mining and Reclamation**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases. There will be no additional construction activities or surface disturbance whatsoever in Hoffman Creek or Alrad Canyon.

However, Andalex does intend to add a fan installation in the left-hand fork of Deadman Canyon at some point in time. This installation will be according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) Andalex will submit detailed plans for this installation at the appropriate time. The location of this breakout is shown on Plate 29 (R.O.W.). Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with three production units and the longwall scheduled to be operating by mid-1994. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market.

Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. Although no significant erosion problems have occurred, Andalex will notify the Division by the fastest available means of any slides or other damage and comply with any remedial measures required by the Division (generally, reporting will be accomplished by telephone).

Andalex will cover acid or toxic forming materials if any are encountered.

Andalex will advise the Division in the event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-515.200. IMPOUNDMENT HAZARDS

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on-site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing. (Pond C)

~~**Monitoring**~~

~~Water monitoring stations will be established at the outlet of the ponds. Sample parameters and frequencies shall be as per~~

specification of the NPDES permit.

**Maintenance**

The ponds shall be inspected after each storm and the sediment cleaned as necessary. In no event shall sediment be allowed to build beyond 60% of sediment design capacity.

**Seeding**

An approved seed mix will be applied to all feasible disturbed areas in an effort to minimize erosion and sediment loading to the ponds. The proper seed mixture for this area has been obtained through the local BLM.

**Culverts**

All culverts are shown on Plate 9. Calculations for sizing are also included. It should be noted that all culvert sizes were arrived at and approved through consultation with the DOGM hydrologic engineer.

**Calculations**

The following reflects the calculations for sizing and details of each separate pond. Plates 6 through 13 show pond locations and volumes as well as watershed areas.

**Construction Specifications for Sedimentation Ponds**

All construction of sedimentation ponds have been performed under the direction of a qualified registered professional engineer.

Dams are constructed with primary overflows at least 2 ft. from the top, and emergency overflows at least 1.5 ft. from the top. The areas of the pond construction had been examined for topsoil, and if present in removable quantities such soil was removed separately and stored in an approved topsoil storage location.

In areas where fill was to be placed, natural ground was removed for at least 12" below the base of the structure.

~~Native materials were used where practical. Fill was placed in lifts not exceeding 15" and compacted prior to placement of the next lift. Compaction of all fill materials is at least 95%.~~

~~Grouted rip rap or culverts have been placed at all inlets and outlets to prevent scouring. Each pond is fitted with an inverted inlet to the primary overflow, to prevent the passage of oil into the discharge.~~

~~Slopes of the dams are not steeper than 2.0:1, inside and outside, with a total of the inslope and outslope not less than 5:1. The inside slope of Pond E exceeded the steepness of 2:1. In part these slopes are incised and in part are constructed in from fill. Because of the steepness of these side slopes an investigation of stability was performed by Palmer Wilding Engineers. The conclusion was that the stability analysis is adequate and a stable section with respect to shear under static loading conditions is indicated. Please Appendix K.~~

~~Tops and external slopes of the dams were planted with an approved seed mix to prevent erosion and promote stability. Compaction of the slopes were at least 95%. Top width of dams are not less than (H + 35)/5.~~

~~Primary Settling Basins (Formerly Pond B)~~

~~**General Notes**~~

~~The primary settling basins (formerly Pond B) are located above Pond "C". A.~~

## R645-301-515.300. TEMPORARY CESSATION OF OPERATIONS

Whenever it is known that operations are to be temporarily ceased for more than 30 days, Andalex Resources will submit to the Division a notice of intention to cease or abandon the operations, in accordance with R645-301-515.320 and to MSHA standards.

This notice will describe mitigation measures to be employed in accordance with the terms and conditions of the permit approval, such as a statement of the number of surface areas

involved in the cessation, extent of sub-surface strata, prior reclamation efforts accomplished on the property, and identification of all backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

Temporary closing of underground workings will be accomplished with chain link fence material as recommended by MSHA. This prevents access by unauthorized individuals during idol periods. It is not anticipated that once Andalex reaches its peak production that this will occur.

If underground openings are to remain inactive for a period greater than 90 days, such openings will be temporarily closed off from access. Such closures will consist of a chain link or other substantial wire mesh fabric fence placed over the portals to prevent public access while allowing for air flow. Locked gates may be installed in the portal to allow for mine inspection.

HISTORICAL NOTE: On June 11, 2008 the company requested permission from the BLM to modify the R2P2 to allow the mine to be temporarily idled due to economic factors. The BLM approved the modification on June 20, 2008. The portals were then sealed to prevent public access. The idle status has continued for more than 30 days. The surface facilities are secured by a security guard at all times. At the time of the temporary idling, the permit area included 6516.91 acres, and the total disturbed area ~~of 9.42 acres drain into the settling basins as shown on Plate 8. These basins collect sediment and runoff from this area; however, since they are a series of cells, any overflow from the basins will be cleaned and go into Pond "C".~~

~~It is proposed that 18" culverts be added between cells B-1 and B-2, and between B-2 and B-3. An 18" culvert already exists between cells B-3 and B-4. These culverts will prevent breaching of the dikes between cells during major runoff events. The inflow to the basins is from culverts CD-12 and CD-13, which is a total of 2.79 cfs, as shown on Table IV-3C. Based on the Manning's Equation for culverts (p.169-C), the required diameter to carry a flow of 2.79 cfs is only 0.95 feet; therefore, the 18" culvert overflows are more than adequate to pass the design flow. The placement of the culverts will not affect the maximum water~~

~~levels or sediment storage capacity of the basins.~~

~~The basins are cleaned when sediment accumulations reach 50% of the original volume. The original volume was 0.540 acre feet, and the sediment cleanout level (0.270 acre feet) is at the culvert inlet level between cells B-2 and B-1 as shown on certified Plate 11.~~

~~Pond C~~

~~1. Use 1.82" for 10 year – 24 hour event~~
~~Use 1.91" for 100 year – 6 hour event~~

~~*2. Disturbed Watershed – 14.79 acres~~

~~3. Runoff Curve No. = CN = 90~~

~~4. Area Runoff = Q (in.) = $(P - 0.2S)^2/(P+0.8S)$; Where:~~

~~S = (1,000/CN) – 10~~

~~$Q_{10/24}$ = 0.942 in./12 = 0.0785 ft.~~

~~$Q_{100/6}$ = 1.018 in./12 = 0.0848 ft.~~

~~Disturbed Volume $_{10/24}$ = 14.79 ac. x 0.0785 ft. = 1.161 ac. ft.~~

~~Disturbed Volume $_{100/6}$ = 14.79 ac. x 0.0848 ft. = 1.254 ac. ft.~~

~~5. Undisturbed Watershed – 30.89 acres~~

~~6. Runoff Curve No. = CN = 70~~

~~7. Area Runoff:~~
~~$Q_{10/24}$ = 0.180 in./12 = 0.0150 ft.~~

~~$Q_{100/6}$ = 0.208 in./12 = 0.0173 ft.~~

~~Undisturbed Volume $_{10/24}$ = 30.89 ac. x 0.0150 ft. = 0.463 ac. ft.~~

~~Undisturbed Volume $_{100/6}$ = 30.89 ac. x 0.0173 ft. = 0.534 ac. ft.~~

~~8. Sediment Storage:~~
~~**Disturbed Area 14.79 ac. x 0.05 ac. ft./ac. = 0.740 ac. ft.~~

~~***Undisturbed Area 30.89 ac. x 0.016 ac. ft./ac. =~~

0.494 ac. ft.

Total Sediment Storage Volume Required = 1.234 ac. ft.

60% Cleaning Point = 0.740 ac. ft.

9. Direct Precipitation into Pond

Area of Ponds = 0.39 acres

Volume $_{10/24}$ = 0.39 ac. x 1.82 in./12 in./ft. = 0.059 ac. ft.

Volume $_{100/6}$ = 0.39 ac. x 1.91 in./12 in./ft. = 0.062 ac. ft.
ft.

10. Total Required Pond Volume

Volume $_{10/24}$ = 1.161 + 0.463 + 1.234 + 0.059 = 2.917 ac. ft.

Volume $_{100/6}$ = 1.254 + 0.534 + 1.234 + 0.062 = 3.084 ac. ft.

11. Pond Volume at Outlet

18" cmp oil skimmer = 3.321 ac. ft.

36" cmp overflow = 4.264 ac. ft.

12. Conclusions:

A. Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event.

B. Pond size is also adequate to contain the runoff and sediment load from a 100 year - 6 hour precipitation event.

* Includes runoff to "Primary Settling Basins" (Formerly

~~Pond B)~~

~~** Does not include sediment to "Primary Settling Basins". The sediment factor of 0.05 acre ft./acre is considered conservative due to the extensive paving (roads and loadout area), and the grouted or paved ditches to the pond.~~

~~The USLE calculation for Disturbed Areas (Table IV-9) shows the actual expected sediment yield to be much lower than the 0.05 figure used.~~

~~*** Sediment yield taken from the USLE calculations on Table IV-10, "Sediment Yield for Undisturbed Areas".~~

POND C

1STAGE VOLUME DATA

| Stage | Elevation | Volume (Ac. Ft.) | Acc. Vol. (Ac. Ft.) |
|---|---|---|---|
| Bottom | 7040.0 | | |
| | 7042.0 | 0.082 | 0.082 |
| | 7044.0 | 0.162 | 0.244 |
| | 7046.0 | 0.293 | 0.537 |
| 60% Sed. | 7046.9 | 0.203 | 0.740 |
| Cleanout | | | |
| | 7048.0 | 0.266 | 1.006 |
| Max. Sed. | 7048.7 | 0.228 | 1.234 |
| Level | | | |
| Decant | 7049.7 | 0.330 | 1.564 |
| Level | | | |
| | 7050.0 | 0.099 | 1.663 |
| | 7052.0 | 0.862 | 2.525 |
| 10 yr. 24 hr. | 7052.7 | 0.392 | 2.917 |
| Volume | | | |
| 100 yr. 6 hr. | 7053.1 | 0.167 | 3.084 |
| Volume | | | |
| 18" Oil | 7053.5 | 0.237 | 3.321 |
| Skimmer | | | |
| | 7054.0 | 0.297 | 3.618 |
| 36" CMP | 7055.0 | 0.646 | 4.264 |
| Overflow | | | |
| Crest of | 7056.5 | 0.969 | 5.233 |
| Embankment | | | |

INSERT P.E. STAMPED ORIGINAL

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Pond C
Stage - Volume Curve

INSERT ACTUAL DRAWING, P.E. STAMPED ORIGINAL

**Pond "C" - General Notes**

The sizing of Pond C is based on the drainage areas delineated on Plate 8 - "Drainage Map". As can be seen from this Plate, a portion of the minesite drainage goes into the Pinnacle Mine, the old Chidister Portal, and the Apex Mine. The actual disturbed area draining directly to Pond "C" was planimetered from this Plate and determined to be 10.72 acres. The disturbed area flowing to the "Primary Settling Basins" was measured to be 4.07 acres. This flow drains to Pond "C" and is therefore considered in the sizing; however, the projected sediment load to the Primary Settling Basins is not considered in sizing Pond "C", since the basins could be completely full of sediment before it could impact Pond "C". As stated earlier, the Primary Settling Basins will be cleaned when sediment accumulation reaches one-half of the total basin volume; therefore, sediment from this area will not impact Pond "C".

In addition, a certain amount of undisturbed area does not flow into the undisturbed drainage culverts, and thus drains onto the mine site (see plates 8 and 9). The portion of this drainage that flows to Pond "C" was measured at 30.89 acres, and is included in the Pond "C" sizing calculations.

Runoff Curve numbers used in the calculations were: 90 for disturbed areas and 70 for undisturbed areas.

An "As Constructed" plan and profile of Pond "C" is shown on Plate 12. This plate has been certified by a registered, professional engineer. Also shown on this plate is a proposed sediment marker, and maximum and cleaning point depths for sediment. The cleaning point for sediment is at 60% of the maximum design depth for sediment storage. This point will be clearly marked on the sediment marker.

Also shown on Plate 12 is the location of each of the pond inlets. Inlets are either grouted concrete or culvert, and do not require rip rap or other additional erosion protection.

Pond "C" will be removed during the earthwork portion of reclamation. The culvert will also be removed and the main channel restored throughout the area. All reclaimed area above will then drain into Pond "E" below.

~~Decanting for Pond C, as needed, will be accomplished with pumps located at the minesite. Decanted water will be pumped into the primary spillway once the 24 hour retention time has been met. An access ramp will be constructed to allow for inspection and sampling at the overflow riser pipe.~~

~~Pond E~~

~~1. Use 1.82" for 10 year - 24 hour event~~

~~2. Disturbed Watershed - 12.21 acres~~

~~3. Runoff Curve No. = CN = 90~~

~~4. Area Runoff = Q (in.) = $(P-0.2S)^2/(P+0.8S)$; Where:~~

~~S = (1,000/CN) - 10~~

~~P = 1.82"~~

~~Q (in.) = $[1.82-0.2(1.11)]^2/[1.82+0.8(1.11)]$ =~~

~~2.553 = .94 in. = .0785 ft.~~
~~2.709~~

~~Volume = 12.21 acres x 0.0785 ft. = 0.959 acre ft.~~

~~5. Undisturbed Watershed - 12.20 acres~~

~~6. Runoff Curve No. = CN = 70~~

~~7. Area Runoff = 12.20 ac. x 0.2 in./12 = 0.203 acre-ft.~~

~~8. Sediment Storage Volume~~

~~12.21 acres x 0.1 acre ft./acre = 1.221 acre ft. *~~

~~60% Cleaning Point = 0.733 acre ft.~~

~~9. Direct Precipitation into Pond~~

~~Area of Ponds = 0.500 acres~~

~~0.500 acres x 1.82 in. x 1/12 ft./in. = 0.076 acre-ft.~~

~~10. Total Required Pond Volume~~

~~0.959 + 0.203 + 1.221 + 0.076 = 2.459 acre ft.~~

~~11. Pond Volume @ Outlet (Principle Spillway)~~

~~Total Pond Volume = 2.569 acre ft. (As constructed)~~

~~12. Conclusion: Pond size is adequate to contain the runoff and sediment load from a 10 year 24 hour precipitation event in the area of drainage to the pond.~~

~~* Due to the elevation of the decant inlet, the maximum sediment storage volume is .930 ac ft. However the 60% cleanout level will not be exceeded and the total pond volume takes into account the disturbed area of 12.21 acres.~~

~~PAGE 5-45 OF DOCUMENT~~

~~Stage Volume Data~~
~~for~~
~~Pond "E"~~

~~INSERT ORIGINAL P.E. STAMPED TABLE~~

~~Pond "E" – PM~~

~~**Post Mining Sediment Control**~~

~~1. Use 1.82" for 10 year – 24 hour event.~~

~~2. Disturbed (Reclaimed) Watershed – 34.2 acres~~

~~a. Runoff Curve No. = 90~~

~~b. Runoff Volume = 2.740 ac. ft.~~

~~3. Undisturbed Watershed = 805.50 acres~~

~~a. Runoff Curve No. = 70~~

~~b. Runoff Volume = 13.425 ac. ft.~~

~~4. Sediment Storage Volume = 0.150 ac. ft. (Upper Cell)~~

~~5. Direct Precipitation into Pond~~

~~a. Use 0.5 acres~~

~~b. 0.5 ac. x 1.82 in. x 1/12 = 0.076 ac. ft.~~

~~6. Expected Flow (10 yr. – 24 hr. event) = 88.94 cfs~~

~~7. Inflow Velocity (from RC-1) = 8.78 fps~~

~~8. Pond Configuration~~

~~3 cells: 2 Gravel Filter Dikes and 1 Compacted Earthen Dam~~

~~9. Pond Capacity – 1.592 ac. ft.~~

~~Note: Pond is designed to clean and discharge runoff. Sediment will be removed by gravel filter dikes, and cleaned from pond when maximum sediment storage level is reached. Ponds will be cleaned when the 0.150 acre feet capacity of the upper cell is reached.~~

~~**Pond "E" – General Notes**~~

~~Pond "E" is to control runoff from the Aberdeen Mine. The disturbed area to drain to this pond is 12.21 acres. Pond E for the Aberdeen minesite was constructed prior to any other disturbance of the drainage area which report to the ponds.~~

Plate 13 shows the plan and profile of the pond. Also shown on this plate is a sediment marker and the level of the sediment 60% cleaning point. The constructed height of the dam includes a 5% settling factor. The elevations on Plate 13 are final.

Grouted rip rap or culvert is used on all pond inlets; therefore, additional rip rap or energy dissipators are not required.

Twelve 60" x 60" anti seepage collars were installed on the main culvert beneath the pond. The collars are of concrete or a standard, manufactured design. Collar sizes and numbers are based on the following:

Flow length = 340'
Increase in flow length = 10% or 34'
Use 60" x 60" anti seep collars
Each collar increases flow length by 2 x 8" or 3'; therefore, use 12 anti seep collars.

An emergency spillway has been constructed to convey overflow from the pond into undisturbed diversion UD 4 as shown on Plates 8 and 13. This spillway consists of 12" D50 grouted rip rap as shown on Figure IV 6. The dimensions of this spillway are shown of Figure IV 6.

Pond E was constructed prior to any disturbance of the drainage area to the pond.

As built certified drawings of Sediment Pond E have been submitted.

**Pond "E" - PM - General Notes**

Upon reclamation, Pond "E" will be enlarged and left in place until rEVEGATATION standards are met, as shown on Plate 16. The culvert will be removed, and the pond will be reconstructed to clean and discharge the entire runoff from the drainage area above. Pond sizing calculations are shown on the page entitled "Pond E - PM", "Post Mining Sediment Control". Andalex will commit to the concept of allowing the entire undisturbed and reclaimed area to drain into this one structure if approved.

The rationale for removing all upper ponds and diversions is based on the following:

~~1. Pond E is the lowermost structure, and can be rebuilt and later removed and reclaimed with minimum damage to the reclaimed site.~~

2. The upper site can be reclaimed in a more natural and permanent manner, as shown on the post mining topography map, Plate 17, without leaving temporary structures such as diversions, ponds, etc. Once vegetation is established, it will not have to be re-disturbed.

3. The extensive use of loose rock check dams in the restored drainages will serve as effective sediment and erosion control, and will promote the establishment of a riparian area along the drainage.

Because of the large size of the undisturbed drainage above (805.5 acres), upon reclamation, it is proposed to construct a series of filtering ponds to clean and discharge the water rather than try to fully contain the runoff. The expected flow from a 10 year 24 hour event for the entire undisturbed and reclaimed area is 88.94 cfs at a velocity of 8.78 fps. The total volume of water would be approximately 16.2 acre-ft. It is proposed to build a 3-celled system with 2 gravel filter dikes and concrete grouted overflows. The upper 2 cells will act as filters for sediment removal, and the lower cell will become a settling basin for final cleaning prior to discharge. The pond discharge will be sampled per NPDES requirements to check for compliance with effluent standards.

It is expected that effluent standards will be met by this structure; similar filtering ponds have cleaned and discharged up to 1,000,000 gallons per day of sediment laden mine water and remained in compliance.

The rationale for proposing such a filtering discharge system is based on the following:

1. The main purpose of sediment ponds or any other treatment facility is to control and minimize water pollution by causing the water to meet effluent standards; this type of system will accomplish this purpose:

2. Acceptable practices to control and minimize water pollution include:

(i) Stabilizing the disturbed area through land shaping;

(ii) Diverting runoff;

(iii) Achieving vegetation standards;

(iv) Regulating channel velocity of water;

(v) Lining channels with rock or vegetation;

(vi) Mulching;

(vii) Selectively placing and sealing acid forming and toxic forming materials;

(viii) Designing mines to prevent gravity drainage of acid waters;

(ix) Sealing;

(x) Controlling subsidence; and

(xi) Preventing acid mine drainage.

The planned reclamation at this site will meet the above criteria;

3. All surface drainage from the disturbed area, including areas that have been graded, seeded, or planted, shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility before leaving the permit area.

The proposed pond will be equipped with a sediment marker, and cleaned as needed. The pond will also be fitted with a combined primary and emergency spillway, sized and protected to handle the 25-year 6 hour event.

When rEVEGATATION standards are met on the reclaimed site, the Pond "E PM" will be removed, the main channel restored, and the area reseeded according to the approved plan.

Pond Discharge Structures

**Principle Spillways**

Pond C has a single spillway consisting of a 36" cmp riser pipe located 1.5' below the top of the dam at elevation 7,055.0. This

pipe discharges directly into the main 42" culvert located beneath the pond. An 18" cmp skimmer pipe is located in the side of the 36" riser 1.5' below the riser inlet at an elevation of 7,053.5. This pipe will be the first to discharge, and will act as an oil skimmer since the pipe inlet is inverted with the intake approximately 1' below water level. Pond C will be decanted as needed by the use of a pump. Decanted water will go into the 36" riser and be discharged into the 42" cmp passing beneath the disturbed area.

The Pond E principle spillway consists of a 30" riser pipe, connected to the 42" culvert beneath the ponds. A decant device is also attached to the riser pipe for de-watering, and is controlled by a hand-operated valve. Both the riser pipe and decant are constructed to minimize oil from entering the discharging water. Please see Plate 13 for details on the spillway structures for Pond E.

**Emergency Spillways**

The emergency spillway for Pond E is the open notch type with a trapezoidal cross section. The spillway is of grouted rip-rap as shown on Figure IV-6. The spillway dimensions are as shown on the Figure IV-6. This is located 12" above the principal spillway and 2' below the top of the dam. This structure is rip-rapped through the point of discharge and into the main channel. This spillway provides an added safety factor to protect the dam in the event of overlad on the culvert discharge.

**Pond E - PM Spillway**

Pond E - PM will be constructed with an open notch spillway in the lower cell to allow for safe discharge of runoff from the reclaimed area as well as the contributing undisturbed area. The spillway will be of grouted rip-rap and dimension as shown on Figure IV-6. Calculations for the spillway are shown.

The spillway for Pond C consists of an open 36" culvert which empties directly into the main 42" culvert which drains the main canyon. This spillway is open at the top and extends to within 2.5' of the top of the dam. At right angle to this spillway culvert is an 18" culvert to handle pre-design overflow conditions. This 18" pipe has an inverted inlet to skim oil and grease and flotsam from the water. This is considered a single spillway; however, the following discussion will explain how the

~~pond meets the criteria for exemption of combination spillways required by R645-301-742-223.~~

~~**Pond C - Exemption from R645-301-742-223**~~

~~The following will describe how Pond C meets the criteria for exemption of the combination spillway requirements of R645-301-742.223 as provided in R645-301-742.225.2:~~

1 Storage - The pond has been shown to be adequately sized to safely control the 100 year - 6 hour precipitation event. The pond will not only contain the 100 year - 6 hour event (including sediment), but the overflow will safely pass the runoff from such an event if necessary.

2 Dewatering - Water can be safely removed from the pond in accordance with current, prudent engineering practices. For this pond, water will be removed by the use of a portable pump system. The following is a description of details relating to the dewatering operation:

a - The pump to be used is an electric 220 volt unit. The pump will be powered by a portable generator set. These units will be available on an as needed basis.

b - The pump will dewater at a rate of approximately 350 gallons per minute. At 1.0' above the maximum sediment elevation, the 10 year - 24 hour volume is 1.683 acre feet. At the proposed pumping rate, the pond would be dewatered in approximately 26 hours.

c - The decant water will be discharged directly into the 36" cmp overflow. Any discharge will be done in accordance with the UPDES permit conditions. Samples will also be taken as required.

d - The pump inlet line will be equipped with a floating intake and an oil skimming device. A typical drawing is included as Figure IV-13.

e - The 36" outlet pipe will be visibly marked to show the limit of the decant level. This marker will be placed 2' above the maximum sediment level. This allows for the 18" oil skimmer shown on Figure IV-13, plus the required 1' shutoff above maximum sediment elevation. The pump will be turned off when the water level is drawn down to this marker.

f - All storm water will be retained in the pond for a minimum of 24 hours, or until effluent limitations will be met prior to decanting.

g. Sedimentation Pond C to this date has never discharged. It is unlikely at any future date that the pond will discharge water. However, if a discharge ever occurs Andalex will construct an access ramp at that time. The access ramp will consist of a walk way from the bank to the top of the stand pipe. It will be equipped with hand rails and safety chains.

**Certification Statement**

A certification statement by a qualified, registered professional engineer that the pond will safely control the 100 year - 6 hour precipitation event, is included with this section.

**Location**

The pond is located where failure could be expected to cause loss of life or serious property damage. In accordance with the requirements, the pond is designed and constructed to safely control the runoff from a 100 year - 6 hour precipitation event. (See related table and certification with this section for designs, and Plates 8 and 12 for location and "As Constructed" details of the pond).

**Calculations:**

The following pond spillway calculations have been shown separately for each sediment pond at this site. Each of the sheets is separately certified by a registered professional engineer, as required. (appendix N)

Pond C - Spillway Calculations

Design Parameters

| | |
|---|---|
| (1) Disturbed Drainage Area (a.c.) | 14.79 |
| (1) Undisturbed Drainage Area (a.c.) | 30.89 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.176 |
| Land Slope (%) | 6.25 |
| Hydraulic Length (ft.) | 1200 |

Overflow

| | | |
|---|---|---|
| | 10 yr. – 24 hr. Event (in.) | 1.82 |
| | Peak Flow 10/24 (cfs) | 27.56 |
| | 25 yr. – 6 hr. Event (in.) | 1.50 |
| | Peak Flow 25/6 (cfs) | 18.06 |
| | 100 yr. – 6 hr. Event (in.) | 1.91 |
| | Peak Flow 100/6 (cfs) | 30.35 |
| (3) | Oil Skimmer Diameter (in.) | 18 |
| | Overflow Diameter (in.) | 36 |
| (4) | Required Head 10/24 (ft.) | 0.98 |
| (4) | Required Head 25/6 (ft.) | 0.74 |
| (4) | Required Head 100/6 (ft.) | 1.05 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV 3A; Total Flows from DD 1, DD-2, & DD 3
(3) Reference Only – Not included in calculations.
(4) Taken from Stage Volume Curve – 36" riser only.

## Pond E - Spillway Calculations

### Design Parameters

| | |
|---|---|
| (1) Disturbed Drainage Area (ac.) | 12.21 |
| (1) Undisturbed Drainage Area (ac.) | 12.20 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.289 |
| Land Slope (%) | 8.00 |
| Hydraulic Length (ft.) | 1200 |

### Primary Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 14.55 |
| Riser Diameter (in.) | 30" |
| Required Head (ft.) | 0.73 |

### Emergency Overflow

| | |
|---|---|
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 9.96 |
| Structure Area Used ($ft.^2$) | 18.00 |
| Required Structure Area ($ft.^2$) | 2.40 |
| Depth of Flow (ft.) | 0.41 |
| Slope (%) | 5.00 |
| Velocity (fps) | 4.15 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV 3A; DD 4.

Pond E PM Spillway Calculations

Design Parameters:

| | |
|---|---|
| (1) Disturbed Drainage Area (ac.) | 34.91 |
| (1) Undisturbed Drainage Area (ac.) | 805.50 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 1.02 |
| Land Slope (%) | 19.83 |
| Hydraulic Length (ft.) | 10,200 |

(3) Overflow

| | |
|---|---|
| 10 yr. 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 88.94 |
| 25 yr. 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 45.77 |
| Structure Area Used ($ft.^2$) | 18.0 |
| Slope of Spillway (%) | 33.3 |
| Required Structure Area 10/24 ($ft.^2$) | 5.58 |
| Required Structure Area 25/6 ($ft.^2$) | 3.54 |
| Depth of Flow 10/24 (ft.) | 0.84 |
| Depth of Flow 25/6 (ft.) | 0.58 |
| Velocity 10/24 (fps) | 15.94 |
| Velocity 25/6 (fps) | 12.94 |

Notes: (1) From Plates 8 & 9; Includes B.T.C.A. Areas
(2) Taken from Table IV-4
(3) Single, open channel spillway

~~PAGE 5-56 OF DOCUMENT~~

~~Stage Discharge Data~~
~~for~~
~~Sediment Pond "C"~~

~~INSERT ORIGINAL P.E. STAMPED TABLE~~

Stage Discharge
Centennial Pond C

INSERT ORIGINAL P.E. STAMPED GRAPH

## Certification Statement

INSERT ORIGINAL P.E. STAMPED STATEMENT

~~CHANNEL FLOW CALCULATIONS~~

~~FOR: POND "E" EMERGENCY SPILLWAY~~

~~Bed Slope = .05Manning's N = .04Bottom Width = 5feetChannel Side Slope = .5Flow Depth = .6950414feetCross Sectional Area = 4.441372square feetWetted Perimeter = 8.10832feetHydraulic Radius = .547755feetDischarge =24.74cubic feet / secVelocity = 5.570351feet / sec~~

~~Culverts~~

**~~General~~**

~~Culverts have been sized as per the designations on Plates 8 and 9, and are placed to drain on a minimum of .0556 (1 ft./18 ft.) slope. Undisturbed drainage culverts (shown on Plate 9) are fitted with trash racks in drainages where introduction of rocks and other debris into the main culvert is foreseen as a problem. The main culvert inlet (C 1a) is fitted with a trash rack. All disturbed area culverts are designated with a CD number as shown on Plate 8. These culverts handle much smaller flows and are thus not fitted with trash racks in most cases.~~

~~The undisturbed area culverts (C 0 through C 13) flow into the main culvert. The main culvert outlets at section C 15, which is protected from erosion as described on Table IV 7. Disturbed area culverts (CD 1 through CD 7) as shown on Plate 8 discharge onto grouted rip rap surfaces for protection from erosion. Energy dissipators are also employed where necessary to reduce velocities and prevent erosion from culvert discharges (see Plate 8).~~

**~~Maintenance~~**

~~Culverts shall be inspected regularly, and cleaned as necessary to provide for passage of designed flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.~~

**~~Size Justification~~**

~~The following note on the undisturbed culverts is for reference only, to show the original design criteria. Due to the complicated nature of the undisturbed culvert flows, it was decided that a drainage system analysis would be used to demonstrate the ability of the system to pass the design event. This system analysis is provided in Appendix O and shows the existing system to be more than adequate for the design storm event.~~

**~~Undisturbed Area Culvert Size Determination*~~**

~~Source:~~

~~"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.~~

~~Peak Flow – SCS TR-55 Method For Type II Storms:~~

~~$qp = qp^* AQ$;~~

~~A = Watershed in square miles;~~

~~Q = Runoff volume in inches;~~

~~$qp^*$ = Discharge from Fig. 2.40~~

~~qp = Peak Discharge in cfs.~~

~~Source:~~

~~B.L.M. State Engineer~~

~~Manning Equation:~~

~~$D = \frac{2.16Qn}{\sqrt{s}}^{0.375}$~~

~~D = Diameter (feet)~~

~~Q = QP = Peak Discharge (cfs)~~

~~n = roughness factor (0.02 for steel culvert)~~

~~s = slope (0.0556% = 1 foot for 18 feet)~~

~~Using the above formulas, minimum culvert sizes were calculated based on 100% runoff from a 10 year – 24 hour storm.~~

~~* Reference Only – See Appendix O for justification of culvert sizes.~~

**~~Watershed and Culvert Sizing Map (Plate 9)~~**

~~TABLE IV-2~~

| Culvert | Watershed Area (acres) | Culvert Needed (in.) | Culvert Used (in.) |
|---|---|---|---|
| C-0 | 36.65 | 13 | 18 |
| C-1a | 469.51 | 22 | 36 |
| C1 | 506.16 | 22 | 36 |
| C2 | 23.03 | 12 | 18 |
| C3 | 529.19 | 23 | 36 |
| C4 | 77.29 | 16 | 30 |
| C5 | 606.48 | 23 | 36 |
| C6 | 26.87 | 12 | 18 |
| C7 | 633.35 | 24 | 42 |
| C8 | 45.25 | 14 | 30 |
| C9 | 678.60 | 25 | 42 |
| C10 | 18.16 | 10 | 18 |
| C11 | 696.73 | 25 | 42 |
| C12 | 55.31 | 14 | 18 |
| C13 | 752.04 | 27 | 42 |
| C15 | 752.04 | 27 | 42 |

~~Note: Culvert C14 flow has been routed to diversion UD-4, and C14 has been eliminated.~~

## Diversion Structures

### General

Diversion ditch locations are shown on the Surface Facilities Map and Drainage Map, Plate 8. The direction of flow is also shown. All diversions are classed as temporary, and will be removed upon final reclamation.

Note: (1) The runoff curve number of 65 was used only for calculation of the undisturbed culvert diversions. All other diversions, culverts, and pond designs are based on a more conservative runoff curve number of 70 for undisturbed drainages.

(2) Brycan is Hydrologic Soil Group B, Datino (stoney) is also Hydrologic Soil Group B; reference "SCS, National Engineering Handbook, Section 4, 1972".

### Specifications

Diversions along the upslope side of the road will be as per specifications on the haul road design. At a minimum, these, and any other diversions shown, will meet the minimum size specifications on the Diversion Ditch Summary sheet (Table IV-3B). Disturbed divisions DD-1 and DD-8 through DD-11 are sized to carry the runoff from a 2 year - 6 hour precipitation event in the area, per requirements of R645-301-742.330 "Division of Miscellaneous Flow". There are no divisions of intermittent or perennial flows.

Undisturbed diversions and drainage control for primary roads are sized to carry runoff from a 10 year - 6 hour precipitation event in the area.

Calculations for the 10 year - 24 hour runoff are included only for sediment pond sizing purposes.

### Maintenance

All diversions will be maintained so as to pass the volumes of water for which they were designed. Sloughage will be cleaned out along with regular road maintenance procedures, and any blockage will be removed as soon as practicable after occurrence. Velocities will be controlled as needed to prevent excessive

~~securing.~~

**Diversions and Conveyance of Overland Flow**

There are two types of diversions at this property: undisturbed and disturbed. The undisturbed diversions are labeled UD-1, through UD-5, and C-1 through C-15, and carry undisturbed drainage around and under the disturbed area. All undisturbed diversions are in place, and are shown on Plate 8, along with respective drainage areas. Cross sections of the undisturbed diversions are shown on the "Undisturbed Diversion Ditch Typical" (Figure IV-4). Design calculations are shown on the tables entitled "Diversion Design" (Table IV-3), "Diversion Ditch Summary Sheet" (Table IV-3B) "Main Channel Culvert Design" (Table IV-4), and "Side Drainage Culvert Design" (Table IV-5).

The disturbed diversions carry disturbed drainage to the sediment ponds. The existing disturbed diversions are labeled DD-1, through DD-11 and are shown on Plate 6 "Support Facilities - As Constructed" and on Plate 8 "Support Facilities - Surface Area Drainage and Topography". The diversion DD-4 is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". Cross sections of the disturbed diversions are shown on the Division Ditch Typical" (Figure IV-3) Design calculations are shown on the table entitled "Disturbed Diversion Design" (Table IV-3A) and on the "Diversion Ditch Summary" (Table IV-3B).

Peak flows for all diversions were calculated by the SCS TR55 Method for Type II storms using the computer program: Office of Surface Mining Watershed Model, Version: Storm 6.20, by Gary E. McIntosh.

A runoff curve number of 70 was used for all undisturbed areas, except for the undisturbed culvert diversions, which use a CN of 65. A CN of 90 was used for the disturbed area.

The curve numbers are based on Table 2.20 "Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Land Use" (Antecedent Moisture Condition II), page 82 of "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.

A runoff curve number of 65 was selected for the undisturbed culvert diversion areas, based on the following.

(1) Land Use Description - Wood or Forest Land: thin stand, moderate to poor cover, no mulch.

(a) The above description was selected from SCS soils and vegetation data in Appendix M, wherein the site is described as not desirable as rangeland due to the steep slopes and moderately sparse vegetative cover. The predominant vegetation is trees or large shrubs (pine, juniper, oak, sagebrush) with a mixture of grasses (wildrye, bluegrass, etc.). This land form and vegetation type best fits the Wood or Forest Land Category.

(2) Hydrologic Soil Group - B.

(a) The undisturbed soils of the permit area are predominantly bouldery loam or bouldery fine sandy loam, as described in the SCS report in Appendix M. These soils are further defined as deep and well-drained with moderate permeability and infiltration rates. This description fits the SCS Hydrologic Soil Group B very well.

(3) The runoff curve number of 65 is further supported by an on-site visit and professional judgement of a respected professional engineer/hydrologist from Horrocks, Carollo Engineers. In his opinion, a curve number of 65 best fits the site conditions, based on the site visit, and Richard H. McCuen's, "A Guide to Hydrologic Analysis Using SCS Methods".

(4) Appendix O, which is the calculations performed by Horrocks Engineering reflects a curve number of 65. Tables IV-4 and IV-5 are also included and use a curve number of 70. Both calculations show adequately sized culverts; the curve number of 70 is slightly more conservative.

The Curve Number of 90 for the disturbed area is based on Hydrologic Soil Group B, Streets and Roads, with a weighted average of 40% paved area and 60% gravel area.

The outlet of C-15 (Main Channel Culvert) shows a velocity

of 7.28 fps, which could be slightly erosive in this area; however, existing boulders at this outlet range from 12 to 36 inches in diameter and function as an adequate energy dissipator and erosion control device. Based on past history of storms with little or no evidence of erosion, at this point it is not felt necessary to install additional protection. Erosion protection parameters are shown on the "Erosion Protection" (Table IV-7), for reference only, to show that the existing natural rock is adequate size for erosion control.

The culvert outlet will be visually examined after each major storm to ensure that erosion is not occurring. If erosion does become evident as determined by visual observation, protection will be installed according to the design on the table entitled "Erosion Protection" (Table IV-7).

Velocities on undisturbed diversions UD-1, UD-3 and UD-5 and portions of UD-2 and UD-4 are less than 6.0 fps, and are not considered erosive. Velocities on disturbed diversions DD-1, through DD-11 are also less than 6.0 fps, and are not considered erosive on this site.

Velocities on the upper and lower portion of UD-2 and the lower 150' of UD-4 and are greater than 6.0 fps, and are considered potentially erosive; therefore, rip-rap will be placed at these locations (see Plate 8). Rip-rap or liner is placed as described in Table IV-7, and is sized according to Figure IV-12. Diversion UD-2 has been observed to be non erosive.

Undisturbed diversion UD-2 was resurveyed in November 1992. Based on this survey, the division can be divided into four separate components, as follows:

Upper Section - This is the extreme upper end of the division near the disturbed area boundary. This is a fairly steep, rocky area, and is quite inaccessible to equipment. The average grade through this section is 12.33%. the ditch is protected by a liner, which appears to have been effective in preventing erosion over the last 10 years. The liner will be maintained throughout this section;

Undisturbed Section - This is an area below the upper

(lined) section and the office pad section. The drainage flows through an undisturbed, vegetated area for approximately 100 feet, at an average slope of 12.11%. There is no evidence of erosion through this area;

Office Pad Section – This is an extremely flat portion of the diversion with an average grade of 3.50% for approximately 200 feet. Velocities through this section are non-erosive, and this is the only portion of the diversion which has required periodic maintenance for silt cleaning;

Lower Section – This section is approximately 100 feet in length with an average slope of 41.60%. The ditch is rip-rapped through this section.

Flow calculations are provided in Table IV-3 for the various sections, and erosion protection requirements are provided in Table IV-7. The diversion has been in place for approximately 10 years, and has required only minimal maintenance for silt clean out in that time. It has been designed, located, constructed, maintained, used and will be removed in accordance with requirements of R645-301-742.300.

A loose rock check dam will be placed at the discharge point of UD-4 for energy dissipation. The dam will be constructed as described in Figure IV-9 and located as shown on Plate 8.

All diversion ditches are sized and maintained to at least the minimum requirements of R645-301-742.330 "Diversion of Miscellaneous Flows" and R645-301-742.423 "(Road) Drainage Control". There are no diversions of intermittent or perennial drainages at this minesite. Ditch sizes, including flow depths and minimum size for maintenance are summarized on Table IV-3B, "Division Ditch Summary". Computer backup sheets for all calculations are provided in Appendix O.

**Stream Channel Diversions**

Re-establishment of drainages is shown on Plates 15 and 16 which are reclamation contours and cross sections. The cross sections show cut and fill which has occurred on site versus the original contours and reclaimed contours.

The reclamation plans for the drainage in the area consist of replacing each of the culverts C-1 through C-15 with restored

channels. The undisturbed diversions UD-1 and UD-2 will also be removed and replaced with appropriate sized channels, corresponding to the channels at culverts C-4 and C-12 respectively. The restored channels are all sized to carry the runoff from a 100 year - 24 hour precipitation event. Cross sections of the restored channels are shown in the "Restored Channel Typicals" (Figure IV-10). Design calculations are summarized in the table entitled Restored Channel Designs" (Table IV-6).

Culverts C-1, C-3, C-5, C-7, C-9, C-11, C-13, and C-15 will be replaced by the Main Channel RC-1, and culverts C-2, C-4, C-6, C-8, C-10, C-12, and C-14 will be replaced by the Side Channels entitled RC-2, RC-4,....RC-14, respectively.

The only restored channels with erosive velocities for this area (greater than 4.5 fps) are RC-1, RC-4, and RC-12. Erosion protection is planned for these channels, as shown on the table entitled "Erosion Protection" (Table IV-7). All other restored channels are expected to have non erosive velocities, and will not require erosion protection.

Loose rock check dams will be placed at the exit of each side drainage prior to entering RC-1. Please see Figure IV-9, for a typical section of the Loose Rock Check Dams.

Hydrologic Balance:

**Sedimentation Ponds**

The sedimentation ponds are shown on Plates 11, 12 and 13. Pond C is constructed as shown on Plate 6 "Support Facilities - As Built". There will be no Pond D. Pond E has been constructed (Plate 13), and is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". The plans and profiles shown on Plate 12 are for Pond C, as constructed. Plate 13 (Pond E) plans and profiles are as built.

All elevations of inflow and discharge are shown on the plates. Also, the embankment slopes are shown not to exceed 5:1 as required. The embankment widths are greater than the required width of height of embankment plus 35 feet divided by 5' as required. (Please note the different horizontal and vertical

~~scales used on the section views of Pond C. Horizontal and vertical scales for Pond E are the same.)~~

~~Previous Pond "B" has been redesignated as "Primary Settling Basins" since all the runoff from the basins reports to Sediment Pond "C" (See Plate 11).~~

~~**Sediment Pond "C"**~~

~~Design specifications for Sediment Pond "C" are shown in this submittal.~~

~~**Sediment Pond "E"**~~

~~Design specifications for Sediment Pond "E" are covered under this submittal.~~

**Discharge Structures**

Discharge structures from the sediment ponds have been included.

**Permanent and Temporary Impoundments**

The sedimentation pond E will remain in place after reclamation, until adequate rEVEGATATION is established on the reseeded areas. At this time, the pond will be removed and reclaimed.

**Discharge of Water into an Underground Mine**

The Drainage Map, Plate 8, delineates various drainage areas on the site. Based on planimeter areas from this map, the following areas are drained into the respective mines:

| Mine | Disturbed (ac.) | Undisturbed (a.c) |
|---|---|---|
| Pinnacle Mine | 0.81 | 0.13 |
| Apex | 1.23 | 2.06 |
| Old Chidister Mine | 4.53 | 16.21 |

The water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps. Water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps.

Andalex owns the rights to this water.

Hydrologic Balance:

**Water Quality Standards and Limitations.**

**Sediment control for Office Facilities**

~~The office facilities area is a small paved parking area and runoff from a portion of this area will report to Sediment Pond "E" as shown on Plate 8. The remaining portion is classified as a B.T.C.A. Area (2.19 2).~~

~~Natural runoff from above the office area is diverted to the south of the pad, and flows in an open ditch down to the lower (road) level where it enters an 18" culvert going into the 42" culvert carrying undisturbed drainage off site. Straw bales are maintained in the open ditch to minimize sediment in the undisturbed flow.~~

~~Most of the office pad and access road are paved. Runoff from a portion of the pad and road flow down a grouted ditch along the north and south sides of the road, through a culvert and then down the east side of the main paved road. From here the runoff flows into Pond E. See Plate 8. Sediment contributions from the office facilities area are negligible (if any) due to the pavement and concrete grouted ditch. Straw bales are also maintained along the main haul road to minimize sediment loading from this area.~~

~~**Disturbed Area Drainage not Reporting to Sediment Ponds**~~

~~Please refer to Plate 8 in Volume II of the PAP for exempt "Alternate Sediment Control Area" or (ASCA) (areas not reporting to sedimentation ponds). There are 3 areas, 2 of which are shown on Plate 8 as ASCA's and a third in Appendix U as an SAE, with a total area of 1.08 acres or 3.2% of the Disturbed Area:~~

~~(1) ASCA #1 - 0.72 acres - near the office, which includes a topsoil storage pile, UD 2, a portion of the main office pad and a portion of the weather station outslope.~~

~~(a) Treatment: As a result of a 10 year - 24 hour storm, there would potentially be a discharge of 2,462 cubic feet of runoff from this area. Alternate sediment controls consist of straw dikes, vegetation on the topsoil pile, chemically treated gravel parking areas and paved parking areas.~~

~~(2) ASCA #2 - 0.27 acres - Substation area.~~

~~(a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 923 cubic feet of runoff from this area. Alternate sediment controls on this site consist of a graveled surface, a straw dike and snow fences.~~

~~(3) Small Area Exemption (SAE) #1 - 0.09 acres - Left Fork Fan~~

~~Powerline area.~~

~~(a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 308 cubic feet of runoff from this area. As these are power poles, there will be no sediment runoff.~~

~~These three areas are exempt from the requirement that the drainage report to a sedimentation pond (817.42a) as provided for in 817.42b. The drainage from these areas will meet the effluent standards of 817.42 and State and Federal water quality standards for the receiving waters. In order to assure this, any discharge from these ASCA's will be monitored for suspended solids, total suspended solids and total dissolved solids.~~

~~There are three additional undisturbed diversions constructed just inside the disturbed area boundary (UD 1, UD 3 and UD 4). These ditches carry only undisturbed runoff from the areas above, are well vegetated, and discharge directly to the main channel undisturbed drainage without further treatment. Only undisturbed diversion UD 2 is included as a ASCA (#1), due to the fact that it also picks up drainage from a topsoil storage pile and a portion of the office pad as described on the previous page.~~

**~~NPDES Permit~~**

~~Three point sources are included in Andalex's new UPDES Permit issued in May of 1989. Quarterly reports are submitted to the Utah Department of Health and the EPA.~~

~~TYPICAL~~

~~SCS TR55 Method of Diversion Calculation~~

~~1. Find Drainage Area Plate 8 or 9~~

~~2. Find Runoff from Appropriate Event:~~
~~$Q = \frac{(P - 0.2S)^2}{(P+0.8S)}$; where: P = Precip. in inches~~
~~$S = \frac{1,000}{CN} - 10$~~

~~CN = 70 for Undisturbed~~
~~CN = 90 for Disturbed~~

~~3. Find Hydraulic Length of Watershed Plate 8 or 9~~

~~4. Find Land Slope Plate 8 or 9~~

~~5. Calculate Lag Time; $t_l = \frac{L^{0.8}(S+1)^{0.7}}{1900\ y^{0.5}}$~~

~~where: $t_l$ = Lag Time in Hrs.~~
~~L = Hydraulic Length in ft.~~
~~$S = (\frac{1,000}{CN} - 10)$~~
~~y = Land Slope in %~~

~~6. Find Time of Concentration; $t_c = \frac{t_l}{0.6}$~~

~~**7. Find Peak Flow (qp) from: $qp = qp^* AQ$~~
~~where qp = Peak Flow in cfs~~
~~$qp^*$= Peak Discharge from Figure 2.40, page 115***.~~
~~A = Drainage Area in Square Miles~~
~~Q = Runoff (from #2 above)~~

~~**8. Find Velocity of Flow from:~~
~~$V = \frac{1.49}{n} R^{0.67} S^{0.5}$~~

~~where: V = Velocity in fps~~
~~n = Manning's Number for ditch~~
~~R = Hydraulic Radius in ft. = $\frac{\text{Area}}{\text{Wetted Perim.}}$~~

S = Slope in ft./ft.

**9. Find Required Ditch Area by dividing peak flow by the velocity.

$$Q = AV; \quad A = \frac{Q}{V}$$

**10. Find depth of flow by applying required area to ditch size.

* Where undisturbed and disturbed flows enter the same ditch, a weighted curve number is used, calculated by:

$$\frac{(\text{Area Undisturbed})(70) + (\text{Area Disturbed})(90)}{(\text{Total Area})}$$

** Items 7 through 10 can also be calculated by the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.

*** "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

~~TABLE IV-3~~

~~UNDISTURBED DIVERSION DESIGN~~

| ~~Structure~~ | ~~UD-1~~ | ~~UD-2~~ | ~~UD-3~~ | ~~UD-4~~ | ~~UD-5 (PAD)~~ |
|---|---|---|---|---|---|
| ~~Drainage Area (s)~~ | ~~87.78~~ | ~~56.20~~ | ~~23.87~~ | ~~26.14~~ | ~~16.90~~ |
| ~~Time of Conc. (hours)~~ | ~~0.24~~ | ~~0.21~~ | ~~0.22~~ | ~~0.06~~ | ~~0.14~~ |
| ~~Runoff Curve Number (CN)~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Manning's Number (n)~~ | ~~0.038~~ | ~~0.038~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ |
| ~~Ditch Slope (%)~~ | ~~6.75~~ | ~~3.50~~ | ~~6.75~~ | ~~4.50~~ | ~~3.79~~ |
| ~~Hydraulic Length (ft.)~~ | ~~2850~~ | ~~2800~~ | ~~1400~~ | ~~600~~ | ~~1800~~ |
| ~~Land Slope (%)~~ | ~~47.22~~ | ~~58.33~~ | ~~56.67~~ | ~~66.67~~ | ~~62.50~~ |
| ~~10 yr. 6 hr. Event (in.)~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.24~~ | ~~0.21~~ | ~~0.22~~ | ~~0.06~~ | ~~0.14~~ |
| ~~Peak Flow 10/6 (cfs)~~ | ~~1.35~~ | ~~0.99~~ | ~~0.11~~ | ~~0.47~~ | ~~0.29~~ |
| ~~Required Area 10/6 ($ft^2$)~~ | ~~0.37~~ | ~~0.37~~ | ~~0.06~~ | ~~0.20~~ | ~~0.15~~ |
| ~~Flow Depth 10/6 (ft)~~ | ~~0.61~~ | ~~0.61~~ | ~~0.24~~ | ~~0.45~~ | ~~0.39~~ |
| ~~Velocity 10/6 (fps)~~ | ~~3.65~~ | ~~2.64~~ | ~~1.88~~ | ~~2.32~~ | ~~1.93~~ |
| ~~10 yr. 24 hr. Event (in.)~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ |
| ~~Peak Flow 10/24 (cfs)~~ | ~~7.94~~ | ~~4.75~~ | ~~2.03~~ | ~~3.45~~ | ~~1.59~~ |
| ~~Req'd Area 10/24 ($ft^2$)~~ | ~~1.40~~ | ~~1.21~~ | ~~0.52~~ | ~~0.90~~ | ~~0.54~~ |
| ~~Flow Depth 10/24 ($ft^2$)~~ | ~~1.18~~ | ~~1.10~~ | ~~0.72~~ | ~~0.95~~ | ~~0.73~~ |
| ~~Velocity 10/24 ($ft^2$)~~ | ~~5.69~~ | ~~3.91~~ | ~~3.90~~ | ~~3.82~~ | ~~2.95~~ |

~~Notes: 1 Ditch slopes measured from Plate 8.~~

~~2 UD-2 slope measured directly in field.~~

~~3 Peak flows by SCS TR55 Method using "Storm 6.20" computer program.~~

~~4 Manning's number based on Table 3.1, p. 159, under Small Drainage Ditches - earth Lined, "Applied~~

Hydrology and Sedimentology Disturbed Areas", Barfield, Warner and Haan, 1983.

5 See Appendix O for computer back up.

6 All calculations are based on minimum ditch size "V" shape with 1:1 side slopes. Ditch configurations may vary in field.

TABLE IV-3 (cont'd)

UNDISTURBED DIVERSION DESIGN

| Structure | UD-2 (upper) | UD-2 (lower) | UD-4 (max) | UD-5 (max) |
|---|---|---|---|---|
| Drainage Area (acres) | 56.20 | 56.20 | 26.14 | 16.90 |
| Time of Conc. (hrs.) | 0.21 | 0.21 | 0.06 | 0.14 |
| Runoff Curve Number (CN) | 70 | 70 | 70 | 70 |
| Manning's Number (n) | 0.025 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 12.33 | 42.60 | 20.00 | 17.75 |
| Hydraulic Length (ft.) | 2800 | 2800 | 600 | 1800 |
| Land Slope (%) | 58.33 | 58.33 | 66.67 | 62.50 |
| 10 yr. 6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 0.99 | 0.99 | *10.43 | 0.29 |
| Req'd Area 10/6 (ft.$^2$) | 0.17 | 0.15 | 1.18 | 0.08 |
| Flow Depth 10/6 (ft.) | 0.41 | 0.39 | 1.09 | 0.29 |
| Velocity 10/6 (fps) | 5.80 | 6.49 | 8.81 | 3.44 |
| 10 yr. 24 hr. Event (in) | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow (cfs) | 4.75 | 4.75 | *13.41 | 1.59 |
| Req'd Area (ft.$^2$) | 0.55 | 0.49 | 1.43 | 0.30 |
| Flow Depth 10/24 (ft) | 0.74 | 0.70 | 1.20 | 0.55 |
| Velocity 10/24 (fps) | 8.59 | 9.61 | 9.38 | 5.27 |

* Includes discharge from Pond E Emergency Spillway.

Note: 1. Ditch slopes measured from Plate 8.
2. UD-2 Slopes Measured Directly in Field; UD-2 (Upper) is a lined channel. UD-2 (lower) is rip rapped.
3. Peak flows by SCS TR55 Method using "Storm 6.20" computer program.
4. The Manning's number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.
5. See Appendix O for computer back up.
6. All calculations are based on minimum ditch size "V" shape with 1:1 side slopes. Ditch Configurations may vary in field.

~~TABLE IV 3A~~

~~DISTURBED DIVERSION DESIGN~~
~~(MISCELLANEOUS FLOWS 2YR. 6 HR. DESIGN)~~

| ~~Structure~~ | ~~DD 1~~ | ~~*DD 8~~ | ~~*DD 9~~ | ~~DD 10~~ | ~~DD 11~~ |
|---|---|---|---|---|---|
| ~~Drainage Area (acres)~~ | | | | | |
| ~~Disturbed~~ | ~~3.31~~ | | | ~~0.34~~ | ~~5.35~~ |
| ~~Undisturbed~~ | ~~5.40~~ | | | | ~~6.12~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.08~~ | ~~0.327~~ | ~~0.327~~ | ~~0.11~~ | ~~0.08~~ |
| ~~Runoff Curve Number (CN)~~ | | | | | |
| ~~Disturbed~~ | ~~90~~ | | | ~~90~~ | ~~90~~ |
| ~~Undisturbed~~ | ~~70~~ | | | | ~~70~~ |
| ~~Weighted CN~~ | ~~78~~ | | | ~~90~~ | ~~79~~ |
| ~~Manning's Number (n)~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ |
| ~~Ditch Slope (%)~~ | ~~6.25~~ | ~~6.25~~ | ~~6.25~~ | ~~6.25~~ | ~~5.25~~ |
| ~~Hydraulic Length (ft.)~~ | ~~200~~ | ~~1200~~ | ~~1200~~ | ~~300~~ | ~~800~~ |
| ~~Land Slope (%)~~ | ~~6.25~~ | ~~6.25~~ | ~~6.25~~ | ~~6.25~~ | ~~56.25~~ |
| ~~2 yr. 6 hr. Event (in)~~ | ~~0.80~~ | ~~0.80~~ | ~~0.80~~ | ~~0.80~~ | ~~0.80~~ |
| ~~Peak Flow 2/6 (cfs)~~ | ~~0.08~~ | ~~0.07~~ | ~~0.07~~ | ~~0.05~~ | ~~0.13~~ |
| ~~Required Area 2/6 ($ft^2$)~~ | ~~0.05~~ | ~~0.04~~ | ~~0.04~~ | ~~0.03~~ | ~~0.07~~ |
| ~~Flow Depth 2/6 (ft.)~~ | ~~0.22~~ | ~~0.21~~ | ~~0.21~~ | ~~0.18~~ | ~~0.26~~ |
| ~~Velocity 2/6 (fps)~~ | ~~1.69~~ | ~~1.63~~ | ~~1.63~~ | ~~1.50~~ | ~~1.90~~ |
| ~~10 yr. 24 hr. Event (in.)~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ |
| ~~Peak Flow 10/24 (cfs)~~ | ~~3.49~~ | ~~2.88~~ | ~~2.88~~ | ~~0.31~~ | ~~4.75~~ |

~~* Based on ½ flow from DD 3, which is 0.13 cfs for 2 yr. 6 hr.event. See Appendix O.~~

TABLE IV-3A (Continued)

DISTURBED DIVERSION DESIGN
(PRIMARY ROAD DRAINAGE 10YR. 6HR. DESIGN)

| Structure | DD-2 | DD-3 | DD-4 | DD-6 | DD-7 |
|---|---|---|---|---|---|
| Drainage Area (acres) | | | | | |
| Disturbed | 4.07 | 7.41 | 12.21 | | 1.28 |
| Undisturbed | | 25.49 | 12.20 | | 6.12 |
| Time of Conc. (hrs.) | 0.04 | 0.327 | 0.289 | 0.289 | 0.08 |
| Runoff Curve Number (CN) | | | | | |
| Disturbed | 90 | 90 | 90 | | 90 |
| Undisturbed | | 70 | 70 | | 70 |
| Weighted CN | 90 | 75 | 80 | | 74 |
| Manning's Number (n) | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.25 | 6.25 | 6.25 | 5.95 | 5.56 |
| Hydraulic Length (ft.) | 200 | 1200 | 1200 | | 800 |
| Land Slope (%) | 6.25 | 6.25 | 8.00 | | 56.25 |
| 10 yr. 6 hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 1.70 | 0.90 | 1.67 | 0.84 | 0.20 |
| Required Area 10/6 ($ft^2$) | 0.47 | 0.30 | 0.40 | 0.28 | 0.10 |
| Flow Depth 10/6 (ft.) | 0.69 | 0.24 | 0.68 | 0.53 | 0.31 |
| Velocity 10/6 (fps) | 3.62 | 2.96 | 3.60 | 2.98 | 2.03 |
| 10yr. 24hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 3.50 | 5.75 | 8.06 | 4.03 | 1.92 |

* Based on ½ flow for DD-4

Notes:

1. Ditch Slopes measured from Plate 8.
2. Peak flows by SCS TR55 Method using "Storm 6.20" Computer

program.

3. The Manning's Number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.

4. See Appendix O for computer back up.

5. All calculations are based on minimum ditch size "V" shape with 1:1 side slopes, except DD 3 which has a 1' bottom width. Ditch configurations may vary in field.

TABLE IV - 3B

DIVERSION DITCH SUMMARY

| DITCH NO. | FLOW (cfs) | REQ'D FLOW DEPTH (ft.) | REQ'D FLOW AREA ($ft^2$) |
|---|---|---|---|
| UD 1 | 1.35 | 0.61 | 0.37 |
| UD 2 (PAD) | 0.99 | 0.61 | 0.37 |
| UD 2 (UPPER) | 0.99 | 0.41 | 0.17 |
| UD 2 (LOWER) | 0.99 | 0.39 | 0.15 |
| UD 3 | 0.11 | 0.24 | 0.06 |
| UD 4 | 0.47 | 0.45 | 0.20 |
| UD 4 (MAX) | 10.43 | 1.09 | 1.18 |
| UD 5 | 0.29 | 0.39 | 0.15 |
| UD 5 (MAX) | 0.29 | 0.29 | 0.08 |
| DD 1 | 0.08 | 0.22 | 0.05 |
| DD 2 | 1.70 | 0.69 | 0.47 |
| DD 3 | 0.90 | 0.24 | 0.30 |
| DD 4 | 1.67 | 0.68 | 0.46 |
| DD 6 | 0.84 | 0.53 | 0.28 |
| DD 7 | 0.20 | 0.31 | 0.10 |
| DD 8 | 0.07 | 0.21 | 0.04 |
| DD 9 | 0.07 | 0.21 | 0.04 |
| DD 10 | 0.05 | 0.18 | 0.03 |
| DD 11 | 0.13 | 0.26 | 0.07 |

Notes: 1 Flows for UD ditches and primary road ditches (D 2 through DD 7) based on 10 yr. 6hr. event (1.25).

2 Flows for Ditches DD 1 and DD 8 through DD 11 based on 2yr. 6hr. event (0.80").

3- All calculations based on minimum ditch size - "V" ditch with 1:1 side slopes, except DD 3, which has a 1' bottom width. Ditch configurations may vary in field.

4- Ditches will be maintained to minimum depth and/or area shown in this table.

~~METHOD OF CULVERT CALCULATION~~
~~(TYPICAL)~~
~~See Appendix N for calculation reference~~

~~1. Find Drainage Area — Plate 9~~

~~2. Find Runoff from Appropriate Event:~~
~~$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$; Where: P = Precipitation in Inches.~~
~~$S = \frac{1,000}{CN} - 10$~~
~~or CN = 70~~

~~3. Find Hydraulic Length of Watershed — Plate 9.~~

~~4. Find Land Slope — Plate 9~~

~~5. Calculate Lag Time; $t_b = \frac{L^{0.8}(S+1)^{0.7}}{1,900\ Y^{0.5}}$~~
~~where: $t_b$ = Lag Time in Hrs.~~
~~L = Hydraulic Length in Ft.~~
~~$S = \frac{1,000}{CN} - 10$~~
~~Y = Land Slope in %.~~

~~6. Find Time of Concentration; $t_c = \frac{t_b}{0.6}$~~

~~**7. Find Peak Flow (qp) from: $qp = qp^* AQ$~~
~~where: qp = Peak Flow~~
~~$qp^*$ = Peak Discharge from Figure 2.40, page 115*.~~
~~A = Drainage Area in Square Miles~~
~~Q = Runoff (from #2 above)~~

~~8. Find Required Culvert Size by Manning's Equation:~~

~~$D = \left(\frac{2.16\ Qn}{\sqrt{s}}\right)^{0.375}$~~
~~where: D = Required Culvert Diameter in Ft.~~
~~Q = Peak Flow (qp) from 7.~~
~~n = Manning's Number (0.025 for culv.)~~
~~s = Slope in ft./ft.~~

~~* "Applied Hydrology and Sedimentology for Disturbed Areas",~~

~~Barfield, Warner and Haan, 1983.~~

~~** Item 7 can also be calculated by using the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.~~

~~TABLE IV 3C~~

~~DISTURBED AREA CULVERT DESIGN~~
~~(Drainage to Old Works)~~

| ~~Structure~~ | ~~CD 1~~ | ~~CD 2~~ | ~~CD 8~~ |
|---|---|---|---|
| ~~Drainage Area (ac.)~~ | | | |
| ~~Undisturbed~~ | ~~10.09~~ | ~~6.12~~ | ~~10.09~~ |
| ~~Disturbed~~ | ~~3.25~~ | ~~1.28~~ | ~~3.25~~ |
| ~~10 yr. 6 hr. event (in.)~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.10~~ | ~~0.10~~ | ~~0.10~~ |
| ~~Curve Number~~ | | | |
| ~~Undisturbed~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Disturbed~~ | ~~90~~ | ~~90~~ | ~~90~~ |
| ~~Manning's Number~~ | ~~0.025~~ | ~~0.025~~ | ~~0.025~~ |
| ~~Culvert Slope (%)~~ | ~~5.56~~ | ~~5.56~~ | ~~5.56~~ |
| ~~Peak Flow (cfs)~~ | ~~1.73~~ | ~~0.72~~ | ~~1.73~~ |
| ~~Velocity~~ | ~~4.41~~ | ~~3.49~~ | ~~3.08~~ |
| ~~D Req'd (ft.)~~ | ~~0.71~~ | ~~0.51~~ | ~~0.71~~ |
| ~~D in Place (ft.)~~ | ~~1.00~~ | ~~1.00~~ | ~~1.50~~ |

~~TABLE IV 3C (Continued)~~

~~DISTURBED AREA CULVERT DESIGN~~

| ~~Structure~~ | ~~CD 4~~ | ~~CD 5~~ | ~~CD 6~~ | ~~CD 7~~ |
|---|---|---|---|---|
| ~~10 yr. 6 hr. Event (in.)~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ | ~~1.25~~ |
| ~~Manning's Number (n)~~ | ~~0.025~~ | ~~0.025~~ | ~~0.025~~ | ~~0.025~~ |
| ~~Culvert Slope (%)~~ | ~~5.56~~ | ~~5.56~~ | ~~5.56~~ | ~~5.56~~ |
| ~~Peak Flow~~ | ~~1.50~~ | ~~1.55~~ | ~~2.33~~ | ~~4.65~~ |
| ~~Velocity~~ | ~~4.26~~ | ~~4.29~~ | ~~4.75~~ | ~~5.65~~ |
| ~~D Req'd (ft.)~~ | ~~0.67~~ | ~~0.68~~ | ~~0.79~~ | ~~1.02~~ |
| ~~D in Place (ft.)~~ | ~~1.50~~ | ~~1.50~~ | ~~2.00~~ | ~~2.00~~ |

~~Note: All culverts have adequate headwater to allow flow.~~

~~TABLE IV 3C (Continued)~~

~~CULVERT CD 3~~
~~(Inlet to Sed. Pond "C")~~

~~10 yr.6 hr. Event 1.25"~~
~~Mannings Number 0.025~~
~~Culvert Slope 3.30%~~
~~Peak Flow 3.00 cfs~~
~~Velocity 4.16 fps~~
~~D. Required 0.96 ft.~~
~~D. In Place 1.50 ft.~~

~~NOTES: 1. Peak flow is based on entire flow from Diversion DD 3.~~
~~2. Details for Diversion DD 3 are on Table IV 3A.~~
~~3. Culvert slope is based on actual field measurement.~~
~~4. A headwall of 4' exists at the culvert inlet, which is adequate to allow the calculated peak flow of 3.00 cfs.~~
~~5. Please refer to Plate 8 for CD 3 location and drainage areas.~~

TABLE IV-3C (Continued)
DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD-9 | CD-10 | CD-11 | CD-12 | CD-13 |
|---|---|---|---|---|---|
| 10yr. 6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 8.00 | 6.25 | 8.00 | 5.56 | 6.25 |
| Peak Flow 10/6 (cfs) | 0.31* | 0.31* | 0.31** | 0.92** | 1.87*** |
| Velocity 10/6 (fps) | 3.29 | 3.00 | 3.29 | 3.77 | 4.70 |
| Diam. Req'd. (ft.) | 0.35 | 0.36 | 0.35 | 0.56 | 0.71 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 1.00 | 2.00 | 1.50 |

* Based on 1/3 flow form DD 11.
** Based on entire flow from DD 11.
**** Based on entire flow from DD 2.

TABLE IV 3C (Continued)
DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD 14 | CD 15 | CD 16 | CD 17 | CD 18 |
|---|---|---|---|---|---|
| 10yr. 6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.0025 |
| Culvert Slope (%) | 3.50 | 3.50 | 6.25 | 5.56 | 57.74 |
| Peak Flow 10/6 (cfs) | 1.35* | 2.84** | 4.65*** | 4.65*** | 0.29 |
| Velocity 10/6 (fps) | 3.51 | 4.20 | 5.90 | 5.65 | 6.79 |
| Diam. Req'd. (ft.) | 0.70 | 0.93 | 1.00 | 1.02 | 0.23 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 2.00 | 2.00 | 1.50 |

* Based on entire flow from DD-1.
** Based on entire flows from DD-2, CD 10 & DD 11
*** Based on entire flow from DD-4.

~~TABLE IV-4~~

~~MAIN CHANNEL CULVERT DESIGN~~

~~(optional)~~

| ~~Structure~~ | ~~C-1a~~ |
|---|---|
| ~~Drainage Area~~ | ~~469.51~~ |
| ~~10 yr. - 24 hr. Event~~ | ~~1.82~~ |
| ~~Time of Conc. (hrs.)~~ | ~~1.02~~ |
| ~~Curve number~~ | ~~70~~ |
| ~~Manning's Number~~ | ~~0.025~~ |
| ~~Ditch Slope (%)~~ | ~~5.56~~ |
| ~~Peak Flow~~ | ~~22.12~~ |
| ~~Structure Area Used (ft.²)~~ | ~~7.07~~ |
| ~~Velocity (fps)~~ | ~~9.20~~ |
| ~~Hydraulic Length~~ | ~~10,200~~ |
| ~~Land Slope~~ | ~~19.83~~ |
| ~~Headwater Req'd (ft.)~~ | ~~2.22~~ |
| ~~D Req'd (ft.)~~ | ~~1.84~~ |
| ~~D in Place~~ | ~~3.00~~ |

~~Note: See Appendix O for culvert justification.~~

TABLE IV-4 (cont'd)

MAIN CHANNEL CULVERT DESIGN

| Structure | C1 | C3 | C5 | C7 |
|---|---|---|---|---|
| Drainage Area | 506.16 | 529.19 | 606.48 | 633.35 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | | | | |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 23.12 | 23.62 | 26.02 | 26.72 |
| Structure Area Used (ft.²) | 7.07 | 7.07 | 7.07 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | | | | |
| Land Slope | | | | |
| Headwater Req'd (ft.) | N/A | N/A | | |
| D Req'd (ft.) | 1.86 | 1.88 | 1.95 | 1.97 |
| D in Place | 3.00 | 3.00 | 3.00 | 3.50 |

Note: See Appendix O for culvert justification.

TABLE IV-4 (cont'd)

MAIN CHANNEL CULVERT DESIGN

| Structure | C9 | C11 | C13 | C15 |
|---|---|---|---|---|
| Drainage Area | 678.60 | 696.73 | 752.04 | 752.04 |
| 10 yr. 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | | | | |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 29.82 | 32.42 | 38.92* | 38.92* |
| Structure Area Used ($ft.^2$) | 9.62 | 9.62 | 9.62 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | | | | |
| Land Slope | | | | |
| Headwater Req'd (ft.) | | | | |
| D Req'd (ft.) | 2.06 | 2.12 | 2.27 | 2.27 |
| D in Place | 3.50 | 3.50 | 3.50 | 3.50 |

Note: See Appendix O for culvert justification.

Note: All culverts are within capacity for open channel flow.

* If design peak flows for primary spillways from Ponds C and E are included, the peak flows for C 13 and C 15 are 65.6 cfs and 90.9 cfs respectively.

~~TABLE IV-5~~

~~SIDE DRAINAGE CULVERT DESIGN~~

| ~~Structure~~ | ~~C-0~~ | ~~C-2~~ | ~~C-4~~ | ~~C-6~~ |
|---|---|---|---|---|
| ~~Drainage Area~~ | ~~36.65~~ | ~~23.03~~ | ~~77.29~~ | ~~26.87~~ |
| ~~10 yr. - 24 hr. Event~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ | ~~1.82~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.12~~ | ~~0.08~~ | ~~0.24~~ | ~~0.22~~ |
| ~~Curve number~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Manning's number~~ | ~~0.025~~ | ~~0.025~~ | ~~0.025~~ | ~~0.025~~ |
| ~~Ditch Slope (%)~~ | ~~4.00~~ | ~~4.00~~ | ~~10.00~~ | ~~4.00~~ |
| ~~Peak Flow~~ | ~~5.65~~ | ~~3.90~~ | ~~8.77~~ | ~~4.17~~ |
| ~~Structure Area Used (ft.²)~~ | ~~1.767~~ | ~~1.767~~ | ~~1.767~~ | ~~1.767~~ |
| ~~Velocity (fps)~~ | ~~6.18~~ | ~~6.18~~ | ~~8.73~~ | ~~6.18~~ |
| ~~Hydraulic Length~~ | ~~1300~~ | ~~850~~ | ~~2850~~ | ~~1400~~ |
| ~~Land Slope~~ | ~~51.43~~ | ~~61.54~~ | ~~47.22~~ | ~~56.67~~ |
| ~~Headwater Req'd (ft.)~~ | ~~1.35~~ | ~~1.12~~ | ~~*2.40~~ | ~~1.02~~ |
| ~~D Req'd (ft.)~~ | ~~1.10~~ | ~~0.96~~ | ~~*1.30~~ | ~~0.98~~ |
| ~~D In Place (ft.)~~ | ~~1.50~~ | ~~1.50~~ | ~~1.50~~ | ~~1.50~~ |

~~* Available headwater at culvert inlet is greater than that required to allow for surge storage and passage of flows.~~

~~Headwater = distance from base of culvert to top of headwall.~~

TABLE IV-5 (cont'd)

SIDE DRAINAGE CULVERT DESIGN

| Structure | C-8 | C-10 | C-12 |
|---|---|---|---|
| Drainage Area | 45.25 | 18.16 | 55.31 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | 0.14 | 0.11 | 0.21 |
| Curve Number | 70 | 70 | 70 |
| Manning's Number | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 4.00 | 4.00 | 10.00 |
| Peak Flow | 7.09 | 2.65 | 6.50 |
| Structure Area Used (ft.*) | 4.91 | 3.14 | 1.767 |
| Velocity (fps) | 6.18 | 4.90 | 9.77 |
| Hydraulic Length | 1600 | 1250 | 2800 |
| Land Slope | 58.62 | 63.16 | 58.33 |
| Headwater Req'd (ft.) | 1.25 | 0.98 | 1.60 |
| D Req'd (ft.) | 1.20 | 0.83 | 1.16 |
| D In Place (ft.) | 2.50 | 2.00 | 1.5 |

~~TABLE IV-6~~

~~RESTORED CHANNEL DESIGNS*~~

| | Main Channel | Side Channel* | | |
|---|---|---|---|---|
| ~~Structure~~ | ~~RC-1~~ | ~~RC-O~~ | ~~RC-2~~ | ~~RC-4~~ |
| ~~Drainage Area~~ | ~~469.22~~ | ~~34.55~~ | ~~22.18~~ | ~~71.83~~ |
| ~~100 yr. - 6 hr. Event~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ |
| ~~Time of Conc. (hrs.)~~ | ~~3.19~~ | ~~0.18~~ | ~~0.09~~ | ~~0.44~~ |
| ~~Curve number~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Manning's Number~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ |
| ~~Ditch Slope (%)~~ | ~~6.60~~ | ~~4.00~~ | ~~4.00~~ | ~~10.00~~ |
| ~~Peak Flow~~ | ~~60.31**~~ | ~~2.64~~ | ~~1.93~~ | ~~4.12~~ |
| ~~Min. Structure Area (ft.²)~~ | ~~27.00~~ | ~~8.00~~ | ~~8.00~~ | ~~8.00~~ |
| ~~Req'd Area (ft.²)~~ | ~~7.26~~ | ~~0.84~~ | ~~0.67~~ | ~~0.83~~ |
| ~~Depth of Flow (ft.)~~ | ~~1.03~~ | ~~0.35~~ | ~~0.30~~ | ~~0.35~~ |
| ~~Velocity (fps)~~ | ~~8.31~~ | ~~3.16~~ | ~~2.86~~ | ~~4.98~~ |
| ~~Hydraulic Length~~ | ~~10,200~~ | ~~1,300~~ | ~~850~~ | ~~2,400~~ |
| ~~Land Slope (%)~~ | ~~19.80~~ | ~~51.40~~ | ~~61.50~~ | ~~47.00~~ |
| ~~Erosion Protection (Y/N)~~ | ~~Y~~ | ~~N~~ | ~~N~~ | ~~Y~~ |

~~* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.~~

~~** Includes Reclaimed Area.~~

~~Note: Ditch Slopes measured from Plate 17.~~
~~Areas from Plate 17-A~~

~~TABLE IV-6 (cont'd)~~

~~RESTORED CHANNEL DESIGNS*~~

| ~~Structure~~ | ~~RC-6~~ | ~~RC-8~~ | ~~RC-10~~ | ~~RC-12~~ | ~~RC-14~~ |
|---|---|---|---|---|---|
| ~~Drainage Area~~ | ~~28.74~~ | ~~46.92~~ | ~~20.74~~ | ~~58.20~~ | ~~24.37~~ |
| ~~100 yr. - 6 hr. Event~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.20~~ | ~~0.24~~ | ~~0.18~~ | ~~0.53~~ | ~~0.20~~ |
| ~~Curve number~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Manning's Number~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ | ~~0.040~~ |
| ~~Ditch Slope (%)~~ | ~~4.00~~ | ~~4.00~~ | ~~4.00~~ | ~~10.00~~ | ~~4.00~~ |
| ~~Peak Flow~~ | ~~2.15~~ | ~~3.39~~ | ~~1.60~~ | ~~3.12~~ | ~~1.82~~ |
| ~~Min. Structure Area (ft.$^2$)~~ | ~~8.00~~ | ~~8.00~~ | ~~8.00~~ | ~~8.00~~ | ~~8.00~~ |
| ~~Req'd Area (ft.$^2$)~~ | ~~0.73~~ | ~~0.99~~ | ~~0.60~~ | ~~0.69~~ | ~~0.65~~ |
| ~~Depth of Flow (ft.)~~ | ~~0.31~~ | ~~0.41~~ | ~~0.26~~ | ~~0.30~~ | ~~0.29~~ |
| ~~Velocity (fps)~~ | ~~2.96~~ | ~~3.43~~ | ~~2.68~~ | ~~4.55~~ | ~~2.80~~ |
| ~~Hydraulic Length~~ | ~~1,400~~ | ~~1,600~~ | ~~1,250~~ | ~~2,800~~ | ~~1,300~~ |
| ~~Land Slope (%)~~ | ~~57.00~~ | ~~58.60~~ | ~~63.20~~ | ~~58.30~~ | ~~46.80~~ |
| ~~Erosion Protection (Y/N)~~ | ~~N~~ | ~~N~~ | ~~N~~ | ~~Y~~ | ~~N~~ |

~~* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.~~

~~Note: Ditch Slopes measured from Plate 17.~~

~~TABLE IV-6 (con't)~~

~~RESTORED CHANNEL DESIGNS~~
~~(Sub-Areas)*~~

| ~~Structure~~ | ~~1~~ | ~~2~~ | ~~3~~ | ~~4~~ | ~~5~~ | ~~6~~ | ~~7~~ |
|---|---|---|---|---|---|---|---|
| ~~Drainage Area (ac.)~~ | ~~4.72~~ | ~~1.09~~ | ~~8.73~~ | ~~24.37~~ | ~~4.37~~ | ~~24.00~~ | ~~12.74~~ |
| ~~100 yr. 6 hr. event (in.)~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ | ~~1.91~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.08~~ | ~~0.07~~ | ~~0.13~~ | ~~0.22~~ | ~~0.09~~ | ~~0.20~~ | ~~0.17~~ |
| ~~Curve Number~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ | ~~70~~ |
| ~~Peak Flow (cfs)~~ | ~~0.42~~ | ~~0.10~~ | ~~0.72~~ | ~~1.78~~ | ~~0.38~~ | ~~1.78~~ | ~~0.99~~ |
| ~~Hydraulic Length (ft.)~~ | ~~600~~ | ~~400~~ | ~~800~~ | ~~1,500~~ | ~~700~~ | ~~1,200~~ | ~~1,100~~ |
| ~~Land Slope (%)~~ | ~~66.67~~ | ~~55.17~~ | ~~58.33~~ | ~~66.67~~ | ~~60.00~~ | ~~60.87~~ | ~~60.00~~ |

~~* These areas drain directly to RC-1 by sheet flow, without entering other channels. See Plate 17-A.~~

~~TABLE IV-6 (con't)~~

~~RESTORED CHANNEL DESIGNS~~

| ~~Structure~~ | ~~*Reclaimed Area~~ |
|---|---|
| ~~Drainage Area (ac.)~~ | ~~32.34~~ |
| ~~100 yr. 6 hr. event (in.)~~ | ~~1.91~~ |
| ~~Time of Conc. (hrs.)~~ | ~~0.54~~ |
| ~~Curve Number~~ | ~~90~~ |
| ~~Peak Flow (cfs)~~ | ~~23.17~~ |
| ~~Hydraulic Length (ft.)~~ | ~~49.50~~ |
| ~~Land Slope (%)~~ | ~~6.60~~ |

~~* This area drains directly to RC 1 by sheet flow, without entering other channels. See Plate 17-A.~~

~~TABLE IV-6 (con't)~~

~~RESTORED CHANNEL DESIGNS~~

~~Peak flow for RC-1 is based on the total of peak flows for RC-1 (Upper) plus channels RC-0 through RC-14, plus sub-areas 1 through 7, plus the reclaimed area. Peak flows for each of these are shown in Appendix P.~~

~~TABLE IV-7~~

~~EROSION PROTECTION~~

| ~~Structure~~ | ~~*Main Channel C-15~~ | ~~Restored Main Channel RC-1~~ | ~~Restored Main Channel RC-4~~ | ~~Restored Side Channel RC-12~~ | ~~Restored Side Channel~~ |
|---|---|---|---|---|---|
| ~~Flow (cfs)~~ | | | ~~4.12~~ | ~~3.12~~ | |
| ~~Slope (%)~~ | ~~5.56~~ | ~~6.60~~ | ~~10.00~~ | ~~10.00~~ | |
| ~~Velocity (fps)~~ | ~~9.20~~ | ~~8.31~~ | ~~4.98~~ | ~~4.55~~ | |
| ~~Rip rap Size ($D_{50}$)~~ | ~~15"~~ | ~~12"~~ | ~~6"~~ | ~~6"~~ | |
| ~~Bedding ( 3/4" gravel)~~ | ~~25"~~ | ~~20"~~ | ~~10"~~ | ~~10"~~ | |
| ~~Length of Protection (ft.)~~ | ~~20'~~ | ~~All~~ | ~~All~~ | ~~All~~ | |
| ~~Width of Protection (ft.)~~ | ~~10'~~ | ~~12'~~ | ~~6'~~ | ~~6'~~ | |
| ~~Rip Rap Depth~~ | ~~18"~~ | ~~15"~~ | ~~8"~~ | ~~8"~~ | |

| ~~Structure~~ | ~~UD-1~~ | ~~UD-4 (Max.)~~ | ~~UD-5 (Max.)~~ | ~~DD-3~~ | ~~DD-4 (Max.)~~ |
|---|---|---|---|---|---|
| ~~Flow (cfs)~~ | ~~20.57~~ | ~~14.82~~ | ~~4.75~~ | ~~15.18~~ | ~~14.55~~ |
| ~~Slope (%)~~ | ~~6.75~~ | ~~20.00~~ | ~~17.75~~ | ~~6.25~~ | ~~8.00~~ |
| ~~Velocity (fps)~~ | ~~7.25~~ | ~~9.67~~ | ~~6.98~~ | ~~6.28~~ | ~~6.82~~ |
| ~~Rip rap Size (D50)~~ | ~~9"~~ | ~~15"~~ | ~~9"~~ | ~~9"~~ | ~~9"~~ |
| ~~Bedding ( 3/4" gravel)~~ | ~~15"~~ | ~~25"~~ | ~~15"~~ | ~~15"~~ | ~~15"~~ |
| ~~Length of~~ | ~~All~~ | ~~150'~~ | ~~150'~~ | ~~All~~ | ~~All~~ |

~~Protection (ft.)~~

| | | | | | |
|---|---|---|---|---|---|
| ~~Width of Protection (ft.)~~ | ~~5'~~ | ~~5'~~ | ~~5'~~ | ~~4'~~ | ~~4'~~ |
| ~~Rip Rap Depth~~ | ~~12"~~ | ~~18"~~ | ~~12"~~ | ~~12"~~ | ~~12"~~ |

~~* For Reference Only. Natural Rip rap is more than adequate for erosion protection.~~

~~Note: Rip Rap shall be graded according to the following:~~

~~$D_{15}$ = 0.42D; $D_{50}$ = 1D; $D_{85}$ = 1.6D.~~

~~For Median Diameter of 12", $D_{15}$ = 5", $D_{50}$ = 12", $D_{85}$ = 19.25".~~

~~For Median Diameter of 21", $D_{15}$ = 9", $D_{50}$ = 21", $D_{85}$ = 34.00".~~

| | UD-2 (upper) | UD-2 (lower) |
|---|---|---|
| Flow (cfs) | 13.87 | 13.87 |
| Slope (%) | 12.33 | 42.60 |
| Velocity (fps) | 10.63 | 11.90 |
| Rip Rap Size (D50) | N/A** | 12" |
| Bedding ( 3/4" gravel) | N/A** | 20" |
| Length of Protection (ft.) | 150' | 100' |
| Width of Protection (ft.) | 5' | 5' |
| Rip Rap Depth | N/A** | 15" |

** UD-2 (upper) is protected by a channel liner.

~~During the earthwork portion of the reclamation suitable rip-rap will be segregated and stored on site for later use in the stream channel restorations it will not be necessary to haul rip-rap in from an outside source. Also native material will be used for the filter blanket under the rip-rap. This material can be used because of its sandy nature it will not be necessary to haul gravel in.~~

~~TABLE IV-8~~

~~VALUES FOR MANNING'S N AND MAXIMUM PERMISSIBLE VELOCITY OF FLOW IN OPEN CHANNELS~~

| | Ditch lining | | Manning's n | $V_{max}$ fps[1] |
|---|---|---|---|---|
| 1. Natural earth | | | | |
| a. Without vegetation | | | | |
| (1) Rock | | | | |
| (a) Smooth and uniform ..... | | | 0.035-0.040 | 20 |
| (b) Jagged & Irregular ..... | | | 0.040-0.045 | 15-18 |
| (2) Soils | | | | |
| Coarse grained | | | | |
| Gravel and gravelly soils | | | | |
| Unified USDA | | | | |
| GW | Gravel | | 0.022-0.024 | 6-7 |
| GP | Gravel | | 0.023-0.026 | 7-8 |
| GM | Loamy Gravel | d<br>u | 0.023-0.025<br>0.022-0.020 | 3-5<br>2-4 |
| | Gravelly Loam | | | |
| GC | Gravelly Clay | | 0.024-0.026 | 5-7 |
| Coarse grained | | | | |
| Sand and sandy soils | | | | |
| SW | Sand | | 0.020-0.024 | 1-2 |
| SP | Sand | | 0.022-0.024 | 1-2 |
| SM | Loamy Sand | d<br>u | 0.020-0.023<br>0.021-0.023 | 2-3<br>2-3 |
| SC | Sandy Loam | | 0.023-0.025 | 3-4 |
| Fine grained | | | | |
| Silts and clays | | | | |
| | Clay Loam | | | |
| 50 CL | Sandy Clay Loam | | 0.022-0.024 | 2-3 |
| | Silty Clay | | | |
| | Silt Loam | | | |
| LL ML | Very Fine Sand | | 0.023-0.024 | 3-4 |
| | Silt | | | |
| 50 OL | Mucky Loam | | 0.022-0.024 | 2-3 |
| CH | Clay | | 0.022-0.023 | 2-3 |
| MH | Silty Clay | | 0.023-0.024 | 3-5 |
| LL OH | Mucky Clay | | 0.022-0.024 | 2-3 |
| Highly Organic | | | | |
| PT | Peat | | 0.022-0.025 | 2-3 |

[1]Maximum recommended velocities

~~Table IV-9~~
~~Sediment Yield~~
~~for~~
~~Disturbed Area~~

~~Using the Universal Soil Loss Equation:~~
~~A = RKLSCP; Where:~~

~~R = 16.53 from R = 27P2.2; $P_{2,6}$ = 0.8 inches~~
~~2,6~~
~~K = 0.50 from Table 5.5 (Ref. Below)~~
~~LS = 2.5 Length/Slope factors from Fig. 5-15 (Ref. Below)~~
~~Average Length = 1200'~~
~~Average Slope = 6.25%~~
~~CP = 1.0 from Table 5.A.1 (Ref. Below)~~
~~Based on combination of compacted surface and pavement with grouted ditches.~~

~~*A = 16.53 x 0.50 x 2.5 x 1.0 = 20.6625 tons/acre/year~~
~~Sediment Yield = A = 0.010 ac./ft./acre/yr.~~

~~Notes: (1) Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.~~
~~(2) Sediment Yield based on a weight of 100 lbs./cu. ft.~~

~~* Included for reference only. A more conservative figure of 0.05 ac. ft./acre has been used for Pond C, and 0.1 ac. ft./acre has been used for Pond E sizing.~~

~~Table IV-10~~
~~Sediment Yield~~
~~for~~
~~Undisturbed Areas~~

~~Using the Universal Soil Loss Equation:~~

~~A = RKLSCP; Where:~~

~~R = 16.53 from R = 27P,2.2,; $P_{2,6}$ = 0.8 inches~~
~~2,6~~

~~K = 0.37 from Table 5.5 (Ref. Below)~~

~~LS = Average Length/Slope Factor from Equation = 56.04~~

~~$LS = \left(\frac{L}{72.6}\right)^{0.5}\left(\frac{430X^2 + 30X + 0.43}{6.613}\right)$;~~

~~L = Avg. Slope Length = 1,000'~~

~~X = Sin 0; 0 = Avg. Slope Angle = 26.57° (50%)~~

~~C = 0.1 from Table 5.A.3 (Ref. Below)~~

~~25% Canopy Cover; 40% Ground Cover~~

~~P = 1 (No. Control Practice)~~

~~A = 16.53 x 0.37 x 56.04 x 0.1 = 34.275 tons/acre/yr.~~

~~Sed. Yield = $\frac{34.275 \times 2,000}{100 \times 43,560}$ = 0.016 ac. ft./acre/yr.~~

~~Notes: (1) Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.~~

~~(2) Sediment yield based on a weight of 100 lbs./cu. ft.~~

~~Table IV-11~~
~~Minesite Drainage Area Summary~~

| ~~Drainage No.~~ | ~~Area (ac.)~~ | ~~Type~~ | ~~Drains To:~~ |
|---|---|---|---|
| ~~1~~ | ~~4.23~~ | ~~Undisturbed~~ | ~~Pond E~~ |
| ~~2~~ | ~~5.40~~ | ~~"~~ | ~~Pond C~~ |
| ~~3~~ | ~~3.00~~ | ~~"~~ | ~~Old Works (Chidister Mine)~~ |
| ~~4~~ | ~~3.12~~ | ~~"~~ | ~~" " "~~ |
| ~~5~~ | ~~11.97~~ | ~~"~~ | ~~Pond C~~ |
| ~~6~~ | ~~2.06~~ | ~~"~~ | ~~Apex Mine~~ |
| ~~7~~ | ~~1.12~~ | ~~"~~ | ~~Old Works (Chidister Mine)~~ |
| ~~8~~ | ~~0.55~~ | ~~"~~ | ~~" " "~~ |
| ~~9~~ | ~~1.01~~ | ~~"~~ | ~~" " "~~ |
| ~~10~~ | ~~7.41~~ | ~~"~~ | ~~" " "~~ |
| ~~11~~ | ~~0.13~~ | ~~"~~ | ~~Pinnacle Mine~~ |
| ~~12~~ | ~~13.52~~ | ~~"~~ | ~~Pond C~~ |
| ~~13~~ | ~~6.20~~ | ~~"~~ | ~~Pond E~~ |
| ~~14~~ | ~~1.77~~ | ~~"~~ | ~~" "~~ |
| ~~15~~ | ~~12.21~~ | ~~Disturbed~~ | ~~" "~~ |
| ~~16~~ | ~~6.04~~ | ~~"~~ | ~~Pond C~~ |
| ~~17~~ | ~~4.07~~ | ~~"~~ | ~~Catch Basin B~~ |
| ~~18~~ | ~~1.28~~ | ~~"~~ | ~~Old Works (Chidister Mine)~~ |
| ~~19~~ | ~~0.81~~ | ~~"~~ | ~~Pinnacle Mine~~ |
| ~~20~~ | ~~4.68~~ | ~~"~~ | ~~Pond C~~ |
| ~~21~~ | ~~3.25~~ | ~~"~~ | ~~Old Works (Chidister Mine)~~ |
| ~~22~~ | ~~1.23~~ | ~~"~~ | ~~Apex Mine~~ |
| ~~Total =~~ | ~~95.06;~~ | | |

~~Disturbed = 33.57 Acres;~~
~~Undisturbed = 61.49 Acres~~

~~Notes: (1) Areas disturbed from Plate 8 (and Plate 9 as~~

~~necessary).~~

~~(2) Does not include diverted undisturbed drainage.~~

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~~Typical Diversion Ditch~~
~~Figure IV-3~~

~~INSERT ORIGINAL DRAWING~~

~~Typical Section for Trapezoidal Ditch~~
~~Figure IV 3A~~

~~INSERT ORIGINAL DRAWING~~

~~Undisturbed Diversion Typical~~
~~Figure IV-4~~

~~INSERT ORIGINAL DRAWING~~

~~Typical Section of Emergency Spillway~~
~~Figure IV-6~~

~~INSERT ORIGINAL DRAWING~~

~~Loose Rock Check Dam~~
~~(Restored Main Drainage Channel)~~
~~Figure IV-8~~

~~INSERT ORIGINAL DRAWING~~

~~Loose Rock Check Dam~~
~~(Restored Side Drainage Channel)~~
~~Figure IV-9Restored Channel Typicals~~
~~Figure IV-09~~

~~INSERT ORIGINAL DRAWING~~

~~Restored Channel Typicals~~
~~Figure IV-10~~

~~INSERT ORIGINAL DRAWING~~

~~Figure IV-12~~

~~INSERT ORIGINAL DRAWING~~

~~Figure IV-13~~
~~Sampling Access Ramp~~

~~INSERT ORIGINAL DRAWING~~

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~~Figure IV-14~~
~~Floating Decant Typical~~

~~INSERT ORIGINAL DRAWING~~

## R645-301-512.250. PRIMARY ROADS

**Roads**

All roads within the permit area are classified as "Primary Roads" in accordance with R614-301-527.100 or "Ancillary Roads" in accordance with R645-301-527.130. Roads on the site are of 2 typical designs:

1. Single lane, gravel or asphalt surfaced roads approximately 12 - 15' wide; and

2. Double lane, either gravel or asphalt surfaced roads, approximately 26' wide.

Although all roads on site are not used for coal hauling, each primary road is constructed to the respective typical design and dimensions shown on Plate 35.

All roads are shown on Plate 6 and Plate 8. Specifics about the road are described individually and include road widths, gradients and surfaces. Drainage ditches and drainage structures for each road (disturbed area ditches or culverts) can be found in Tables IV-2 through IV-8.

Because of the variance in road types, widths and lengths, the roads have been designated on Plate 6 with numbers (i.e. PR-1= Primary Road 1, Ar-1= Ancillary Road 1) to facilitate the description of each.

All paved roads within the permit area are maintained by Carbon County. Maintenance measures include tarring and chipping as well as pothole repair. All decisions regarding maintenance of the paved roads are made by Carbon County Road Department. Gravel roads within the permit area are maintained by adding new gravel as necessary and treating with magnesium chloride. Drainage ditches along roadways are generally stable as they have reached bedrock; however, rocks and other debris are removed with graders and/or loaders as needed.

Steep slope cuts on the mining property, including those for roads, will be reclaimed in accordance with the approved mining and reclamation plan. All road cuts will be backfilled to the extent practical; please refer to Andalex's approved reclamation plan (Plates 14 & 15).

~~Primary Road 1 (PR-1) This road connects Carbon County Road 199 to the two lane paved road which travels past the Aberdeen Mine facilities, past the office driveway and bath house drive ways and~~

past the Pinnacle truck loadout. This is an asphalt surfaced road approximately 26 feet wide and 2700 feet long. The grade on PR-1 ranges from 4% to 8%. It is used for hauling coal and for men and material access to the mines.

Primary Road 2 (PR-2) This road begins at the end of PR-1 and continues north past the shop/warehouse and ends at the eastern side of the Apex Mine stockpile. This is a two lane gravel surfaced road which is approximately 26 feet wide and 1400 feet long. It is treated annually with Magnesium Chloride. The grade on this stretch of road ranges from 5% to 9%. It is used for hauling coal and equipment as well as providing men and materials access to the mines.

Primary Road 3 (PR-3) This road provides access to the Aberdeen Mine truck loadout. It is a single lane gravel surface road approximately 15 feet wide and 590 feet long. It is treated with Magnesium Chloride annually. The grade on this road ranges from 0% to 4%.

Primary Road 4 (PR-4) This road provides access for the coal haul trucks to the Pinnacle Mine truck loadout. It is also crossed to access the bath house parking area. This is a single lane, paved surface road which is approximately 15 feet wide and 500 feet long. The grade on this loop ranges from 0% to 9%.

Primary Road 5 (PR-5) This road provides access for the coal haul trucks coming off of PR-2 to the Apex Mine truck loadout. It is a single lane gravel surfaced road approximately 15 feet wide and 425 feet in length. The grade on this road ranges from 0% to 7%. It is treated annually with Magnesium Chloride. The three truck loadout roads are also accessed by front end loaders for the purpose of cleaning up occasional coal spills.

Primary Road 6 (PR-6) This is an access road which leads to the main office parking area. It is a single lane, paved surface road which is approximately 15 feet wide and 600 feet long. The average grade of this road is 5% to 7%.

Primary Road 7 (PR-7) This is an access road for mining equipment. It provides heavy equipment access to and from the Aberdeen Mine. It begins at the south inlet to pond C and it ends at the bath house parking area. It is a gravel surfaced road and is approximately 12 feet wide and 450 feet long. It has grades which range from 4% to 14%. Magnesium Chloride is applied

annually.

Primary Road 8 (PR-8) – This road leads from the fuel storage area at the Pinnacle Mine facility to the oil storage area near the upper Pinnacle portals. This is a single lane, gravel surface road approximately 15 feet wide and 325 feet long. The grade on this road has a range of 9% to 11%. It is treated with Magnesium Chloride annually.

Primary Road 9 (PR-9) – This road leads from PR-2 and turns west over the top of the Apex Mine conveyor belt. The road leads to the Apex Mine material storage area, adjacent to the mine fan. This is a single lane gravel surfaced road which is approximately 15 feet wide and 200 feet long and includes a steel deck bridge over the mine conveyor. The grade on this road ranges between 0% and 8%, and the gravel is treated with Magnesium Chloride.

Primary Road 10 (PR-10) – This is an access road which leads from the upper Aberdeen Mine material storage area down to the Aberdeen Mine stockpile pad. This is a short stretch of road which is approximately 12 feet wide and 150 feet long. It is a single lane road with an average grade of 12% to 15%.

Primary Road 11 (PR-11) – This is a very short access road which accesses the bath house pad from two directions; both from PR-1 and from PR-4. This road is approximately 12 feet wide and 150 feet long. It is a single lane road with a grade of 0% to 6%. This road is treated with magnesium chloride annually.

Ancillary Road 1 (AR-1) – This is an access road which leads from the south Aberdeen intake portal to the Aberdeen mine fan. It is a single lane road which has a surface of sandstone. The road is used primarily for access to the fan, water system and conveyor. This road is approximately 20 feet wide and 400 feet long. There is a steel deck bridge over the Aberdeen mine conveyor. The grade on this road ranges from 8% to 10%.

Ancillary Road 2 (AR-2) – This road leads from the upper Pinnacle Mine intake portals to the Pinnacle Mine fan. It is a single lane gravel surfaced road which has a steel deck bridge where the road crosses the Pinnacle Mine conveyor. Its primary use is to access the Pinnacle Mine fan. It is approximately 12 feet wide and 250 feet long. The grade on this road ranges from 0% to 12%.

Ancillary Road 3 (AR-3) – This road leads from PR-2 up to the

~~Apex material storage area (Gun range). This is a single lane gravel surface road which is approximately 12 feet wide and 175 feet long. The grade on this road is on an average of 9%. It is treated with Magnesium Chloride annually. It is used primarily for access.~~

~~Ancillary Road 4 (AR-4) This road is access from the upper Apex material storage area to the Powder Magazines. This road continues beyond the north end of our permit area but it becomes a private road beyond the permit area. This is a single lane dirt road which is approximately 12 feet wide and 150 feet long. The grade on this short stretch of road is 5% to 8%.~~

~~Ancillary Road 5 (AR-5) This road is access from Carbon County Road 299 to the left hand fork installation. This existing road will be upgraded adequately for maintenance and emergency access only. It will be equipped with a locked gate. This is a single lane dirt road which is approximately 15 feet wide and 4000 feet long. There will be 3 or 4 locations specifically widened so that two vehicles may pass. The grade on this stretch of road ranges from 0% to 15%. This road will be reclaimed upon cessation of mining pending the approval of Mrs. Gladys Artman. Revised 8/8/95~~
~~Andalex commits to repair roads damaged by a catastrophic event as soon as practical R645-301-534.100 Andalex has located, designed, constructed, used and maintained Primary Roads so as to prevent or control damage to private and public property. Andalex has used non acid or non toxic forming materials in road surfacing. Roads have, at a minimum a static safety factor of 1.3 on embankments. Andalex has a schedule and plan to remove roads that will not be retained as part of the approved post mining land use. Ancillary roads will be traveled only by light vehicles for routine access. Occasionally, they will be traveled by larger equipment but probably only in emergency or repair situations, as 2 of the 4 Ancillary Roads lead to fan installations. All Primary Roads will meet the requirements of R645-301-358, R645-301.527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-542.600 and R645-301-762. Primary Roads will be located in so far as practical on the most stable available surfaces. The roads are surfaced with rock, gravel or asphalt according to R645-301-534.320. They will be routinely maintained, and have culverts which are designed and installed as necessary according to the requirements of R645-301-534.340.~~

All outside conveyor systems at the three minesites consist of rigid steel structure, 30 degree troughing idlers and 42 inch rubber conveyor belt. The stockpile conveyors each drop into a central pile, which in turn gravity feed truck loadout conveyors underneath each stockpile. The truck loadout conveyors are equipped with belt scales for making legal highway loads. All truck loadouts are also equipped with chutes to minimize dust.

## R645-301-512.260. VARIANCE FROM APPROXIMATE ORIGINAL CONTOUR

Only cut slopes at Apex, Pinnacle and Aberdeen will vary from the AOC. Slopes will be backfilled to the extent possible.

## R645-301-513. COMPLIANCE WITH MSHA REGULATIONS AND MSHA APPROVALS

### Ventilation

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and dust; there has been small amounts only found to date in any of the old works or new faces. The longwall faces will be ventilated with a live brattice system consisting of a line curtains. The conveyor systems will be isolated from intake and return except in 2-entrygate systems when the belt will double as the intake. All ventilation requirements of the Coal Mine Health and Safety Act will be met. This ventilation plan will be strictly adhered to, in order to insure safety of all personnel. Please note that the Centennial Seam mining area is ventilated by the existing Pinnacle Mine fan system.

### General Safety Measures

A great emphasis is put on assuring a safe mine operation and the mine and surface facilities will be operated within prudent standards to insure the health and safety of all employees. The facilities will be carefully inspected by company trained safety engineers and state and federal mine inspectors.

The operation will abide by Utah State Coal Mine Regulations and the 1969 Federal Coal Mine Health and Safety Act. In addition, these regulations will be supplemented by a company safety policy. Various training programs will be utilized such as the

following:

- Methane Measurements
- Roof and Rib Control
- Oxygen Deficiency Testing
- Ventilation
- First Aid
- Mine Rescue
- Mine Electrical Certification
- Self Rescue Training
- Use of Personal Protective Equipment
- Recognition of Electrical Hazards
- General Accident Prevention
- Mine Communications
- Job Safety Training

Many of the training programs will run continuously, such as those involving roof control and ventilation. Other programs are held annually with many oriented toward new employees.

All Andalex Mines operate under an approved M.S.H.A. roof support plan which calls for bolting on five foot centers with a minimum 42" bolt length in our development entries. Roof control in the longwall faces will be accomplished using hydraulic shields. The roof in all four seams is a massive sandstone (60'+) and offers excellent support in itself. The old mine workings which were rehabilitated for the Pinnacle Mine main entries had stood unsupported for 40 years. This roof control plan will be strictly adhered to, in order to insure the safety of all personnel.

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**Coal Refuse**

Please refer to Plate 6 for location of disposal areas.

## R645-301-513.500. MINE OPENINGS

**Portals**

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two

air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine.

The portal mine pads consist of approximately The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

## R645-301-513.600. DISCHARGES INTO AN UNDERGROUND MINE

Andalex has approved water rights for collection of disturbed area drainage for collection in the underground workings. This is used as needed.

## R645-301-513.700. SURFACE COAL MINING CLOSER THAN 500 FEET TO AN ACTIVE UNDERGROUND MINE

N/A

## R645-301-513.800. COAL MINE WASTE FIRES

N/A

## R645-301-514. INSPECTIONS

N/A

## R645-301-514.100. EXCESS SPOIL

N/A

~~R645-301-514.110. QUARTERLY INSPECTIONS AND CRITICAL CONSTRUCTION PERIODS~~

~~N/A~~

~~R645-301-514.111. FOUNDATION PREPARATION, TOPSOIL REMOVAL~~

~~N/A~~

~~R645-301-514.112. UNDERDRAINS AND PROTECTIVE FILTER SYSTEMS~~

~~N/A~~

~~R645-301-514.113. FINAL SURFACE DRAINAGE SYSTEMS~~

~~N/A~~

~~R645-301-514.114. FINAL GRADED AND REVEGETATED FILL~~

~~N/A~~

~~R645-301-514.120. CERTIFIED REPORTS~~

~~N/A~~

~~R645-301-514.130. CERTIFIED REPORTS ON DRAINAGE SYSTEM AND PROTECTIVE FILTERS~~

~~N/A~~

~~R645-301-514.131. PHASES OF CERTIFICATION~~

~~N/A~~

~~R645-301-514.132. UNDERDRAINS~~

~~N/A~~

~~R645-301-514.133. PHOTOGRAPHS~~

~~N/A~~

## ~~R645-301-514.140. INSPECTION REPORTS~~

~~N/A~~

## ~~R645-301-514.200. REFUSE PILES~~

~~N/A~~

## ~~R645-301-514.210. REGULAR INSPECTIONS~~

~~N/A~~

## ~~R645-301-514.220. CRITICAL CONSTRUCTION PERIODS~~

~~Construction of the left fork break-out and fan will occur during the Golden Eagle off-nesting period (January 15 through July 15).~~

## ~~R645-301-514.221. FOUNDATION PREPARATION AND TOPSOIL REMOVAL~~

~~N/A~~

## ~~R645-301-514.222. UNDERDRAINS~~

~~N/A~~

## ~~R645-301-514.223. FINAL SURFACE DRAINAGE SYSTEMS~~

~~N/A~~

## ~~R645-301-514.224. FINAL GRADING AND REVEGATATION~~

~~N/A~~

## ~~R645-301-514.230. CERTIFIED REPORT~~

~~N/A~~

## ~~R645-301-514.240. SEPARATE CERTIFICATION FOR EACH PHASE OF CONSTRUCTION~~

~~N/A~~

## ~~R645-301-514.250. ON-SITE COPY OF CERTIFICATION REPORTS~~

~~N/A~~

## ~~R645-301-514.300. IMPOUNDMENTS~~

~~See R645-301-512.240.~~

## ~~R645-301-514.310. CERTIFIED INSPECTION~~

~~This is performed annually by a registered P.E.~~

## ~~R645-301-514.311. COMPLETION OF CONSTRUCTION AND YEARLY INSPECTIONS~~

~~See R645-301-514.310.~~

## ~~R645-301-514.312. CERTIFIED REPORTS~~

~~Certified reports are kept on site.~~

## ~~R645-301-514.313. ON-SITE COPY OF CERTIFICATION REPORTS~~

~~See R645-301-514.312.~~

## ~~R645-301-514.320. WEEKLY INSPECTIONS~~

~~N/A~~

## ~~R645-301-514.330. QUARTERLY INSPECTIONS~~

~~These are conducted quarterly by on site personnel to evaluate erosion, stability, and other items.~~

## ~~R645-301-515. REPORTING AND EMERGENCY PROCEDURES~~

## R645-301-515.100. SLIDES AND OTHER DAMAGE

**Schedule of Construction, Mine Development, Mining and Reclamation**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases. There will be no additional construction activities or surface disturbance whatsoever in Hoffman Creek or Alrad Canyon.

However, Andalex does intend to add a fan installation in the left hand fork of Deadman Canyon at some point in time. This installation will be according to measures outlined by the Bureau of Land Management as part of Right of Way U 64158. (Copy of Right of Way is included in Appendix B.) Andalex will submit detailed plans for this installation at the appropriate time. The location of this breakout is shown on Plate 29 (R.O.W.). Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with three production units and the longwall scheduled to be operating by mid 1994. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market. Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. Although no significant erosion problems have occurred, Andalex will notify the Division by the fastest available means of any slides or other damage and comply with any remedial measures required by the Division (generally, reporting will be accomplished by telephone).

Andalex will cover acid or toxic forming materials if any are encountered.

Andalex will advise the Division in the event of a temporary

shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-515.200. IMPOUNDMENT HAZARDS

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing (Pond C).

## R645-301-515.300. TEMPORARY CESSATION OF OPERATIONS

Whenever it is known that operations are to be temporarily ceased for more than 30 days, Andalex Resources will submit to the Division a notice of intention to cease or abandon the operations, in accordance with R645-301-515.320 and to MSHA standards.

This notice will describe mitigation measures to be employed in accordance with the terms and conditions of the permit approval, such as a statement of the number of surface areas involved in the cessation, extent of sub-surface strata, prior reclamation efforts accomplished on the property, and identification of all backfilling, regrading, rEVEGATATION, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

Temporary closing of underground workings will be accomplished with chain link fence material as recommended by MSHA. This prevents access by unauthorized individuals during idol periods. It is not anticipated that once Andalex reaches its peak production that this will occur.

If underground openings are to remain inactive for a period greater than 90 days, such openings will be temporarily closed

~~off from access. Such closures will consist of a chain link or other substantial wire mesh fabric fence placed over the portals to prevent public access while allowing for air flow. Locked gates may be installed in the portal to allow for mine inspection.~~

~~HISTORICAL NOTE: On June 11, 2008 the company requested permission from the BLM to modify the R2P2 to allow the mine to be temporarily idled due to economic factors. The BLM approved the modification on June 20, 2008. The portals were then sealed to prevent public access. The idle status has continued for more than 30 days. The surface facilities are secured by a security guard at all times. At the time of the temporary idling, the permit area included 6516.91 acres, and the total disturbed area included 52.64~~included 47.19 acres (minesite = 34.2 acres, Left Fork fan and access road = 1.45 acres, and ~~seventeen~~ GVH sites = ~~17~~11.54 acres). The subsurface strata extends from zero at the outcrop to more than 3000' under the northernmost longwall panels, and the horizontal extent of the subsurface strata over the permit area is about 21,432' measured north-south and about 21,768' measured east-west. There has been no reclamation done at the site as a result of the temporary closure, although two GVH sites were reclaimed in the meantime. There are no water treatment activity going on at the mine.

The normal required environmental monitoring has continued since the mine has been idled, including hydrologic monitoring of springs, seeps and wells, UPDES monitoring, subsidence monitoring, and raptor surveys. The UPDES outfall points continue to be monitored but there has been no reported flow since the mine was shut down and the pumps were shut off. Nearly all water in the mine was created from the floor strata as mining occurred, and would normally dry up after the mine advanced several hundred feet. None of the flow was attributed to geological structures such as faults or dikes. Since all mining was advancing down-dip the water had to be continually pumped out to the surface since there were no sumps constructed below the workings to collect and store the water. Now that mining has stopped there is no reason to believe that the floor strata will continue to make water, especially at the liberation rate of 800 gpm typical of the operational period. Also, since all the water was being made in the extreme down-dip section of the mine, the water that does continue out of the floor will fill up the bottom of the mine until it reaches a level of potentiometric equilibrium. The portals are at the highest end of the mine, and

locations.

## R645-301-521.125. SEDIMENTATION PONDS AND IMPOUNDMENTS

See ~~R645-301-512~~R645-301-733.~~240~~.

## R645-301-521.130. LANDOWNERS AND RIGHT OF ENTRY AND PUBLIC INTEREST MAPS

The leases for which we have the legal right of entry are shown on Plate 4. See Appendix R.

## R645-301-521.131. SURFACE AND SUBSURFACE OWNERS

**Owners of Record of Surface and Subsurface Contiguous Areas**

~~Names and addresses of all owners of record for all surface and subsurface areas contiguous to and within the permit area are listed below and indicated on Plates 2 and 3.~~

~~**Subsurface Owners**~~

~~Franklin Real Estate Company (American Electric Power)~~
~~#2 Broadway~~
~~New York, New York (contiguous)~~

~~Bureau of Land Management~~
~~Utah State Office~~
~~136 East South Temple~~
~~Salt Lake City, Utah 84111 (contiguous & within)~~

~~State of Utah~~
~~School Trust Lands Administration~~
~~355 West North Temple~~
~~3 Triad Center, Suite 400~~
~~Salt Lake City, Utah 84180 (contiguous)~~

~~Andalex Resources, Inc.~~
~~PO Box 902~~
~~Price, Utah 84501 (within)~~

~~Sunedco Coal Company~~

~~7401 West Mansfield Avenue~~
~~Suite 418~~
~~P.O. Box 35 B~~
~~Lakewood, Colorado 80235 (contiguous & within)~~

~~Zion Security Corp.~~
~~10 East South Temple~~
~~Salt Lake City, Utah 84111 (within)~~

~~Mathis Land Co.~~
~~Sunnyside Star Route~~
~~Price, Utah 84501 (contiguous & within)~~

~~**Surface Owners**~~

~~Bureau of Land Management~~
~~Utah State Office~~
~~136 East South Temple~~
~~Salt Lake City, Utah 84111 (contiguous & within)~~

~~Gladys R. Artman~~
~~P.O. Box 22~~
~~Mountain City, Georgia 30562 (contiguous & within)~~
~~F. and D. Shimmin~~
~~711 North 5th East~~
~~Price, Utah 84501 (contiguous)~~

~~Sunedco Coal Company~~
~~7401 West Mansfield Avenue~~
~~Suite 418~~
~~P.O. Box 35 B~~
~~Lakewood, Colorado 80235 (contiguous & within)~~

~~R. and E. Nelson~~
~~583 Sundial Drive~~
~~Moab, Utah 84532 (within)~~

~~D. Mathis~~
~~Sunnyside Star Route~~
~~Price, Utah 84501 (contiguous & within)~~

~~J & S Critchlow (Cave, et.al)~~
~~144 South 1650 East~~
~~Price, Utah 84501 (contiguous & within)~~

~~Andalex Resources Inc.~~
~~P.O. Box 902~~
~~Price, Utah 84501 (within)~~

~~Zion Security Corporation~~
~~10 East South Temple~~
~~Salt Lake City, Utah 84111 (within)~~

~~State of Utah~~
~~School Trust Lands Administration~~
~~355 West North Temple~~
~~3 Triad Center, Suite 400~~
~~Salt Lake City, Utah 84180 (contiguous & within)~~

See R645-301-112.500

## R645-301-521.132. RIGHT TO ENTER AND CONDUCT MINING ACTIVITIES

See R645-301-114.230.

## R645-301-521.133.1 OPERATIONS WITHIN 100 FEET OF ROAD RIGHT-OF-WAY

County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' minesite (Plate 1).

## R645-301-521.133.2 RELOCATING A PUBLIC ROAD

N/A

## R645-301-521.140. MINE AND PERMIT AREA MAPS

**Cross Sections, Maps, and Plans**

Most of the cross sections, maps, and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal in Volume II.

All categories within this section have been addressed. Specifically,

a) Plates 26, 27, and 28 and 40 show all the test borings locations and elevations. Specific information relating to these drill holes and the strata encountered can be found in Appendix E (coal quality, description of other strata).

b) Monitoring stations for water quality are shown on Figure IV-11. Including the new 12-11 in Alrad Canyon. Fish and wildlife monitoring stations were not set up for this application. However, refer to Plate 34 which depicts wildlife distribution. Air quality monitoring was not required for this application. Figure 6 in Appendix L shows proposed monitoring stations. Andalex has adhered to the locations shown on Figure IV-11 which is included in

Andalex's operating plan.

c) Refer to Appendix E for specific drill hole lithologies as well as data on quality and chemical characteristics.

d) Crop lines and strikes and dips can be found on the coal thickness isopachs in Volume II, Plates 26, 27, and 28.

e) All old workings in the three coal seams to be mined are shown on Plates 29, 30, and 31. There are no old workings in the Centennial Seam.

f) All subsurface water on the permit area exists in perched aquifers. The Aberdeen sandstone is the lowest water bearing unit within the permit area and is discussed in Geology. The only water well drilled on the property which has been used with any frequency (well #1) has not depicted any seasonal variation. It is always a low producer.

g) There are no surface waters within the permit area. All drainages (natural) are shown on the topography on Plate 21. All constructed drainages are shown on Plates 6 and 7. There are no irrigation ditches. Appendix L, which is the Hydrologic Inventory, contains Figure 4 which clearly depicts the location of springs in the permit area and adjacent areas. This figure, along with Figures 5 and 6, depict the areal extent of the inventory.

h) N/A

i) Plate 6 shows the location of development waste stored in an area which was previously used as a sediment pond. Plate 6 now also shows the location of a new area above the Apex Mine which can be used for temporary and permanent storage of development waste such as sediment pond material. All dams and impoundments are shown on Plates 6 and 7, and detailed on Plates 11, 12, and 13. There are no other water treatment or air pollution control facilities on the permit area.

j) There are no oil or gas wells within the permit area. Three water wells are shown on Plate 6. Well number 1 is 220 feet deep; number 2 is 100 feet deep, and number 3 is 120 feet deep.

k) Plates 14 and 15 accurately depict the area currently affected by mining as well as the area to be affected. They show the slopes as they exist as well as after construction and upon final reclamation.

Operation Plan: Maps and Plans

1) Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal in Volume II.

All necessary maps and plans to complete this section are found in Volume II of the submittal and also in the appendices of Volume I specifically,

a) Underground coal mining activities to be conducted and lands to be affected by surface facilities are shown on Plates 6, 29, 30, 31 and 41.

b-1) Buildings, utilities, and facilities are depicted on Plates 6 and Plate LF-1.

2) The area to be affected is shown on several plates, including 4, 5, 6, 29, 30, 31 and 41. These last four plates show the sequence of mining in the four seams over the five year term of the permit. Plate 30 has been revised to show immediate development in the Gilson Seam as soon as approval is achieved. Reclamation will not take place until after all four seams are mined out. This activity is depicted on Plates 15, 16, 17, and 20.

3) Plates 5 depict the entire disturbed area for which a performance bond is posted. The acreage is shown on Plate 5.

4) Coal storage and loading areas are shown on Plates 6. No cleaning takes place.

5) Plates 6 show a non-coal waste storage area as well as topsoil storage areas. Plates 36 and 37 show the topsoil piles in detail.

6) All water diversions and other water facilities are shown on

Plates 6, 8, 9, 11, 12, and 13. Also, typical diversions for disturbed area and undisturbed areas are shown in the Sedimentation and Drainage Control Plan.

Diversion ditches as they exist are shown on Revised Plate 6. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

Diversions and other hydrologic controls are shown on Plates 6, 7, 8, 11, 12 and 13, for the Aberdeen Mine. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

Plate 16 has been revised to show drainage during the reclamation period before and after removal of sediment ponds (Phase I).

Plate 17 shows final drainage details.

Plate 9 shows delineations of watershed areas.

The main culvert will be removed entirely during the reclamation-earthwork phase except under Pond "E". Pond "E" will be enlarged, and the entire drainage area above will flow into the restored channel RC-1 and through Pond "E-PM". Once ~~rEVEGATATION~~revegetation and water quality standards have been met, Pond "E-PM" and the culvert will be removed and reclaimed.

7) There is no coal processing waste at the Centennial facility There are no pollution control facilities other than sedimentation ponds on the permit area. Please note that waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

8) Specific facilities are not used to protect or enhance wildlife with the exception of the powerline which was built according to strict guidelines issued by the Division of Wildlife Resources and the U.S. Fish and Wildlife Service regarding raptor protection. The powerline design is included in Volume I as Appendix I (powerline design). Also, speed limits are posted within the permit area.

9) The two powder magazines are shown on Plates 6.

10) Plates 6, 8, and 9 show these facilities associated with protection of the hydrologic balance including sedimentation ponds and storage of non-coal waste. There are no permanent impoundments, or coal processing wastes. Underground development waste has been generated while putting in the Aberdeen portals, and has been used as stock pile pad material at the Aberdeen Minesite. The volume of this material is minimal.

11) Plates 16 and 17 show the final reclamation contours and configuration of the surface for Phases I and II respectively.

12) Subsidence monitoring points are shown on Plate 25. ~~An~~ aAdditional station ~~was~~s have been added to Plate 25 to cover ~~pillar extraction on the new Hoffman Creek Lease. Also a new station has been added over the Graves Lease.~~ long wall mining on the new Kenilworth Lease. Water monitoring locations are shown on ~~Figure IV-11. A new water monitoring station will be added over the Graves Lease, however and a new station has been added at the mouth of Alrad Canyon (12-1) for the AEP lease.~~Plate 7-1.

13) There will be no facilities left on the permit area permanently excepting possibly the road through the site. After the completion of underground mining, all facilities will be removed with the exception of one downstream sedimentation pond. This pond will be removed upon final reclamation.

c) Maps, plans, and cross sections required under b)(5),(6),(10), and (11) have been prepared under the direction of, and certified by a registered professional engineer. Assistance has come from a registered land surveyor.

1) Detailed maps, plans, and cross sections for our sediment ponds, Plates 11, 12, and 13 have been certified by a registered professional engineer.

2) Andalex has not used any excess spoil or underground development waste maps or cross sections. A map (uncertified) depicting the location of non-coal waste storage is included as Plate 6.

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See R645-301-521.200.

## R645-301-521.252. PERMIT AREA PERIMETER FOR SURFACE MINING OPERATIONS

N/A

## R645-301-521.260. BUFFER ZONE MARKERS

N/A

## R645-301-521.261. BOUNDARY MARKERS FOR SURFACE ACTIVITIES OF UNDERGROUND OPERATIONS

They consist of orange "Tee" posts which are clearly visible from one marker to the next.

## R645-301-521.262. BOUNDARY MARKERS FOR SURFACE MINING OPERATIONS

N/A

## R645-301-521.270. TOPSOIL MARKERS

See R645-301-521.200.

## R645-301-522. COAL RECOVERY

**Cycle and Sequence of Mining**

~~As there are four coal seams of minable thickness on the leases, a systematic plan of mining will be followed to assure maximum recovery of the coal reserves. When mining is progressing concurrently in two seams, the room and pillar design and layout will be columnized to assure maximum roof support. Over the life of mine, approximately 28 million tons of coal will be mined. We are currently mining at 0.8 million tpy. Of the 2.3 million tons in-place on the Incidental Boundary Change, much of the coal will be left as part of a barrier pillar according to our approved mining plan.~~ The panel-barrier-panel mine design is the only feasible and approvable mine plan. The BLM and MSHA have agreed and the R2P2 reflects this design ~~Appendix U contains ANDALEX's approved~~The R2P2~~ and the most recent modification. This~~ Plan contains specific timing, sequence and method details for recovery of this resource. The panel-barrier design will

## R645-301-523. MINING METHOD

The initial underground mining operation known as the Pinnacle Mine, located on the Zion's fee property, began production on October 3, 1980. It consisted of a single unit's production with an output projected to be approximately 200,000 tons per year and with 20 employees. The mine moved onto the federal leases and with the addition of the Apex Mine in 1982, the Centennial Project now has a production capacity of 1,800,000 tons per year. As there are four minable seams present, the Aberdeen, Gilson, Centennial, and Lower Sunnyside, in ascending order, mining plans call for simultaneous operation of a mine in each seam. The existing operations are in all four seams. The Centennial Seam has been accessed via rock tunnels from the existing Pinnacle Mines.

Mining will consist of the underground method of coal extraction using continuous miners, shuttle cars, roof bolters and feeders and longwall equipment consisting of a shearer, armored face conveyor and shield type roof supports. Room and pillar longwall panel development will be employed with final overall extraction estimated to be about 60 percent of the reserve. See plate 29 for cover isopachs.

Coal ~~is presently being~~will be loaded into 40-ton coal trucks and hauled to ~~Wildcat Jct. near Helper. All seams will be mined using continuous miners and longwall extraction.~~ a unit train loadout in the near vicinity.

## R645-301-523.100. SURFACE MINING OPERATIONS WITHIN 500 FEET OF AN UNDERGROUND MINE

N/A

## R645-301-523.200. EXCEPTIONS TO SURFACE MINING OPERATIONS WITHIN 500 FEET OF UNDERGROUND WORKINGS

N/A

## R645-301-523.210. RESOURCE RECOVERY OF ELIMINATION OF HAZARDS

N/A

## R645-301-524. BLASTING AND EXPLOSIVES

All blasting performed underground will conform to both state and federal regulations governing explosives and blasting in underground coal mines. ~~The rock tunnels to the Centennial Seam were constructed by professional hard rock mining company.~~

A powder magazine has been set up on one of the surface pads, located in a remote area. It is built to conform to all regulations, such as segregation, regarding such a structure (see plate 6). All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved and who possess a valid certificate as required by Title 30 of the Code of Federal Regulations. If any additional surface blasting is required, powder magazines at that location will be in a remote site and will comply with all federal and state regulations.

If required, MSHA will be notified if surface blasting will be performed within 500 feet of an active coal mine. If necessary, joint approval will be obtained from the Division and MSHA.
Revised 9/12/95

## R645-301-524.100. BLASTER CERTIFICATION

All blasting conducted on the surface will be performed by a DOGM- certified blaster.

## R645-301-524.110. CERTIFIED BLASTER

See 301-524.100.

## R645-301-524.120. BLASTING CERTIFICATES

Blasting certificates will be kept on site during blasting operations.

## R645-301-524.130. FIRING OF A BLAST

A blaster and at least one other person will be present at the firing of the blast.

## R645-301-524.140. RESPONSIBILITY

The certified blaster will be familiar with the blasting plan and performance standards, and will give on-the-job training to uncertified persons.

## R645-301-524.621. MAXIMUM AIR BLAST LIMITS

See 301-524.600. Air blasts will not exceed the maximum limits at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area. The blast will be located in a remote steep-sided canyon and will not allow air blasts to affect any of the above items.

## R645-301-524.622. PREVENTION OF DAMAGE

See 301-524.600. and 621.

## R645-301-524.630. MONITORING

See 301-524.600. Monitoring will be conducted if required by the Division.

~~Revised 9/12/95~~

## R645-301-524.631. MEASUREMENTS AND LOCATIONS

See 301-524.630.

~~Revised 9/12/95~~

## R645-301-524.632 MEASURING SYSTEMS

See 301-524.630.

## R645-301-524.633. FLY ROCK

The blast is designed to contain all fly rock and cannot travel beyond the permit boundary.

## R645-301-524.640. GROUND VIBRATION

Due to the location of the blast there is no potential for damage to any structure as the result of ground vibration.

## R645-301-524.641. GENERAL

See 301-524.633.

## R645-301-524.662. PARTICLE VELOCITY AND VIBRATION FREQUENCY LEVELS

See 301-524.643.

~~Revised 9/12/95~~

## R645-301-524.670. DAMAGE PROTECTION

See 301-524.643.

## R645-301-524.680. SEISMIC MONITORING

See 301-524.643.

## R645-301-524.690. STRUCTURES NOT SUBJECT TO AIR BLAST AND GROUND VIBRATION LIMITS

See 301-524.643.

## R645-301-524.700. RECORDS OF BLASTING OPERATIONS

Records will be kept of all blasting operations as required by the regulations.

## R645-301-524.710. RECORDS

See R645-301-524.700

## R645-301-524.711. OPERATOR IDENTIFICATION

See R645-301-524.700

## R645-301-524.712. BLAST LOCATION AND SCHEDULE

See R645-301-524.700

## R645-301-524.713. BLASTER CERTIFICATION

See R645-301-524.700

## R645-301-524.720. NEAREST DWELLING OR FACILITY

## R645-301-524.750. SEISMOGRAPHIC AND AIR BLAST INFORMATION

See R645-301-524.700

## R645-301-524.751. INSTRUMENTATION

See R645-301-524.700

## R645-301-524.752. LOCATION OF INSTRUMENTATION

See R645-301-524.700

## R645-301-524.753. PERSONS COLLECTING DATA

See R645-301-524.700

## R645-301-524.754. PERSONS ANALYZING DATA

See R645-301-524.700

## R645-301-524.755. VIBRATION AND/OR AIR BLAST LEVEL RECORDED

See R645-301-524.700

## R645-301-524.760. UNSCHEDULED BLASTS

See R645-301-524.700

~~Revised 9/12/95~~

## R645-301-524.800. COMPLIANCE WITH OTHER APPROPRIATE REGULATIONS

Andalex Resources will comply with appropriate Utah and federal regulations in the use of explosives.

Subsidence has not been detected at any monitoring location currently in place at Andalex, including two pillar extraction sections in close proximity to our initial longwall panel in the Gilson Seam. These pillar sections extracted 90% of the coal which is similar to longwall (See IBC PHC for additional comments on subsidence. The panel-barrier design will minimize the probability of subsidence.~~)~~ ~~extraction.~~ This fact, in combination with research performed by the Bureau of Mines will justify Andalex using a maximum angle of draw on this property of 20°. The Bureau of Mines performed extensive research at Price River Coal Co. (AEP) in the early 1980's at the #5 and #3 Mines where longwall mining was taking place.

That mining property is in the Book Cliffs Coal field as is Andalex's and is within seven miles. The Bureau's data showed a maximum draw angle over longwall extraction of (+) 15.2° and a minimum of (-) 7.4°. (See App. T.) The massive sandstones and geologic conditions above the Price River Coal mine are the same as those found above the Andalex permit area. Therefore, similar subsidence results will occur.

**Preventive Measures**

Subsidence due to mining on the Andalex property will not occur outside of the approved permit area. Stations have been set up as required for constant monitoring of subsidence movements. (See 6., Monitoring.) The only absolute preventive measure possible is to leave coal in place. This is in direct contrast to maximum economic coal recovery.

Resources on the lands above Andalex's mining plan consist only of wildlife habitat with very limited grazing access.

Subsidence monitoring stations will be established ~~as necessary~~were established along the first proposed longwall mining.~~ (See 6., Monitoring and~~ Plate 2~~8~~5~~)~~.~~)~~ The results of this monitoring program ~~will~~ define monitoring and permitting needs in the future.

**Mitigative Measures**

If minor subsidence would occur, there would be no material

damage or diminution of valuable or foreseeable use of lands including wildlife habitat. It should be noted that subsidence has been occurring in the Book Cliffs coal field for decades with no diminution of resources. The Bureau of Mines Subsidence Study over the #3 Mine longwall panels has substantiated this. (See App. T.) There are no man-made structures or hydrologic concerns located within the affected area of Andalex's mining plan. It has been demonstrated that broad areas of subsidence over longwall panels do not represent adverse impact, if they are even noticeable. Smaller cracks, should they occur, heal themselves quickly and thoroughly.

The one spring located in Hoffman Creek ~~is~~was located stratigraphically well below the lowest coal to be mined. Springs above the seams outside the permit area will not be affected due to their distance from mining activity. Andalex has committed to replacing water should it be proven that mining has disrupted water flow at any location.

In the event mining related subsidence should cause material damage to the land, Andalex Resources, Inc. Will take appropriate steps to mitigate or repair such damage. Such repairs or mitigation may consist of one or more of the following steps:

(1) Filling of hazardous subsidence cracks;
(2) Leveling or regrading of subsidence damaged areas;
(3) Reseeding of repaired areas;
(4) Purchase of damaged site

In the event mining related activities should be shown to adversely affect State-appropriated water supplies, Andalex Resources, Inc. will attempt to repair and restore the affected supply; however, in the event, the supply cannot be restored, the loss may be mitigated by replacement of equivalent water rights from the 19 shares of primary water owned by Andalex Resources, Inc.

Methods to be used to repair damaged supplies may include installation of pipes and/or spring boxes, concreting or filling of cracks with impervious material, reconstructing ponds or damaged channels, or other methods of repair found to be acceptable and based on consultation with the Division and water right owner. It should be noted that any work performed on such hydrologic structures will be first permitted as necessary (i.e.

Stream Alteration Permits, etc.).

**Monitoring**

There are no structures or surface features which could be affected adversely by subsidence. Monitoring stations, however, have been set up at the locations shown on Plate ~~25~~7-1. Locations over the first longwall mining are also shown on Plate 28.

The purpose of the detailed monitoring program over the initial longwall mining is to establish baseline information which is useful in the long-term operation of the Andalex mines. This program will consist of surveyable monuments (nail, rebar, etc.) established on 100-foot centers (where possible) over the lines designated on Plate 28. Where 100-foot spacing is not possible due to topographic or other obstacles, spacing will be as near 100-foot as possible, particularly along potential tension areas above the panel. Distances between points within the compression area of the longwall panel may be increased up to 500-feet depending on accessibility. Also, Andalex will conduct visual inspections over the first panel prior to and subsequent to mining the panel.

In addition, Andalex is committed to establishing subsidence monitoring programs over successive longwall panels which will consist of up to two monuments per panel and will also include visual inspections annually on active panels.

## R645-301-525.100.

## SUBSIDENCE CONTROL PLAN

See R645-301-525.

## R645-301-525.110. MINING METHODS

See R645-301-525.

## R645-301-525.120. LIKELIHOOD OF SUBSIDENCE

See R645-301-525.

## R645-301-525.130. SUBSIDENCE CONTROL MEASURES

## R645-301-525.250. SUSPENSION OF MINING TO MODIFY SUBSIDENCE CONTROL PLAN

N/A

## R645-301-525.260. SUSPENSION OF MINING DUE TO IMMINENT DANGER

N/A

## R645-301-525.270. DETAILED UNDERGROUND MINE PLANS

Underground Operation and Facilities

**Mine Layout (Refer to ~~Plates 26, 27, 28 and~~Plate 29).**

Multiple Seam Considerations

There ~~are~~was four economic seams present on the property. The uppermost seam is the Lower Sunnyside which varies from four to six feet thick. The second highest seam is the Centennial Seam which varies from four to eight feet thick. The third seam is the Gilson Seam which also varies from 4' to 8' thick. The lowermost seam is the Aberdeen, the only seam with coal remaining, which varies from four to thirteen feet in thickness. The bottom two seams are separated by a 200 foot interval which includes a massive sandstone. The Gilson and the Centennial Seams are separated by approximately 130' and the Centennial and Lower Sunnyside Seams are separated by 80' including a massive sandstone. It should be noted that the area in which the Centennial Seam is to mined does not contain any reserves in either the Lower Sunnyside nor the Gilson Seams. Only the Aberdeen Seam is present where the Centennial Seam is to be mined. The mine plan~~s~~ for ~~each~~the aberdeen seam ~~are~~is shown on ~~Plates 26, 27, 28 and~~Plate 29.

**Portals**

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine.

The portal mine pads consist of approximately The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

**Mains, Submains, and Slopes**

A five to seven entry system is being used (two intake portals) and using a continuous miner, the entries are being driven to the property line. Generally, entries on 80 foot centers with crosscuts every 80 feet are being driven on the strike and dip of the coal seam. Development mining for the longwall panels are on 5th entry and 3rd entry systems. Refer to Plates 26 through 29. There exists only one return air portal on the surface, however, two exist underground making the five entry system.

**Shafts and Interconnecting of Slopes**

Mining plans called for rock tunnels to be constructed from the existing Pinnacle Mine up to the Centennial Seam mining area. These rock slopes are each approximately 500' in length. The three tunnels consist of an intake air tunnel, a return air tunnel, and a belt tunnel. Coal is transported via the belt tunnel and transferred on to the existing Pinnacle Mine conveyor belts. These tunnels were constructed in the Spring of 1990 and mining has commenced.

**Longwall Panels**

The mining sequence calls for the development of panels longwall using 2, 3 and 5 entry systems. These panels will be generally 650 to 800 feet in width and up to 8,000 feet in length.

**Barrier Pillars**

A barrier pillar will be left between the bleeders and the longwall panels. A barrier will also be left wherever old mine workings are skirted such as the Olsen Mine on the east side of Deadman Canyon in the Gilson Seam. The approved R2P2 also places barrier pillars between longwall panels to maintain safe working conditions. This was the only mine design approvable by ANDALEX and the BLM.

**Bleeder System**

A bleeder system will be maintained and pillars left to provide for ventilation, eventually extending around all mined out areas.

## R645-301-525.300. PUBLIC NOTICE OF PROPOSED MINING

A copy of the newspaper advertisement of this Mining and Reclamation Plan and proof of publication of the advertisement is filed with the Division and made part of the complete application. ~~Also, please refer to this chapter for the public notice and proof of publication for the newly acquired Sunedco Lease.~~

## R645-301-526. MINE FACILITIES

**Support Structures and Buildings**

Support structures and buildings are shown on Plates 6 and 7.

**Parking Areas**

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

**Storage Areas**

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.—

## R645-301-526.100. MINE STRUCTURES AND FACILITIES

See Volume II.

## R645-301-526.110. EXISTING STRUCTURES

Operation Plan: Existing Structures

**Construction and Design of Surface Facilities**

**Existing Structures**

It should be noted that there are no existing structures located in the Mathis Tract I.B.C. area or on adjacent proposed Federal Lease Applications shown on Plate I-A.

All existing structures are situated on the Zion's fee land, on federal lease SL-027304, or on right-of-way UTU-62045 and are shown on Plate 6. There are no structures existing as part as Andalex's facility which were constructed prior to 1980. Originally it was anticipated that all buildings and structures were to be completed during the first five year permit term. Obviously this is not the case since the Aberdeen Mine has only recently been completely finished to this date. Plate 6 depicts the Aberdeen Mine with the surface facilities completed in early 1990. No new structures on the surface will be required to mine the ~~Centennial and Aberdeen Seams on any lease including the new AEP~~Kenilworth Lease.

Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4. Existing structures include the following:

| | |
|---|---|
| Bathhouse (5) | 14' x 60' |
| Mine Water Storage Tanks (3) | 12' x 16' |
| Warehouse (1) | 14' x 60' |
| Lamphouse (2) | 40' x 40' |
| Substations (2) | 60' x 100' |
| Office Building | 28' x 60' |
| Mine Fans (4) | 88" |
| Portals (15) | 6' x 20' |
| Culinary Water Tanks (3) | 12' x 10' |
| Shop | 80' x 120' |
| Guard Shack | 8' x 8' |

**R645-301-526.116.1 MINING OPERATIONS WITHIN 100 FEET OF THE RIGHT-OF-WAY OF A PUBLIC ROAD**

County Road 299 begins at Highway 6 in Price and terminates at the minesite.

**R645-301-526.116.2 RELOCATING A PUBLIC ROAD**

N/A

**R645-301-526.200. UTILITY INSTALLATION AND SUPPORT FACILITIES**

Appendices G & I

**R645-301-526.210. DESCRIPTION**

Appendices G & I

**R645-301-526.220. COMPLIANCE REQUIREMENTS**

Appendices G & I

**R645-301-526.221. PROTECTION**

Appendices G & I

**R645-301-526.222. MINIMIZATION OF ENVIRONMENTAL IMPACT AND COMPLIANCE WITH EFFLUENT LIMITATIONS**

Appendices G & I

**R645-301-526.300. WATER POLLUTION CONTROL FACILITIES**

See ~~R645-301-512~~R645-301-733.~~240~~.

**R645-301-526.400. AIR POLLUTION CONTROL FACILITIES**

Air Pollution Control Plan and Compliance with Air Quality

and the Wildcat Loadout for 1.5 million tons per year. These were inspected and met compliance during the summers of 1989-1992.

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, pavement, and other fugitive dust control practices outlined in 30 CFR 817.95.

There will be no additional fugitive emissions or air pollution associated with the newly acquired AEP Lease.

## R645-301-527. ~~——~~TRANSPORTATION FACILITIES

~~**Roads**~~

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~~Primary Road 2 (PR 2) This road begins at the end of PR 1 and continues north past the shop/warehouse and ends at the eastern side of the Apex Mine stockpile. This is a two lane gravel surfaced road which is approximately 26 feet wide and 1400 feet long. It is treated annually with Magnesium Chloride. The grade on this stretch of road ranges from 5% to 9%. It is used for hauling coal and equipment as well as providing men and materials access to the mines.~~

~~Primary Road 3 (PR 3) This road provides access to the Aberdeen Mine truck loadout. It is a single lane gravel surface road approximately 15 feet wide and 590 feet long. It is treated with Magnesium Chloride annually. The grade on this road ranges from 0% to 4%.~~

~~Primary Road 4 (PR 4) This road provides access for the coal haul trucks to the Pinnacle Mine truck loadout. It is also crossed to access the bath house parking area. This is a single lane, paved surface road which is approximately 15 feet wide and 500 feet long. The grade on this loop ranges from 0% to 9%.~~

~~Primary Road 5 (PR 5) This road provides access for the coal~~

~~haul trucks coming off of PR 2 to the Apex Mine truck loadout. It is a single lane gravel surfaced road approximately 15 feet wide and 425 feet in length. The grade on this road ranges from 0% to 7%. It is treated annually with Magnesium Chloride. The three truck loadout roads are also accessed by front end loaders for the purpose of cleaning up occasional coal spills.~~

~~Primary Road 6 (PR 6) – This is an access road which leads to the main office parking area. It is a single lane, paved surface road which is approximately 15 feet wide and 600 feet long. The average grade of this road is 5% to 7%.~~

~~Primary Road 7 (PR 7) – This is an access road for mining equipment. It provides heavy equipment access to and from the Aberdeen Mine. It begins at the south inlet to pond C and it ends at the bath house parking area. It is a gravel surfaced road and is approximately 12 feet wide and 450 feet long. It has grades which range from 4% to 14%. Magnesium Chloride is applied annually.~~

~~Primary Road 8 (PR 8) – This road leads from the fuel storage area at the Pinnacle Mine facility to the oil storage area near the upper Pinnacle portals. This is a single lane, gravel surface road approximately 15 feet wide and 325 feet long. The grade on this road has a range of 9% to 11%. It is treated with Magnesium Chloride annually.~~

~~Primary Road 9 (PR 9) – This road leads from PR 2 and turns west over the top of the Apex Mine conveyor belt. The road leads to the Apex Mine material storage area, adjacent to the mine fan. This is a single lane gravel surfaced road which is approximately 15 feet wide and 200 feet long and includes a steel deck bridge over the mine conveyor. The grade on this road ranges between 0% and 8%, and the gravel is treated with Magnesium Chloride.~~

~~Primary Road 10 (PR 10) – This is an access road which leads from the upper Aberdeen Mine material storage area down to the Aberdeen Mine stockpile pad. This is a short stretch of road which is approximately 12 feet wide and 150 feet long. It is a single lane road with an average grade of 12% to 15%.~~

~~Primary Road 11 (PR 11) – This is a very short access road which accesses the bath house pad from two directions; both from PR 1 and from PR 4. This road is approximately 12 feet wide and 150 feet long. It is a single lane road with a grade of 0% to 6%. This road is treated with magnesium chloride annually.~~

~~Ancillary Road 1 (AR 1) – This is an access road which leads from the south Aberdeen intake portal to the Aberdeen mine fan. It is a single lane road which has a surface of sandstone. The road is~~

used primarily for access to the fan, water system and conveyor. This road is approximately 20 feet wide and 400 feet long. There is a steel deck bridge over the Aberdeen mine conveyor. The grade on this road ranges from 8% to 10%.

Ancillary Road 2 (AR 2) This road leads from the upper Pinnacle Mine intake portals to the Pinnacle Mine fan. It is a single lane gravel surfaced road which has a steel deck bridge where the road crosses the Pinnacle Mine conveyor. Its primary use is to access the Pinnacle Mine fan. It is approximately 12 feet wide and 250 feet long. The grade on this road ranges from 0% to 12%.

Ancillary Road 3 (AR 3) This road leads from PR 2 up to the Apex material storage area (Gun range). This is a single lane gravel surface road which is approximately 12 feet wide and 175 feet long. The grade on this road is on an average of 9%. It is treated with Magnesium Chloride annually. It is used primarily for access.

Ancillary Road 4 (AR 4) This road is access from the upper Apex material storage area to the Powder Magazines. This road continues beyond the north end of our permit area but it becomes a private road beyond the permit area. This is a single lane dirt road which is approximately 12 feet wide and 150 feet long. The grade on this short stretch of road is 5% to 8%.

Ancillary Road 5 (AR 5) This road is access from Carbon County Road 299 to the left hand fork installation. This existing road will be upgraded adequately for maintenance and emergency access only. It will be equipped with a locked gate. This is a single lane dirt road which is approximately 15 feet wide and 4000 feet long. There will be 3 or 4 locations specifically widened so that two vehicles may pass. The grade on this stretch of road ranges from 0% to 15%. This road will be reclaimed upon cessation of mining pending the approval of Mrs. Gladys Artman.

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**Railroad**

There are no existing or proposed railroad spurs on the property.

**Other Transportation Facilities**

~~The conveyor structures at the minesite are very standard cross member, bent designs. The Pinnacle conveyor is 180 feet in length and uses a 42" conveyor belt. It is covered with galvanized corrugated sheeting. The Pinnacle Truck Loadout is an under pile gravity feed reclaim system in 8 foot diameter sectioned steel tunnel for 90 feet and surfaces on the typical bent, steel structure~~

~~for an additional 110 feet. The Apex truck loadout is identical to Pinnacle. The mine conveyor is also the same bent/cross member design with a 42" conveyor; however, it is 250 feet in length. The Aberdeen facility is equipped with conveyor facilities similar to that of Pinnacle with only slight variations in exact length anticipated or possible. These facilities will be completed in early 1990.~~

~~Revised 8/8/95~~

~~Transportation facilities such as roads have been addressed. The roads, Class II and I are to be removed upon cessation of mining by simple regrading and re-establishment of contours, unless surface owners request access through the mine area might remain.~~

~~Protection of the environment through the use of these facilities is achieved by speed controls (20 mph minesite). The conveyor structures as such do not impose environmental problems. Public safety obviously is a requirement of law including MSHA but also public safety is a requirement of Andalex Resources. Also the minesite is not frequented by any public outside of normal, weekly business hours.~~

## R645-301-527.100. ROAD CLASSIFICATION

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All roads within the permit area are classified as "Primary Roads" in accordance with R614-301-527.100 or "Ancillary Roads" in accordance with R645-301-527.130. Roads on the site are of 2 typical designs:

1. Single-lane, gravel or asphalt surfaced roads approximately 12 - 15' wide; and

2. Double-lane, either gravel or asphalt surfaced roads, approximately 26' wide.

Although all roads on site are not used for coal hauling, each primary road is constructed to the respective typical design and dimensions shown on Plate 35.

All roads are shown on Plate 6 and Plate 8. Specifics about the road are described individually and include road widths, gradients and surfaces. Drainage ditches and drainage

structures for each road (disturbed area ditches or culverts) can be found in Tables IV-2 through IV-8.

Because of the variance in road types, widths and lengths, the roads have been designated on Plate 6 with numbers (i.e. PR-1= Primary Road 1, Ar-1= Ancillary Road 1) to facilitate the description of each:

Primary Road 1 (PR-1) - This road connects Carbon County Road 199 to the two lane paved road which travels past the Aberdeen Mine facilities, past the office driveway and bath house drive ways and past the Pinnacle truck loadout. This is an asphalt surfaced road approximately 26 feet wide and 2700 feet long. The grade on PR-1 ranges from 4% to 8%. It is used for hauling coal and for men and material access to the mines.

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Primary Road 2 (PR-2) - This road begins at the end of PR-1 and continues north past the shop/warehouse and ends at the eastern side of the Apex Mine stockpile. This is a two lane gravel surfaced road which is approximately 26 feet wide and 1400 feet long. It is treated annually with Magnesium Chloride. The grade on this stretch of road ranges from 5% to 9%. It is used for hauling coal and equipment as well as providing men and materials access to the mines.

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Primary Road 3 (PR-3) - This road provides access to the Aberdeen Mine truck loadout. It is a single lane gravel surface road approximately 15 feet wide and 590 feet long. It is treated with Magnesium Chloride annually. The grade on this road ranges from 0% to 4%.

Primary Road 4 (PR-4) - This road provides access for the coal haul trucks to the Pinnacle Mine truck loadout. It is also crossed to access the bath house parking area. This is a single lane, paved surface road which is approximately 15 feet wide and 500 feet long. The grade on this loop ranges from 0% to 9%.

Primary Road 5 (PR-5) - This road provides access for the

coal haul trucks coming off of PR-2 to the Apex Mine truck loadout. It is a single lane gravel surfaced road approximately 15 feet wide and 425 feet in length. The grade on this road ranges from 0% to 7%. It is treated annually with Magnesium Chloride. The three truck loadout roads are also accessed by front-end loaders for the purpose of cleaning up occasional coal spills.

Primary Road 6 (PR-6) - This is an access road which leads to the main office parking area. It is a single lane, paved surface road which is approximately 15 feet wide and 600 feet long. The average grade of this road is 5% to 7%.

Primary Road 7 (PR-7) - This is an access road for mining equipment. It provides heavy equipment access to and from the Aberdeen Mine. It begins at the south inlet to pond C and it ends at the bath house parking area. It is a gravel surfaced road and is approximately 12 feet wide and 450 feet long. It has grades which range from 4% to 14%. Magnesium Chloride is applied annually.

Primary Road 8 (PR-8) - This road leads from the fuel storage area at the Pinnacle Mine facility to the oil storage area near the upper Pinnacle portals. This is a single lane, gravel surface road approximately 15 feet wide and 325 feet long. The grade on this road has a range of 9% to 11%. It is treated with Magnesium Chloride annually.

Primary Road 9 (PR-9) - This road leads from PR-2 and turns west over the top of the Apex Mine conveyor belt. The road leads to the Apex Mine material storage area, adjacent to the mine fan. This is a single lane gravel surfaced road which is approximately 15 feet wide and 200 feet long and includes a steel deck bridge over the mine conveyor. The grade on this road ranges between 0% and 8%, and the gravel is treated with Magnesium Chloride.

Primary Road 10 (PR-10) - This is an access road which leads from the upper Aberdeen Mine material storage area down to the Aberdeen Mine stockpile pad. This is a short stretch of road which is approximately 12 feet wide and 150 feet long. It is a single lane road with an average grade of 12% to 15%.

Primary Road 11 (PR-11) - This is a very short access road which accesses the bath house pad from two directions; both from PR-1 and from PR-4. This road is approximately 12 feet wide and 150 feet long. It is a single lane road with a grade of 0% to 6%. This road is treated with magnesium chloride annually.

Ancillary Road 1 (AR-1) - This is an access road which leads from the south Aberdeen intake portal to the Aberdeen mine fan. It is a single lane road which has a surface of sandstone. The road is used primarily for access to the fan, water system and conveyor. This road is approximately 20 feet wide and 400 feet long. There is a steel deck bridge over the Aberdeen mine conveyor. The grade on this road ranges from 8% to 10%.

Ancillary Road 2 (AR-2) - This road leads from the upper Pinnacle Mine intake portals to the Pinnacle Mine fan. It is a single lane gravel surfaced road which has a steel deck bridge where the road crosses the Pinnacle Mine conveyor. Its primary use is to access the Pinnacle Mine fan. It is approximately 12 feet wide and 250 feet long. The grade on this road ranges from 0% to 12%.

Ancillary Road 3 (AR-3) - This road leads from PR-2 up to the Apex
material storage area (Gun range). This is a single lane gravel surface road which is approximately 12 feet wide and 175 feet long. The grade on this road is on an average of 9%. It is treated with Magnesium Chloride annually. It is used primarily for access.

Ancillary Road 4 (AR-4) - This road is access from the upper Apex material storage area to the Powder Magazines. This road continues beyond the north end of our permit area but it becomes a private road beyond the permit area. This is a single lane dirt road which is approximately 12 feet wide and 150 feet long. The grade on this short stretch of road is 5% to 8%.

Ancillary Road 5 (AR-5) - This road is access from Carbon County Road 299 to the left hand fork installation. This

existing road will be upgraded adequately for maintenance and emergency access only. It will be equipped with a locked gate. This is a single lane dirt road which is approximately 15 feet wide and 4000 feet long. There will be 3 or 4 locations specifically widened so that two vehicles may pass. The grade on this stretch of road ranges from 0% to 15%. This road will be reclaimed upon cessation of mining pending the approval of Mrs. Gladys Artman.

Andalex commits to repair roads damaged by a catastrophic event as soon as practical according to R645-301-527.240. According to R645-301-534.100 Andalex has located, designed, constructed, used and maintained Primary Roads so as to prevent or control damage to private and public property. Andalex has used non-acid or non-toxic forming materials in road surfacing. Roads have, at a minimum a static safety factor of 1.3 on embankments. Andalex has a schedule and plan to remove roads that will not be retained as part of the approved post mining land use. Ancillary roads will be traveled only by light vehicles for routine access. Occasionally, they will be traveled by larger equipment but probably only in emergency or repair situations, as 2 of the 4 Ancillary Roads lead to fan installations. All Primary Roads will meet the requirements of R645-301-358, R645-301.527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-542.600 and R645-301-762. Primary Roads will be located in so far as practical on the most stable available surfaces. The roads are surfaced with rock, gravel or asphalt according to R645-301-534.320. They will be routinely maintained, and have culverts which are designed and installed as necessary according to the requirements of R645-301-534.340.

**Railroad**

There are no existing or proposed railroad spurs on the property.

**Other Transportation Facilities**

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The conveyor structures at the minesite are very standard cross member, bent designs. The Pinnacle conveyor is 180 feet in length and uses a 42" conveyor belt. It is covered with galvanized corrugated sheeting. The Pinnacle Truck Loadout is an under pile gravity feed reclaim system in 8 foot diameter sectioned steel tunnel for 90 feet and surfaces on the typical bent, steel structure for an additional 110 feet. The Apex truck loadout is identical to Pinnacle. The mine conveyor is also the same bent/cross member design with a 42" conveyor; however, it is 250 feet in length. The Aberdeen facility is equipped with conveyor facilities similar to that of Pinnacle with only slight variations in exact length anticipated or possible. These facilities will be completed in early 1990.
Revised 8/8/95

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Transportation facilities such as roads have been addressed. The roads, Class II and I are to be removed upon cessation of mining by simple regrading and re-establishment of contours, unless surface owners request access through the mine area might remain.

Protection of the environment through the use of these facilities is achieved by speed controls (20 mph minesite). The conveyor structures as such do not impose environmental problems. Public safety obviously is a requirement of law including MSHA but also public safety is a requirement of Andalex Resources. Also the minesite is not frequented by any public outside of normal, weekly business hours.

## R645-301-527.110. DESIGNATION OF ALL ROADS

See R645-301-527.

## R645-301-527.120. PRIMARY ROADS

See R645-301-527.

## R645-301-527.122. FREQUENT USE OR FOR PERIODS IN EXCESS OF 6 MONTHS

a live stockpile as opposed to a storage pile. It should be noted that when the Centennial Seam is mined it is transferred underground to existing Pinnacle Mine conveyors and therefore, ends up in the Pinnacle Mine stockpile.

**Loadout**

Coal is loaded from the stockpile by an electronic automatic loadout into 40 ton coal trucks and hauled to Wildcat Jct. which is on the Utah Railroad.

**Preparation Plant**

A coal cleaning facility will not be used. However, by the new definition of a preparation plant, the Wildcat Loadout now comes under the SMCRA and a plan has been approved under ACT 007/033.

**Removal of Surface Structures**

Upon completion of mining activities, all surface facilities will be removed. The coal pile area will be filled, the slope contoured, compacted, topsoil replaced, regraded, and revegetated. In the materials storage and building areas, all structures and foundations including the shop, office building, bathhouse, substation, and water storage tanks, will be removed, re-contoured, compacted, topsoil replaced and graded, and revegetated according to ~~rEVEGATATION~~revegetation procedures described in this chapter.

## R645-301-528.200. OVERBURDEN

## R645-301-528.300. SPOIL, COAL PROCESSING WASTE, MINE DEVELOPMENT WASTE, AND NON-COAL WASTE REMOVAL

Underground Development Waste

There has been no development waste or excess spoil to date excepting sedimentation pond material.

Coal Waste

Upon completion of mining activities, the portals will be sealed according to existing state and federal regulations. Conveyors will be removed and pads filled. The slope will be contoured, compacted, and topsoil replaced and graded.

The final sealing of mine openings will be accomplished by placing a recessed concrete block seal 25 to 50 feet from the mouth of the portal. Since a portion of the mine slopes towards the portals, and mine water is present, seals will be constructed with at least one drainage pipe in the lowest portal. This pipe shall be a schedule 80 - 4" PVC, with a U-tube water trap and a valve or cap on the end. The pipe will be extended beyond the portal backfill. The area from the seals to the mouth of the portals will be backfilled. The portal structures will be removed and the exposed coal seam, including portal area, will be covered during reclamation. Please note that the Centennial Seam Mine will not require any new portals on the surface.

If a discharge is found to occur after sealing, the water will be sampled quarterly for compliance with effluent standards of 817.42 and treated (if necessary) during the liability period. See Figures IV-1 and IV-2 for portal sealing details.

It is very unlikely that a mine discharge will occur from any of the permanently sealed mine portals, although each seal will be equipped with a drainage pipe described above. To date, Andalex has encountered dry mining conditions and all portals in all three mines drift into the mountain in a down dip direction. If a discharge were to occur, it would only be after the entire pillared out workings had filled first. Then only would the static head against the seal allow any discharge. There is no way of knowing or estimating the mine discharge rate.

As maintained above, Andalex will monitor any discharge. Andalex's existing NPDES allows for a certain volume of mine discharge. This permit will be maintained after cessation of mining for the liability period until the bond is released.

The blowing fan ventilation shaft will be sealed by completely backfilling it from bottom to top. This shaft is 370' deep by 16' diameter, and will require approximately 2,755 cubic yards of backfill material. This backfill material will be hauled in from an offsite commercial gravel pit. See Appendix Y for reclamation information regarding the Ventilation Shaft/Blowing Fan Installation.

**Temporary Cessation**

Whenever it is known that operations are to be temporarily ceased for more than 30 days, Andalex Resources will submit to the Division a notice of intention to cease or abandon the operations, in accordance with MSHA standards.

~~It is very unlikely that a mine discharge will occur from any of the permanently sealed mine portals, although each seal will be equipped with a drainage pipe described above. To date, Andalex has encountered dry mining conditions and all portals in all three mines drift into the mountain in a down dip direction. If a discharge were to occur, it would only be after the entire pillared out workings had filled first. Then only would the static head against the seal allow any discharge. There is no way of knowing or estimating the mine discharge rate.~~

~~As maintained above, Andalex will monitor any discharge. Andalex's existing NPDES allows for a certain volume of mine discharge. This permit will be maintained after cessation of mining for the liability period until the bond is released.~~

~~The blowing fan ventilation shaft will be sealed by completely backfilling it from bottom to top. This shaft is 370' deep by 16' diameter, and will require approximately 2,755 cubic yards of backfill material. This backfill material will be hauled in from an offsite commercial gravel pit. See Appendix Y for reclamation information regarding the Ventilation Shaft/Blowing Fan Installation.~~

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This notice will describe mitigation measures to be employed in accordance with the terms and conditions of the permit approval, such as a statement of the number of surface areas involved in the cessation, extent of sub-surface strata, prior reclamation efforts accomplished on the property, and identification of all backfilling, regrading, ~~rEVEGATATION~~revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

Temporary closing of underground workings will be accomplished with chain link fence material as recommended by MSHA. This prevents access by unauthorized individuals during idol periods. It is not anticipated that once Andalex reaches its peak production that this will occur.

If underground openings are to remain inactive for a period greater than 90 days, such openings will be temporarily closed off from access. Such closures will consist of a chain link or other substantial wire mesh fabric fence placed over the portals

to prevent public access while allowing for air flow. Locked gates may be installed in the portal to allow for mine inspection.

**Casing and Sealing of Drill Holes**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-529.200. UNDERGROUND MINING OPERATIONS

## R645-301-529.210. TEMPORARILY INACTIVE OPERATIONS

See R645-301-515.300.

## R645-301-529.220. RETURN UNDERGROUND DEVELOPMENT WASTE, COAL PROCESSING WASTE OR WATER TO UNDERGROUND WORKINGS

See R645-301-515.300.

## R645-301-529.300. HOLES USED FOR BLASTING

N/A

## R645-301-529.400. SURFACE MINING OPERATIONS

N/A

## R645-301-530. OPERATIONAL DESIGN CRITERIA AND PLANS

~~Operation Plan: Existing Structures~~

~~Construction and Design of Surface Facilities~~

~~Existing Structures~~

~~All existing structures are situated on the Zion's fee land, on federal lease SL-027304, or on right-of-way UTU-62045 and are~~

shown on Plate 6. There are no structures existing as part as Andalex's facility which were constructed prior to 1980. Plate 6 depicts the Aberdeen Mine with the surface facilities completed in early 1990. No new structures on the surface will be required to mine the Centennial and Aberdeen Seams on any lease including the new AEP Lease. Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4. Existing structures include the following:

| | |
|---|---|
| Bathhouse (5) | 14' x 60' |
| Mine Water Storage Tanks (3) | 12' x 16' |
| Warehouse (1) | 14' x 60' |
| Lamphouse (2) | 40' x 40' |
| Substations (2) | 60' x 100' |
| Office Building | 28' x 60' |
| Mine Fans (4) | 88" |
| Portals (15) | 6' x 20' |
| Culinary Water Tanks (3) | 12' x 10' |
| Shop | 80' x 120' |

A new blowing ventilation fan and a new substation is proposed as shown on Plate 6. The fan will be a forced aira fan and shaft to the Aberdeen Seam below. The fan will be located very close to the existing edge of the disturbance as shown on Plate 6. Refer to Appendix Y for additional information regarding this installation. The new substation will be located near the Aberdeen Mine portals. See Plate 6.

Upon completion of mining activities, the portals will be sealed according to existing state and federal regulations and all buildings and structures not being utilized as part of the reclamation sequence, will be removed, according to the Reclamation Plan.

**Construction Schedule**

All of the above structures have been completed. The earthwork for the Aberdeen Mine was completed in 1989. The surface facilities were in early 1990. Construction has been located and carried out so as to prevent and control erosion, siltation, water pollution, and damage to property. All facilities have been designed and constructed and will be maintained and used in a manner which prevents damage to wildlife and related environmental values. Any future construction will be conducted in a similar manner according to regulations regarding protection

~~of the hydrologic system, etc. The rock tunnels for the Centennial Seam development were constructed in the spring of 1990 and completed late in 1990. As previously discussed this mining will require no new surface facilities.~~

~~Construction Methods~~

~~**Major Equipment**~~

~~The portal and building sites were leveled using dozers, trucks, and loaders. At the building sites, the topsoil was removed and transported to a nearby area for storage.~~

~~All surface pads have been graveled and all other disturbed areas (pond embankments, etc.) have been reseeded.~~

## R645-301-531. GENERAL

**Schedule of Construction, Mine Development, Mining and Reclamation**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases. There will be no additional construction activities or surface disturbance whatsoever in Hoffman Creek or Alrad Canyon.

However, Andalex does intend to add a fan installation in the left-hand fork of Deadman Canyon at some point in time. This installation will be according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) Andalex will submit detailed plans for this installation at the appropriate time. The location of this breakout is shown on Plate 29 (R.O.W.).

Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with three production units and the longwall scheduled to be operating by mid-1994. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market. Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. No significant erosion problems have occurred, Andalex will notify the Division in the event of any slides or other damage immediately by telephone and in writing.

Andalex will cover acid or toxic forming materials if any are encountered.

Andalex will advise the Division in the event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-532. SEDIMENT CONTROL

See ~~R645-301-512.240~~R645-301-733.

## R645-301-532.100. MINIMIZING DISTURBANCES

Surface disturbances are minimal due to the nature of the mining activities. The permit area has been previously impacted by mining. Surface disturbances will be limited to the existing facilities which have been constructed. The total existing surface area disturbed is ~~34~~47.~~2~~19

~~a.~~ Existing facilities are indicated on Plate 6 and 7.

The land affected by mining operations which shall be reclaimed, in compliance with the Mining and Reclamation Plan and all requirements of the Mined Land Reclamation Act and Rules and Regulations adopted in accordance therewith, can be described as follows:

~~34~~47.~~2~~19 acres located in T13S, R11E, S.L.B.&M., Carbon County, Utah and contained within,
SE 1/4 SW 1/4 Section 7
NE 1/4 SW 1/4 Section 7
SW 1/4 SE 1/4 Section 7
NW 1/4 SE 1/4 Section 7
SW 1/4 NE 1/4 Section 18

## R645-301-532.200. STABILIZING BACKFILLED MATERIAL

**Backfilling, Grading, and Soil Replacement and Stabilization**

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor. Refer to Appendix K for this study done at the Pinnacle Mine. Andalex has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and ~~rEVEGATATION~~revegetation. Steep slopes will be reclaimed according to the approved plan shown on Plates 14 and 15.

Areas to be regraded include the portal site, surface facility siteand roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final reclamation is completed, slope stability studies will be performed as necessary. All information for slope stability studies will be included as part of the final reclamation package.

Where possible, all final grading and placement of topsoil will be done along the contour to minimize erosion. In all cases, grading will be conducted in a manner which minimizes

erosion and provides a stable surface for the placement of topsoils.

Topsoil existing on site will be spread using a grader. Where possible, the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history, 6".

Andalex will rip the subsurface material to 6" using most likely a toothed motor grader or a disc, prior to soil redistribution.

Andalex will mix one ton of alfalfa per acre with its topsoil material to aid in aeration, microbiological community development, and water holding capacity.

Andalex will distribute topsoil to a minimum depth of 6" as previously stated.

Andalex has already committed to testing of redistributed soil and fill material and has committed to use proper additives if it is discovered necessary. Specifically, Andalex will test for organic matter, phosphorous, potassium, pH, conductivity, and texture. The samples will be taken at 0-6 inches, 6-12 inches, and 12-24 inches at least 90 days prior to final reclamation.

## R645-301-533. IMPOUNDMENTS

See ~~R645-301-512~~R645-301-733.~~240~~.

## R645-301-533.100. STABILITY

See ~~R645-301-512~~R645-301-733.~~240~~.

## R645-301-533.200. FOUNDATION DESIGN

Appendix K

## R645-301-533.210. STABILITY

Appendix K

## R645-301-533.620. ENGINEERING DESIGN

See ~~R645-301-512~~R645-301-733.~~240~~.

## R645-301-533.700. NON-MSHA IMPOUNDMENTS DESIGN REQUIREMENTS

See ~~R645-301-512~~R645-301-733.~~240~~.

## R645-301-534. ROADS

See R645-301-512.250.

## R645-301-534.100. DESIGN, USE AND RECLAMATION

See R645-301-512.250.

## R645-301-534.110. DAMAGE TO PUBLIC OR PRIVATE PROPERTY

See R645-301-512.250.

## R645-301-534.120. NON-ACID OR NONTOXIC FORMING SUBSTANCES IN ROAD SURFACING

No acid or toxic-forming substances will be used for road surfacing.

## R645-301-534.130. FACTOR OF SAFETY FOR ROAD EMBANKMENTS

See R645-301-512.250.

## R645-301-534.200. SAFETY AND ENVIRONMENTAL PROTECTION

See R645-301-512.250.

## R645-301-534.300. PRIMARY ROADS

## R645-301-535.330. FACTOR OF SAFETY

N/A

## R645-301-535.340. UNDERDRAIN SYSTEMS

N/A

## R645-301-535.400. DISPOSAL OF EXCESS SPOIL: PRE-EXISTING BENCHES

N/A

## R645-301-535.410. PLACEMENT

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor.

Refer to Appendix K for this study done at the Pinnacle Mine. Andalex has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and ~~rEVEGATATION~~revegetation.

Areas to be regraded include the portal site, surface facility site and roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final

## R645-301-541. GENERAL

See R645-532.240.

## R645-301-541.100. CESSATION OF MINING OPERATIONS

See R645-532.240.

## R645-301-541.200. REMOVAL OF FACILITIES

See R645-532.240.

## R645-301-541.300. POSTMINING FACILITIES AND MONITORING

~~**Post Mining Hydrology**~~

~~Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:~~

~~1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC 1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).~~

~~All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E PM" through the restored channel RC 1.~~

~~It should be noted that the main road going through the minesite and continuing on will be left intact as part of the post mining use.~~

~~2. Once rEVEGATATION and water quality standards are met, Pond "E PM" will be removed, and the area reclaimed.~~

~~Surface water monitoring will continue during this time as described. Please see Figure IV 11.~~ See R645-301-711.500

## R645-301-541.400. COMPLIANCE REQUIREMENTS FOR RECLAMATION

See R645-301-240.

## R645-301-542. NARRATIVES, MAPS AND PLANS

See R645-301-510.

## R645-301-542.100. TIMETABLE

See R645-301-240.

## R645-301-542.200. BACKFILLING AND GRADING PLAN

See R645-301-532.200.

## R645-301-542.300. FINAL SURFACE CONFIGURATION MAPS

Plates 16 & 17

## R645-301-542.310. CERTIFICATION REQUIREMENTS

~~Operation Plan: Maps and Plans~~

~~Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal in Volume II.~~

~~All necessary maps and plans to complete this section are found in Volume II of the submittal and also in the appendices of Volume I specifically,~~

~~a) Underground coal mining activities to be conducted and lands to be affected by surface facilities are shown on Plates 6, 29, 30, 31 and 41.~~

~~b 1) Buildings, utilities, and facilities are depicted on~~

~~Plates 6.~~

~~2) The area to be affected is shown on several plates, including 4, 5, 6, 29, 30, 31 and 41. These last four plates show the sequence of mining in the four seams over the five year term of the permit. Plate 30 has been revised to show immediate development in the Gilson Seam as soon as approval is achieved. Reclamation will not take place until after all four seams are mined out. This activity is depicted on Plates 15, 16, 17, and 20.~~

~~3) Plates 5 depict the entire disturbed area for which a performance bond is posted. The acreage is shown on Plate 5.~~

~~4) Coal storage and loading areas are shown on Plates 6. No cleaning takes place.~~

~~5) Plates 6 show a non coal waste storage area as well as topsoil storage areas. Plates 36 and 37 show the topsoil piles in detail.~~

~~6) All water diversions and other water facilities are shown on Plates 6, 8, 9, 11, 12, and 13. Also, typical diversions for disturbed area and undisturbed areas are shown in the Sedimentation and Drainage Control Plan.~~

~~Diversion ditches as they exist are shown on Revised Plate 6. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.~~

~~Diversions and other hydrologic controls are shown on Plates 6, 7, 8, 11, 12 and 13, for the Aberdeen Mine. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.~~

~~Plate 16 has been revised to show drainage during the reclamation period before and after removal of sediment ponds (Phase I).~~

~~Plate 17 shows final drainage details.~~
~~Plate 9 shows delineations of watershed areas.~~

~~The main culvert will be removed entirely during the reclamation/earthwork phase except under Pond "E". Pond~~

"E" will be enlarged, and the entire drainage area above will flow into the restored channel RC-1 and through Pond "E-PM". Once rEVEGATATION and water quality standards have been met, Pond "E-PM" and the culvert will be removed and reclaimed.

7) There is no coal processing waste at the Centennial facility There are no pollution control facilities other than sedimentation ponds on the permit area. Please note that waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

8) Specific facilities are not used to protect or enhance wildlife with the exception of the powerline which was built according to strict guidelines issued by the Division of Wildlife Resources and the U.S. Fish and Wildlife Service regarding raptor protection. The powerline design is included in Volume I as Appendix I (powerline design). Also, speed limits are posted within the permit area.

9) The two powder magazines are shown on Plates 6.

10) Plates 6, 8, and 9 show these facilities associated with protection of the hydrologic balance including sedimentation ponds and storage of non-coal waste. There are no permanent impoundments, or coal processing wastes. Underground development waste has been generated while putting in the Aberdeen portals, and has been used as stock pile pad material at the Aberdeen Minesite. The volume of this material is minimal.

11) Plates 16 and 17 show the final reclamation contours and configuration of the surface for Phases I and II respectively.

12) Subsidence monitoring points are shown on Plate 25. An additional station was added to Plate 25 to cover pillar extraction on the new Hoffman Creek Lease. Also a new station has been added over the Graves Lease. Water monitoring locations are shown on Figure IV-11. A new water monitoring station will be added over the Graves Lease, however and a new station has been added at the mouth of Alrad Canyon (12-1) for the AEP lease.

13) There will be no facilities left on the permit area permanently excepting possibly the road through the site. After the completion of underground mining, all facilities will be removed with the exception of one downstream sedimentation pond. This pond will be removed upon final reclamation.

c) Maps, plans, and cross sections required under b)(5),(6),(10), and (11) have been prepared under the direction of, and certified by a registered professional engineer. Assistance has come from a registered land surveyor.

1) Detailed maps, plans, and cross sections for our sediment ponds, Plates 11, 12, and 13 have been certified by a registered professional engineer.

2) Andalex has not used any excess spoil or underground development waste maps or cross sections. A map (uncertified) depicting the location of non-coal waste storage is included as Plate 6.

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The maps and cross sections found in R645-301-521.140 have been certified as required.

## R645-301-542.320. PERMANENT FACILITIES

## R645-301-542.400. FINAL ABANDONMENT OR BOND RELEASE

~~Reclamation Cost and Bonding~~

~~**Introduction**~~

~~An estimate is provided in the Reclamation Cost Projection. Notably changed from the original bond estimate is the addition of the shop/warehouse complex, the removal of which will have to be added to the reclamation cost. The original estimate has also been revised to reflect current prices and wage estimate has also been revised to reflect current prices and wage schedules. Andalex frequently requires the use of dirt contractors and is therefore current on equipment rental costs, labor costs, and productivity, since we have a great deal of experience with construction projects. Andalex has used its experience in construction and earth moving projects to estimate the amount of time which will be required and the equipment needed for individual reclamation activities. Andalex has also been involved with several rEVEGATATION projects from which it drew estimates. Andalex has provided, as Plate 15, accurate as built versus reclaimed cross sections which show the mass balance for earthwork. The approximate original contours will be achieved using the material cut out to create the fill areas. No material will be hauled in. Maps depicting accurately the surface facilities including topsoil areas, structures and facilities are included in Volume II and also specific topsoil maps and cross sections are included. Andalex expects to return topsoil to a depth of up to 6" around the surface area of 34.2 acres.~~

~~Phase I of the reclamation will include, chronologically, structure removal including culverts, portal sealing, well sealing, regrading, recontouring, distribution of topsoil and rEVEGATATION. Additional sediment control during Phase I such as straw dikes and rock check dams will be implemented as shown on Plate 16. Once Phase I is adequately achieved, Phase II will commence which includes the removal of sediment structure E and rEVEGATATION of this area. This is followed by monitoring,~~

~~noting that monitoring had begun during Phase I. See 5.8 re Monitoring. This section discusses the extended period of liability as being ten years if necessary. The entire permit area receives less than 26 inches of annual precipitation; therefore, it is generally accepted that Andalex is subject to an extended period of liability. Obviously if rEVEGATATION is deemed successful prior to this ten year period, Andalex will request bond release. Andalex has not proposed any selective husbandry practices.~~

## Cost of Reclamation

### Detailed Estimate

A detailed cost projection is included.

### Calculations

Calculations of the estimate are included following this page. Calculations for cuts and fills were made and are summarized following the bond estimate. This summary shows the mass balance for the entire disturbed area including the Aberdeen site, as taken from Plates 14 and 15. Station numbers are referenced on Plate 14 and cross sections are shown on Plates 15-1, 2, and 3. Similarly, topsoil piles have been surveyed for the existing minesite and are summarized following the cut and fill summary. Because of deficits Andalex has committed to testing topsoil substitute areas.

### Bond or Surety Arrangement

Andalex currently holds a bond, approved by UDOGM in the amount of $1,080,000.00 and it is included in this MRP in Appendix B.

### Reclamation Plan (before bond estimate)

The productivity of equipment is somewhat difficult to predict, and therefore, Andalex feels that conservative estimates were in order. There are many variables which contribute to the productivity of a particular machine, including operator skill, type of material, and the condition of the material.

It is obvious that a front end loader, for example, can move more topsoil from a pile than, for example, a bouldery conglomerate of highly compacted material.

However, for the purpose of this analysis, it should be assured that based on means cost data the following prices on earthwork can be used:

- Open Dozer grading : $2.25/yd
- Fill Placement : $1.16/yd
- Topsoil Placement: $1.16/yd
- Topsoil Hauling: $4.55/yd
- Compaction: $.21/yd

~~The following cost projection reflects hourly rates. An additional earthwork estimate can be found following the mass balance estimates.~~

1989
Reclamation Cost Projection

Centennial Project

Lower Sunnyside Mine

Restoration to pre-mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Coal Pile Storage Area | | | |
| a. Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. Fill pad | Loader | 55 | 4,400 |
| c. Contour slope including stream channel | D 7 | 50 | 4,000 |
| d. Compact | Loader | 15 | 1,200 |
| e. Replace topsoil | Loader | 23 | 1,840 |
| f. Grade topsoil | Grader | 15 | 1,050 |
| g. Revegetate | Drill | 7 | 350 |
| h. Stake | Engineer | 14 | 700 |
| Total Coal Pile Area: | | | $14,180 |
| 2. Roads | | | |
| a. Recontour | D 7 | 5 | $ 400 |
| b. Compact | Loader | 3 | 240 |
| c. Replace topsoil | Loader | 2 | 160 |
| d. Grade topsoil | Grader | 2 | 140 |
| e. Revegetate | Drill | 1 | 50 |
| Total Roads: | | | $ 990 |
| 3. Seal Wells (2) | | | |
| a. Fill, cement | | | $ 800 |
| Total Wells: | | | $ 800 |
| 4. Material Storage Area (including topsoil pile) | | | |
| a. Remove all structures | 5 man crew | 120 | $ 9,000 |
| b. Recontour including stream channel | D 7 | 30 | 2,400 |
| c. Compact | Loader | 4 | 320 |
| d. Replace topsoil | Loader | 8 | 640 |

| | | | |
|---|---|---|---|
| e. Grade topsoil | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| g. Stake | Engineer | 14 | 700 |
| Total Material Storage: | | | $13,440 |

~~Gilson (Pinnacle Mine)~~

~~Restoration to the pre-mining land use will require:~~

| | Job Description | Equipment | Hours | Cost |
|---|---|---|---|---|
| ~~1.~~ | ~~Mine Portal Area~~ | | | |
| | ~~a. Seal portals, remove conveyor, etc.~~ | ~~Loader~~ | ~~8~~ | ~~$ 640~~ |
| | ~~b. Fill pad~~ | ~~Loader~~ | ~~12~~ | ~~960~~ |
| | ~~c. Contour slope~~ | ~~D 7~~ | ~~8~~ | ~~640~~ |
| | ~~d. Compact~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| | ~~e. Replace topsoil~~ | ~~Loader~~ | ~~6~~ | ~~480~~ |
| | ~~f. Grade topsoil~~ | ~~Grader~~ | ~~4~~ | ~~280~~ |
| | ~~g. Revegetate~~ | ~~Drill~~ | ~~2~~ | ~~100~~ |
| | ~~h. Stake slope~~ | ~~Engineer~~ | ~~4~~ | ~~200~~ |
| | ~~Total Portal:~~ | | | ~~$ 3,620~~ |
| ~~2.~~ | ~~Roads (1 mile)~~ | | | |
| | ~~a. Recontour~~ | ~~D 7~~ | ~~20~~ | ~~$ 1,600~~ |
| | ~~b. Compact~~ | ~~Loader~~ | ~~10~~ | ~~800~~ |
| | ~~c. Topsoil~~ | ~~Loader~~ | ~~8~~ | ~~640~~ |
| | ~~d. Grade~~ | ~~Grader~~ | ~~8~~ | ~~560~~ |
| | ~~e. Revegetate~~ | ~~Drill~~ | ~~4~~ | ~~200~~ |
| | ~~Total Roads:~~ | | | ~~$ 3,800~~ |
| ~~3.~~ | ~~Coal Pile Area~~ | | | |
| | ~~a. Fill pad~~ | ~~Loader~~ | ~~16~~ | ~~$ 1,280~~ |
| | ~~b. Contour slope including stream channel~~ | ~~D 7~~ | ~~20~~ | ~~1,600~~ |
| | ~~c. Compact~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| | ~~d. Topsoil~~ | ~~Loader~~ | ~~6~~ | ~~480~~ |
| | ~~e. Grade~~ | ~~Grader~~ | ~~4~~ | ~~280~~ |
| | ~~f. Revegetate~~ | ~~Drill~~ | ~~2~~ | ~~100~~ |
| | ~~g. Stake~~ | ~~Engineer~~ | ~~4~~ | ~~200~~ |
| | ~~Total Stockpile Area:~~ | | | ~~$ 4,260~~ |
| ~~4.~~ | ~~Seal Wells~~ | | | |
| | ~~a. Fill, cement~~ | | ~~8~~ | ~~$ 1,000~~ |
| | ~~Total Wells:~~ | | | ~~$ 1,000~~ |
| ~~5.~~ | ~~Material Storage & Building Areas~~ | | | |
| | ~~a. Remove all structures (including shop/ warehouse)~~ | ~~5 man crew~~ | ~~240~~ | ~~$27,000~~ |
| | ~~b. Recontour including stream channel~~ | ~~D 7~~ | ~~30~~ | ~~2,400~~ |
| | ~~c. Compact~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| | ~~d. Replace topsoil~~ | ~~Loader~~ | ~~8~~ | ~~640~~ |

| | | | |
|---|---|---|---|
| e. | Grade Grader | 4 | 280 |
| f. | Revegetate Drill | 2 | 100 |
| | Total Material: | | $30,740 |

Aberdeen Mine

Restoration to the pre-mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Mine Portal Area | | | |
| a. Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. Fill pad | Loader | 24 | 1,920 |
| c. Contour slope | D 7 | 16 | 1,280 |
| d. Compact | Loader | 8 | 640 |
| e. Replace topsoil | Loader | 12 | 960 |
| f. Grade topsoil | Grader | 8 | 560 |
| g. Revegetate | Drill | 4 | 200 |
| h. Stake slope | Engineer | 8 | 400 |
| Total Portal Area: | | | $ 6,600 |
| 2. Coal Pile Area (including topsoil storage and sedimentation pond) | | | |
| a. Fill pad | Loader | 50 | $ 4,000 |
| b. Contour slope including stream channel | D 7 | 50 | 4,000 |
| c. Compact | Loader | 15 | 1,200 |
| d. Replace topsoil | Loader | 22 | 1,760 |
| e. Grade topsoil | Grader | 15 | 1,050 |
| f. Revegetate | Drill | 7 | 350 |
| g. Stake slope | Engineer | 14 | 700 |
| Total Stockpile Area: | | | $13,060 |
| 3) a. Seal Portals, fill cut slope | Loader | 8 | $ 640 |
| b. Remove culvert | Backhoe | 25 | 2,000 |
| c. Contour stream channel | D 7 | 16 | 1,280 |
| d. Contour slope | D 7 | 16 | 1,280 |
| e. Compace | Loader | 8 | 640 |
| f. Replace topsoil | Loader | 16 | 1,200 |
| g. REVEGATATION | Drill | 2 | 100 |
| h. Stake slope | Engineer | 8 | 400 |
| Total Stockpile Area: | | | $ 7,540 |

~~Office Site~~

~~Restoration to pre-mining land use will require:~~

| ~~Job Description~~ | ~~Equipment~~ | ~~Hours~~ | ~~Cost~~ |
|---|---|---|---|
| ~~1. Office Site~~ | | | |
| ~~a. Remove structures~~ | ~~5 man crew~~ | ~~50~~ | ~~$ 3,750~~ |
| ~~b. Recontour~~ | ~~D-7~~ | ~~8~~ | ~~640~~ |
| ~~c. Compact~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| ~~d. Replace topsoil~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| ~~e. Grade topsoil~~ | ~~Grader~~ | ~~4~~ | ~~280~~ |
| ~~f. Revegetate~~ | ~~Drill~~ | ~~2~~ | ~~100~~ |
| ~~g. Stake slope~~ | ~~Engineer~~ | ~~4~~ | ~~200~~ |
| ~~Total Office Site:~~ | | | ~~$ 5,610~~ |
| ~~2. Seal Well (1)~~ | | | |
| ~~a. Fill, cement~~ | | ~~4~~ | ~~$ 400~~ |
| ~~Total Well:~~ | | | ~~$ 400~~ |
| ~~3. Roads 1/4 Mile~~ | | | |
| ~~a. Recontour~~ | ~~D-7~~ | ~~5~~ | ~~$ 400~~ |
| ~~b. Compact~~ | ~~Loader~~ | ~~3~~ | ~~240~~ |
| ~~c. Replace topsoil~~ | ~~Loader~~ | ~~2~~ | ~~160~~ |
| ~~d. Grade topsoil~~ | ~~Grader~~ | ~~2~~ | ~~140~~ |
| ~~e. Revegetate~~ | ~~Drill~~ | ~~1~~ | ~~50~~ |
| ~~Total Roads:~~ | | | ~~$ 990~~ |

~~Total Projected Reclamation Costs:~~

| | |
|---|---|
| ~~Lower Sunnyside Mine~~ | ~~$ 29,410~~ |
| ~~Gilson (Pinnacle) Mine~~ | ~~43,420~~ |
| ~~Aberdeen Mine~~ | ~~27,200~~ |
| ~~Office Site~~ | ~~7,000~~ |
| ~~Monitoring (5 years)~~ | ~~10,000~~ |
| ~~Total Reclamation, 1987 $~~ | ~~$117,490~~ |
| ~~Contingency 10%~~ | ~~11,750~~ |
| ~~Grand Total*~~ | ~~$129,240~~ |

~~* Please note that as no reclamation is required for the Centennial Seam Mine no costs for reclamation are described above.~~

## MASS BALANCE SUMMARY

| Station | CUT | | FILL | |
|---|---|---|---|---|
| | ft² | yds³ | ft² | yds³ |
| 1 + 00 | 520 | 963 | 160 | 2148 |
| 0 + 00 | 0 | 815 | 1000 | 1889 |
| 1 + 00 | 440 | 1000 | 20 | 407 |
| 2 + 00 | 100 | 1074 | 200 | 1259 |
| 3 + 00 | 480 | 3333 | 480 | 1519 |
| 4 + 00 | 1320 | 2593 | 340 | 2259 |
| 5 + 00 | 80 | 2889 | 880 | 1852 |
| 6 + 00 | 1480 | 6778 | 120 | 2704 |
| 7 + 00 | 1736 | 6429 | 2493 | 8310 |
| 8 + 00 | 2572 | 4764 | 1316 | 4874 |
| 9 + 00 | 1696 | 6281 | 1444 | 5348 |
| 10 + 00 | 1480 | 6444 | 1800 | 6519 |
| 11 + 00 | 2000 | 6259 | 1720 | 5593 |
| 12 + 00 | 1380 | 9222 | 1300 | 5074 |
| 13 + 00 | 3600 | 7037 | 1440 | 6148 |
| 14 + 00 | 200 | 370 | 1880 | 8852 |
| 15 + 00 | 0 | 370 | 2900 | 5815 |
| 16 + 00 | 200 | 407 | 240 | 2111 |
| 17 + 00 | 20 | 1889 | 900 | 5593 |
| 18 + 00 | 1288 | 4720 | 2116 | 7836 |
| 19 + 00 | 1168 | 4325 | 2344 | 7813 |
| 20 + 00 | 536 | 1985 | 688 | 2546 |
| 21 + 00 | 1736 | 6429 | 557 | 2059 |
| 22 + 00 | 2748 | 5090 | 1056 | 3910 |
| 23 + 00 | 1544 | 2860 | 1056 | 3910 |
| 24 + 00 | 220 | 1148 | 820 | 2963 |
| 25 + 00 | 400 | 926 | 780 | 4519 |
| 26 + 00 | 100 | 2630 | 1660 | 10222 |
| 27 + 00 | 1320 | 4444 | 3860 | 7407 |
| 28 + 00 | 1080 | 3111 | 140 | 1741 |
| 29 + 00 | 600 | 2222 | 800 | 2815 |
| 30 + 00 | 600 | 2074 | 720 | 2222 |
| 31 + 00 | 520 | 1889 | 480 | 1741 |
| 32 + 00 | 500 | 1482 | 460 | 2185 |
| 33 + 00 | 300 | 2037 | 720 | 1815 |
| 34 + 00 | 800 | 3111 | 260 | 852 |

| | | | | |
|---|---|---|---|---|
| 35 + 00 | 880 | 3185 | 200 | 1630 |
| 36 + 00 | 840 | 1963 | 680 | 3482 |
| 37 + 00 | 220 | 1741 | 1200 | 5407 |
| 38 + 00 | 720 | 2741 | 1720 | 4037 |
| 39 + 00 | 760 | 3000 | 460 | 6111 |
| 40 + 00 | 860 | 2704 | 2840 | 5593 |
| 41 + 00 | 600 | 1444 | 180 | 1148 |
| 42 + 00 | 180 | 482 | 440 | 963 |
| 43 + 00 | 80 | 148 | 80 | 148 |

* Total Cut = 136,858 yds$^3$; * Total Fill = 154,301 yds$^3$
* Ratio of fill to cut = 1.11:1.00. This allows for an expansion factor of 1.11 or 11% on the cut material.

As Constructed Earthwork Volume (Aberdeen Mine and Left Fork Fan)

Cut 72,406 yds.³
Fill 76,925 yds.³
Topsoil 4,250 yds.³ (Piles H & J)

As Constructed Earthwork Volumes
(including Aberdeen Site)

Cut 117,273 yds.³
Fill 112,969 yds.³
Topsoil 8,500 yds.³

For purposes of reclamation costs for earthwork, the following estimates can be used. Please keep in mind that as built cross sections for the Aberdeen Mine will aid in the final earthwork estimates.

Open Grading (including 10% swell factor)
76,925 + 7693 = 84,618 @ $2.25
112,969 + 11,297 = 124,266 @ $2.25
208,884 @ $2.25 = $469,989
Topsoil Hauling and Placement
22,750 + 2275 = 25,025 @ $5.71 = $142,893
Compaction
158,294 @ $.21 = $33,242
Total Earthwork: $646,124

There is a 8,000 yd.³ topsoil deficit. The topsoil substitutes will make up this deficit.

The test plots previously discussed regarding the topsoil deficit is further discussed here.

Two test plot locations were decided upon based on certain known parameters. The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the rEVEGATATION test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the

~~deficit problem.~~

## R645-301-542.500. IMPOUNDMENTS AND EMBANKMENTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-542.600. ROADS

~~Transportation~~

~~**Roads**~~

~~All roads within the permit area are classified as "Primary Roads" in accordance with R614-301-527.100 or "Ancillary Roads" in accordance with R645-301-527.130. Roads on the site are of 2 typical designs:~~

~~1. Single lane, gravel or asphalt surfaced roads approximately 12 - 15' wide; and~~

~~2. Double lane, either gravel or asphalt surfaced roads, approximately 26' wide.~~

~~Although all roads on site are not used for coal hauling, each primary road is constructed to the respective typical design and dimensions shown on Plate 35.~~

~~All roads are shown on Plate 6 and Plate 8. Specifics about the road are described individually and include road widths, gradients and surfaces. Drainage ditches and drainage structures for each road (disturbed area ditches or culverts) can be found in Tables IV-2 through IV-8.~~

~~Because of the variance in road types, widths and lengths, the roads have been designated on Plate 6 with numbers (i.e. PR-1= Primary Road 1, Ar-1= Ancillary Road 1) to facilitate the description of each.~~

~~Primary Road 1 (PR-1) This road connects Carbon County Road 199 to the two lane paved road which travels past the Aberdeen Mine facilities, past the office driveway and bath house drive ways and past the Pinnacle truck loadout. This is an asphalt surfaced road approximately 26 feet wide and 2700 feet long. The grade on PR-1 ranges from 4% to 8%. It is used for hauling coal and for men and material access to the mines.~~

~~Text Was Moved From Here: 5~~

~~Primary Road 3 (PR-3) – This road provides access to the Aberdeen Mine truck loadout. It is a single lane gravel surface road approximately 15 feet wide and 590 feet long. It is treated with Magnesium Chloride annually. The grade on this road ranges from 0% to 4%.~~

~~Primary Road 4 (PR-4) – This road provides access for the coal haul trucks to the Pinnacle Mine truck loadout. It is also crossed to access the bath house parking area. This is a single lane, paved surface road which is approximately 15 feet wide and 500 feet long. The grade on this loop ranges from 0% to 9%.~~

~~Primary Road 5 (PR-5) – This road provides access for the coal haul trucks coming off of PR-2 to the Apex Mine truck loadout. It is a single lane gravel surfaced road approximately 15 feet wide and 425 feet in length. The grade on this road ranges from 0% to 7%. It is treated annually with Magnesium Chloride. The three truck loadout roads are also accessed by front end loaders for the purpose of cleaning up occasional coal spills.~~

~~Primary Road 6 (PR-6) – This is an access road which leads to the main office parking area. It is a single lane, paved surface road which is approximately 15 feet wide and 600 feet long. The average grade of this road is 5% to 7%.~~

~~Primary Road 7 (PR-7) – This is an access road for mining equipment. It provides heavy equipment access to and from the Aberdeen Mine. It begins at the south inlet to pond C and it ends at the bath house parking area. It is a gravel surfaced road and is approximately 12 feet wide and 450 feet long. It has grades which range from 4% to 14%. Magnesium Chloride is applied annually.~~

~~Primary Road 8 (PR-8) – This road leads from the fuel storage area at the Pinnacle Mine facility to the oil storage area near the upper Pinnacle portals. This is a single lane, gravel surface road approximately 15 feet wide and 325 feet long. The grade on this road has a range of 9% to 11%. It is treated with Magnesium Chloride annually.~~

~~Primary Road 9 (PR 9) – This road leads from PR 2 and turns west over the top of the Apex Mine conveyor belt. The road leads to the Apex Mine material storage area, adjacent to the mine fan. This is a single lane gravel surfaced road which is approximately 15 feet wide and 200 feet long and includes a steel deck bridge over the mine conveyor. The grade on this road ranges between 0% and 8%, and the gravel is treated with Magnesium Chloride.~~

~~Primary Road 10 (PR 10) – This is an access road which leads from the upper Aberdeen Mine material storage area down to the Aberdeen Mine stockpile pad. This is a short stretch of road which is approximately 12 feet wide and 150 feet long. It is a single lane road with an average grade of 12% to 15%.~~

~~Primary Road 11 (PR 11) – This is a very short access road which accesses the bath house pad from two directions; both from PR 1 and from PR 4. This road is approximately 12 feet wide and 150 feet long. It is a single lane road with a grade of 0% to 6%. This road is treated with magnesium chloride annually.~~

~~Ancillary Road 1 (AR 1) – This is an access road which leads from the south Aberdeen intake portal to the Aberdeen mine fan. It is a single lane road which has a surface of sandstone. The road is used primarily for access to the fan, water system and conveyor. This road is approximately 20 feet wide and 400 feet long. There is a steel deck bridge over the Aberdeen mine conveyor. The grade on this road ranges from 8% to 10%.~~

~~Ancillary Road 2 (AR 2) – This road leads from the upper Pinnacle Mine intake portals to the Pinnacle Mine fan. It is a single lane gravel surfaced road which has a steel deck bridge where the road crosses the Pinnacle Mine conveyor. Its primary use is to access the Pinnacle Mine fan. It is approximately 12 feet wide and 250 feet long. The grade on this road ranges from 0% to 12%.~~

~~Ancillary Road 3 (AR 3) – This road leads from PR 2 up to the Apex material storage area (Gun range). This is a single lane gravel surface road which is approximately 12 feet wide and 175 feet long. The grade on this road is on~~

~~an average of 9%. It is treated with Magnesium Chloride annually. It is used primarily for access.~~

~~Ancillary Road 4 (AR 4) This road is access from the upper Apex material storage area to the Powder Magazines. This road continues beyond the north end of our permit area but it becomes a private road beyond the permit area. This is a single lane dirt road which is approximately 12 feet wide and 150 feet long. The grade on this short stretch of road is 5% to 8%.~~

~~Ancillary Road 5 (AR 5) This road is access from Carbon County Road 299 to the left hand fork installation. This existing road will be upgraded adequately for maintenance and emergency access only. It will be equipped with a locked gate. This is a single lane dirt road which is approximately 15 feet wide and 4000 feet long. There will be 3 or 4 locations specifically widened so that two vehicles may pass. The grade on this stretch of road ranges from 0% to 15%. This road will be reclaimed upon cessation of mining pending the approval of Mrs. Gladys Artman.~~

~~Andalex commits to repair roads damaged by a catastrophic event according to R645-301-527.240. According to R645-301-534.100 Andalex has located, designed, constructed, used and maintained Primary Roads so as to prevent or control damage to private and public property. Andalex has used non acid or non toxic forming materials in road surfacing. Roads have, at a minimum a static safety factor of 1.3 on embankments. Andalex has a schedule and plan to remove roads that will not be retained as part of the~~ Roads not to be retained for use under an approved post mining land use~~. Ancillary roads will be traveled only by light vehicles for routine access. Occasionally, they will be traveled by larger equipment but probably only in emergency or repair situations, as 2 of the 4 Ancillary Roads lead to fan installations. All Primary Roads will meet the requirements of R645-301-358, R645-301.527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-542.600 and R645-301-762. Primary Roads will be located in so far as practical on the most stable available surfaces. The roads are surfaced with rock, gravel or asphalt according to R645-301-534.320. They will be routinely maintained, and have culverts which are designed and installed as necessary according to the requirements of

~~R645-301-534.340.~~

~~**Railroad**~~

~~There are no existing or proposed railroad spurs on the property.~~

~~**Other Transportation Facilities**~~

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~~Transportation facilities such as roads have been addressed. The roads, Class II and I are to be removed upon cessation of mining by simple regrading and re-establishment of contours, unless surface owners request access through the mine area might remain.~~

~~Protection of the environment through the use of these facilities is achieved by speed controls (20 mph minesite). The conveyor structures as such do not impose environmental problems. Public safety obviously is a requirement of law including MSHA but also public safety is a requirement of Andalex Resources. Also the minesite is not frequented by any public outside of normal, weekly business hours.~~
will be reclaimed immediately after it is no longer needed for mining and reclamation operations.

## R645-301-542.610. CLOSURE

See R645-301-240.

## R645-301-542.620. REMOVAL OF BRIDGES AND CULVERTS

~~Post Mining Hydrology~~

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases including the left fork fan installation:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

   All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

2. Once ~~rEVEGATATION~~revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-542.630. TOPSOIL REPLACEMENT AND ~~REVEGATATION~~Revegetation

**Backfilling, Grading, and Soil Replacement and Stabilization**

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor. Refer to Appendix K for this study done at the Pinnacle Mine. Andalex
_has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and ~~rEVEGATATION~~revegetation.

Areas to be regraded include the portal site, surface facility site and roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final reclamation is completed, slope stability studies will be performed as necessary. All information for slope stability studies will be included as part of the final reclamation package.

Where possible, all final grading and placement of topsoil will be done along the contour to minimize erosion. In all cases, grading will be conducted in a manner which minimizes erosion and provides a stable surface for the placement of topsoils.

Topsoil existing on site will be spread using a grader. Where possible, the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history, 6".

Andalex will rip the subsurface material to 6" using most likely a toothed motor grader or a disc, prior to soil redistribution.

Andalex will mix one ton of alfalfa per acre with its

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 5

## Engineering

**C/007/019**

(Revised)
July, 2014

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## R645-301-500. ENGINEERING

The Kenilworth Tract will not require any changes to engineering practices currently employed at the Aberdeen Mine. The change simply involves an extension of underground mine workings and does not involve the surface in any way. See 301-522 and 301-525 for additional comments on subsidence.

## R645-301-510. INTRODUCTION

At present the Mining and Reclamation Plan for the Centennial Project includes 2,274.77 acres under permit (see Plate 3). This permit is now being amended to include the Kenilworth Federal Lease UTU-81893 (1760.0 acres), bringing the total permit area to 4,034.77 acres (see Plate 3). Lease UTU-81893 was acquired in 2006. Mining activity within the Kenilworth lease area will be an extension of the underground workings of the existing Aberdeen Mine. Therefore there will be no new surface facilities associated with mining in the new lease areas (other than additional Gob Gas Vent holes, if needed, which will be permitted on a site-specific basis in the future). It should be noted that UTU-81893 was previous included in the Willow Creek Mine Permit No. ACT/007/038 which has been previously approved by DOGM. After the Willow Creek Mine was closed the Kenilworth lease was terminated. The area was subsequently re-leased by BLM in 2006 through the normal LBA process after an application by Andalex Resources.

Since the Kenilworth Lease is simply an extension of underground mine workings under roughly 2,000 to 3,000 feet of cover there will be absolutely no effect on Engineering except for additional subsidence points. (Plate 25)

Most of the maps previously submitted as part of the Mining and Reclamation Plan are applicable. Where necessary, original maps have been revised to indicate the newly acquired lease area and these revisions are included with this submittal as figures or as plates in Volume II. Plates which have been changed to show the location of the incidental boundary change are included.

It should be noted that no man made surface features are located in or around the Kenilworth Lease UTU 81893 shown on Plate 25 and others.

All categories within this section have been addressed, primarily in Volume II of the MRP which contains most of the

plates.

a) Surface and subsurface ownership of lands contiguous to the permit area are shown on Plates 2 and 3.

b) The leases for which we have the legal right of entry are shown on Plate 4.

c) Andalex has submitted a permit modification to include the new Kenilworth Lease recently acquired. Also, a permit was sought in 1993 for a fan installation immediately adjacent to Andalex's leases in the left hand fork in Deadman Canyon.

d) There are no buildings within 1,000 feet of the permit area except those used as part of the mining operation. They are shown on Plates 6 and 7.

e) There are no surface or subsurface man-made features within, passing through or passing over the permit area except the powerline, telephone cables, culverts, and etc., installed for the operation of this mine. See Plate 6 for their locations.

f) Reference areas are shown on Plate 9 as R-1, R-3 and R-4. They are each 200 feet square approximately.

g) Surface water users within this immediate hydrologic area are shown on (Refer to Figure 5, Appendix L, which shows additional water use on Emma Park in the form of stock watering). Water rights for this area are found in Appendix L Tables 1 and 5 and Figure 5. The intake location for this water into the mine is located on Plate 6. Disturbed area runoff is collected in a culvert and taken directly into the mine. Andalex controls this water right. If a discharge were to occur from any sediment pond (this has yet to occur), it would discharge into the Deadman Canyon drainage (Plate 21) which is ephemeral.

h) County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' mine site (Plate 1).

i) There are no public parks nor any cultural or historical sites eligible for listing in the National Register in or adjacent to the mine plan area.

j) There are no cemeteries or burial grounds in or within 100 feet of the permit area.

k) There is no land which is within the boundaries of any units of the National System of Trails or the Wild and Scenic Rivers System including study rivers.

Cross Sections, Maps, and Plans

Most of the cross sections, maps, and plans of the approved plan remain applicable. Where necessary, original maps have been revised to indicate the addition of the newly acquired lease area and are included in this submittal, primarily in Volume II.

All categories within this section have been addressed. Specifically,

a) Plates 26, 27, and 28 show all the test borings locations and elevations. Specific information relating to these drill holes and the strata encountered can be found in Appendix E (coal quality, description of other strata). Into regarding roof & floor analyses is in Appendix E.

b) Monitoring stations for water quality are shown on Figure 7-1. Fish and wildlife monitoring stations were not set up for this application. However, refer to Plates 34A, 34B, 34C, and 34D, which depicts wildlife distribution. Air quality monitoring was not required for this application. Figure 6 in Appendix L shows proposed monitoring stations. Andalex has adhered to the locations shown on Figure IV-11 which is included in Andalex's operating plan.

c) Refer to Appendix E for specific drill hole lithologies as well as data on quality and chemical characteristics.

d) Crop lines and strikes and dips can be found on the coal thickness isopachs in Volume II, Plates 26, 27, 28, and 40.

e) All old workings in the three coal seams to be mined are shown on Plates 29, 30, and 31. There are no old workings in the Centennial Seam. (plate 41)

f) All subsurface water on the permit area exists in perched aquifers. The Aberdeen sandstone is the lowest water bearing unit within the permit area and is discussed in this chapter, Geology. The only water well drilled on the property which has been used with any frequency (well #1) has not depicted any seasonal variation. It is always a low producer.

g) There are no surface waters within the permit area. All drainages (natural) are shown on the topography on Plate 21. All constructed drainages are shown on Plates 6 and 7. There are no irrigation ditches. Appendix L, which is the Hydrologic Inventory, contains Figure 4 which clearly depicts the location of springs in the permit area and adjacent areas. This figure, along with Figures 5 and 6, depict the areal extent of the inventory. See Plate 1 for other spring locations in the adjacent area and 1A for Kenilworth Lease Area.

h) N/A

i) Plate 6 shows the location of temporary storage for underground development waste and excess spoil which can be stored in an area which was previously used as a sediment pond. Plate 6 now also shows the location of a new area above the Apex Mine which can be used for temporary and permanent storage of coal mine development waste such as sediment pond material. All dams and impoundments are shown on Plates 6 and 7, and detailed on Plates 11, 12, and 13. There are no other water treatment or air pollution control facilities on the permit area.

j) There are no oil or gas wells within the permit area. Three water wells are shown on Plate 6. Well number 1 is 220 feet deep; number 2 is 100 feet deep, and number 3 is 120 feet deep. Also, there are no oil or gas wells located in the adjacent areas.

k) Plates 14 and 15 accurately depict the area currently affected by mining as well as the area to be affected. They show the slopes as they exist as well as after construction and upon final reclamation.

## R645-301-511. GENERAL REQUIREMENTS

See R645-301-510.

## R645-301-511.100. PROPOSED COAL MINING AND RECLAMATION OPERATIONS

See R645-301-510.

## R645-301-511.200. POTENTIAL IMPACTS TO THE ENVIRONMENT

See R645-301-510.

## R645-301-511.300. RECLAMATION

See R645-301-240.

## R645-301-512. CERTIFICATION

See Volume II and R645-301-510.

## R645-301-512.100. CROSS SECTIONS AND MAPS

See R645-301-510.

## R645-301-512.110. MINE WORKINGS TO THE EXTENT KNOWN

Introduction

**Mine Property**

The coal leases owned by Andalex Resources are located in the Deadman Canyon area of the Book Cliffs coal field. The property is located about 10 miles north-northeast of Price, Utah in Carbon County. Mining has progressed onto all of Andalex's federal leases except the Kenilworth Lease. As is shown on the enclosed Plate 6, development into all seams involves separate surface facilities which are located adjacent to each other in Deadman. The Centennial coal seam which is an isolated pocket of recoverable coal was accessed from the Pinnacle Mine via rock slopes. The three rock slopes constructed each of which was be approximately 500' in length. The three tunnels are for intake air, return air, and belt line. No waste rock was removed from the Pinnacle Mine either during or after construction. All waste rock will be disposed of underground.

**Economic Geology**

This project is located in a region where coal mining has historically been the only industry. The main coal-bearing rocks occur in the Blackhawk Formation of the Upper Cretaceous Mesa Verde Group. Several small operations have mined coal in the Deadman Canyon area over the past 70 years. These mines, however, merely scratched the surface of the estimated reserve. There are no other economically recoverable, replenishible or non-replenishible resources within this property.

**Exploration**

All exploration and drilling programs have been completed. The drilling and exploration activities were supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the lease area. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Zion's, Star Point, and Blue Flame No. 1 mines. Samples have been taken from the Centennial Seam at 89-1-CP and underground. See appendix E.

A five hole drilling program was conducted by Centennial Coal Associates in 1971. A seven hole drilling program was conducted by Andalex in 1977. These programs were supplemented by two holes drilled west of the property by North American Coal Company in 1948 and one drilled by Pacific, Gas and Electric in 1980. All drill sites are shown on Plates 26, 27, and 28. Refer to Appendix E.

**Reserves**

By U.S. Geological Survey definition, approximately 30% of the entire reserve is classified as "measured". The remainder is classified as indicated, based on all available measurements.

Total coal reserves in the four seams have been estimated at 50.8 million tons. Recoverable coal has been estimated at 30.5 million tons. Andalex expects an initial recovery rate of about 35 percent and upon final pillar extraction, total recovery is expected to be more than 65 percent. Cover ranges from 0 feet to more than 3,000 feet on the northern end of the property.

## Underground Operation and Facilities

**Mine Layout(Refer to Plates 26, 27, 28 and 29).**
**Multiple Seam Considerations**

There were four economic seams present on the property. The uppermost seam is the Lower Sunnyside which varies from four to six feet thick. The second highest seam is the Centennial Seam which varies from four to eight feet thick. The third seam is the Gilson Seam which also varies from 4' to 8' thick. The lowermost seam is the Aberdeen which varies from four to thirteen feet in thickness. The bottom two seams are separated by a 200 foot interval which includes a massive sandstone. The Gilson and the Centennial Seams are separated by approximately 130' and the

Centennial and Lower Sunnyside Seams are separated by 80' including a massive sandstone. It should be noted that the area in which the Centennial Seam is to mined does not contain any reserves in either the Lower Sunnyside nor the Gilson Seams. Only the Aberdeen Seam is present where the Centennial Seam is to be mined. The mine plans for each seam are shown on Plates 26, 27, 28 and 29.

**Portals**

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine. The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

**Mains, Submains, and Slopes**

A five entry system is being used (two intake portals) and using a continuous miner, the entries are being driven to the property line. Generally, entries on 80 foot centers with crosscuts every 80 feet are being driven on the strike and dip of the coal seam. Development mining for the longwall panels are on 5th entry and 3rd entry systems. Refer to Plates 26 through 29. There exists only one return air portal on the surface, however, two exist underground making the five entry system.

**Shafts and Interconnecting of Slopes**

Mining plans called for rock tunnels to be constructed from the existing Pinnacle Mine up to the Centennial Seam mining area. These rock slopes are each approximately 500' in length. The three tunnels consist of an intake air tunnel, a return air tunnel, and a belt tunnel. Coal is transported via the belt

tunnel and transferred on to the existing Pinnacle Mine conveyor belts. These tunnels were constructed in the Spring of 1990 and mining has commenced.

**Longwall Panels**

The mining sequence calls for the development of panels longwall using 2, 3 and 5 entry systems. These panels will be generally 650 to 800 feet in width and up to 800 feet in length.

**Barrier Pillars**

A barrier pillar will be left between the bleeders and the longwall panels. A barrier will also be left wherever old mine workings are skirted such as the Olsen Mine on the east side of Deadman Canyon in the Gilson Seam. Due to resent MSHA requirements a barrier pillar will be left between longwall panels at depths deeper than 1,500 feet.

**Bleeder System**

A bleeder system will be maintained and pillars left to provide for ventilation, eventually extending around all mined out areas.

**Ventilation**

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and dust; there has been small amounts only found to date in any of the old works or new faces. The longwall faces will be ventilated with a live brattice system consisting of a line curtains. The conveyor systems will be isolated from intake and return except in 2 entry gate systems when the belt will double as the intake. All ventilation requirements of the Coal Mine Health and Safety Act will be met. This ventilation plan will be strictly adhered to, in order to insure safety of all personnel. Please note that the Centennial Seam mining area is ventilated by the existing Pinnacle Mine fan system. The new left fork fan installation will provide additional required ventilation for the Aberdeen Mine longwall faces.

**Roof Control**

All Andalex Mines operate under an approved M.S.H.A. roof support plan which calls for bolting on five foot centers with a minimum 42" bolt length in our development entries. Roof control

in the longwall faces will be accomplished using hydraulic shields. The roof in all four seams is a massive sandstone (60'+) and offers excellent support in itself. The old mine workings which were rehabilitated for the Pinnacle Mine main entries had stood unsupported for 40 years. This roof control plan will be strictly adhered to, in order to insure the safety of all personnel.

**Explosives and Blasting**

All blasting performed underground will conform to both state and federal regulations governing explosives and blasting in underground coal mines. The rock tunnels to the Centennial Seam were constructed by professional hard rock mining company.

All surface blasting activities necessary for present operations have been completed in compliance with sections 817.61 through 817.68 of Chapter VIII of Title 30 of the Code of Federal Regulations.

Blasting consisted of portal highwall construction for purposes of stability. A powder magazine has been set up on one of the surface pads, located in a remote area. It is built to conform to all regulations, such as segregation, regarding such a structure (see plate 6). All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved and who possess a valid certificate as required by Title 30 of the Code of Federal Regulations.

**General Safety Measures**

A great emphasis is put on assuring a safe mine operation and the mine and surface facilities will be operated within prudent standards to insure the health and safety of all employees. The facilities will be carefully inspected by company-trained safety engineers and state and federal mine inspectors.

The operation will abide by Utah State Coal Mine Regulations and the 1969 Federal Coal Mine Health and Safety Act. In addition, these regulations will be supplemented by a company safety policy. Various training programs will be utilized such as the following:

Methane Measurements
Roof and Rib Control
Oxygen Deficiency Testing

Ventilation
First Aid
Mine Rescue
Mine Electrical Certification
Self Rescue Training
Use of Personal Protective Equipment
Recognition of Electrical Hazards
General Accident Prevention
Mine Communications
Job Safety Training

Many of the training programs will run continuously, such as those involving roof control and ventilation. Other programs are held annually with many oriented toward new employees.

**Mine Development (Refer to Plates 26, 27, 28 and 29).**

**Room and Pillar**

Room and pillar design will be employed in fringe areas surrounding the longwall panels as conditions allow.

**Pillar Extraction**

Once development in fringe areas is completed, pillar extraction will commence as conditions permit. Final pillar extraction will result in a total recovery rate of approximately 65 percent.

**Cycle and Sequence of Mining**

As mining progresses, the following equipment was added to start up additional mining areas and increase production (currently four units have been employed):

4th Mining Unit - January, 1990
Longwall - August, 1994

As there was four coal seams of minable thickness on the leases, a systematic plan of mining will be followed to assure maximum recovery of the coal reserves. When mining is progressing concurrently in two seams, the room and pillar design and layout will be columnized to assure maximum roof support.

## Underground Equipment

**Production Units**

In each mine, the longwall development entry systems, will be mined with a drum-type continuous miner similar to the Joy 12 CM. Presently, Joy 12 CM-11's and 14 CM's are being used in the operation. Coal is transported by shuttle car (Joy) to a loading point consisting of a Long Airdox Feeder Breaker or similar machine, which will discharge onto a 42" panel conveyor or a 42" main conveyor. Roofbolting is and will be accomplished by a Lee Norse Roof Bolter or a similar type machine. The longwall panels will employ a Joy, 4-LS or similar shearer. Coal will be discharged into a pan face conveyor which will carry the coal to a crusher 1 stage loader for transportation by belt conveyor to the surface. Roof support will be by hydraulic shields. Additional production units will be added as previously outlined.

**Belt Conveyors**

The feeder breaker or state loader will discharge the coal onto either a 48" panel conveyor or a 42" main conveyor. The conveyor will transport the coal to the outside, where it will be discharged to a live stockpile, (see Plate 6). Currently, Long Airdox conveyor belt drives are being used. For the longwall installations, the same, or similar drives will be employed.

**Water System**

Water for mining use, such as for providing face fire protection and dust suppression, will be obtained from Water Well No. 1, shown on Plate 6. Water is also collected from the disturbed area via a system of culverts to underground workings connected to the Pinnacle Mine. This water will be pumped to the Mine Water Storage Tank and from there into the mine using a high pressure pump. Several sumps have been cut in the mine for the purpose of reclaiming water as most available water will be needed. Enough water is currently generated from the formation and coal seam that Andalex currently discharges approximately 50% of the time through approved UPDES point 002.

**Power System and Communication Facilities**

A 7200 volt, 3 phase, 60 hertz power distribution system has been taken underground from a 2500 KW substation located on the surface plant area. The primary feed into the substation is 46,000 volts from the Utah Power and Light Company transmission system located approximately 6 miles south, adjacent to the airport. This 46 KV line taps Utah Power and Light's Helper - Columbia 46 KV line, at structure #89. The powerline was designed according to Utah Power and Light's specifications. After approval by Utah Power and Light, it was installed by a

private local contractor at the expense of Andalex Resources. Within the minesite area, the power is reduced to 7200 volts for the primary underground usage. This is fracture reduced up to 2300 to 6000, 480 and 240 volts for equipment operation. Surface power is on a 480 volt system. Electrical Specifications for the Deadman Canyon Mine Substation are included as Appendix I.

A 25-pair telephone communications cable is buried along the existing Deadman Canyon road, with its origin at Carbon County Airport approximately 7.5 miles from the minesite. Currently, 13 pairs are in use with additional capacity to add as the mine facilities expand. This cable was designed, supplied and installed by Mountain Bell Telephone at the expense of Andalex Resources. Mountain Bell is responsible for maintenance

The mine permit area has no utilities or services through it other than those which are accurately depicted on Plate 6. All utilities have been constructed under the close scrutiny of the Utah DWR and the U.S. Fish and Wildlife Service.

**Other Equipment**

Other equipment being utilized includes mantrips, rock dusters, tractors, rubber tired scoops, power cables, communication equipment, and miscellaneous section tools. The mine is also equipped with emergency tools and necessary supplies in the unlikely event that a fire or explosion should occur, in accordance with M.S.H.A. regulations.

**Surface Equipment**

Surface equipment includes a Cat 980-B front-end loader. Also, there is a grader for road maintenance. Other equipment such as diesel scoops and tractors will be utilized on the surface from time to time for material haulage. There are two bulk rock dust silos on the surface.

**Employment**

Andalex Resources is an Equal Employment Opportunity Employer.
The type of hourly employees to be hired are highly skilled personnel, including miner operators, shuttle car operators, roof bolters, mechanics, and electricians. All hourly employees will be properly trained and certified where necessary in accordance with M.S.H.A. regulations. Currently, Andalex Resources' employs 75 hourly wage earners. Employment at the mine will not change significantly with the installation of the longwall. The

Pinnacle Andalex's Mines, are located in Carbon County near the town of Price. Since this area is supported to a large degree by coal mining and other related industries, it is anticipated that a labor force will always be readily available.

Management and other salaried employees will consist of the Manager of Mines, the General Superintendent, the Mine Superintendents, the Mine Foremen, Safety Personnel, Secretarial and Clerical, Geologists, and Engineers (see Table IV-1).

**Schedule of Development and Mining**

There are four economic seams present on the property; mining plans are based on simultaneously developing longwall panels in 3 of the 4 seams. The incremental increases listed below represent the first eight years of production (from 1982):

| Year | Production Rate Tons/Year |
|---|---|
| 1st year (1982) | 700,000 |
| 2nd year (1983) | 350,000 |
| 3rd year (1984) | 300,000 |
| 4th year (1985) | 650,000 |
| 5th year (1986) | 700,000 |
| 6th year (1987) | 400,000 |
| 7th year (1988) | 700,000 |
| 8th year (1989) | 1,100,000 |

Mining progression for the life of the mine is shown on Plates 26, 27, 28, and 29, and will increase from 1,100,000 tpy current to 1.5 mm tpy by 1995 and will stay at this rate until mining is completed making a mine life of approximately 15-20 years.

| Year | Estimated Production | Recoverable Tons Remaining |
|---|---|---|
| 1993 | 1,200,000 | 21.2 million |
| 1994 | 1,200,000 | 20.0 |
| 1995 | 1,500,000 | 18.5 |
| 1996 | 1,500,000 | 17.0 |
| 1997 | 2,000,000 | 15.5 |
| Duration | 2,000,000 | 10 years |

To date, Andalex has mined approximately 20% of its Lower Sunnyside Reserve, 80% of its Gilson Reserve, 5% of its Aberdeen Reserve and 20% of its Centennial Reserve (The Centennial Reserve consisted originally of approximately 2.5 million recoverable

tons). All seams within the current leases have been mined out. The addition of the Kenilworth lease will provide some coal for future recovery.

**Support Structures and Buildings**

Support structures and buildings are shown on Plates 6 and 7.

**Parking Areas**

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

**Storage Areas**

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.

**Water Supply**

Water for use in the mine is described. Water for culinary use is hauled in approved water haulers from Price City. There is a sump cut in the mine from which water can be reclaimed as all available water will be needed. Since all mining is down dip from the portals, little water will exit from the mine. Information concerning the wells and water analysis is presented as Appendix L.

**Landscaping**

All disturbed areas have been graded to the most moderate slope possible to assure stability. Vegetative cover has been promptly re-established to stabilize erosion. Revegetation was accomplished by Andalex under the recommendations of the U.S. Department of Agriculture, Soil Conservation Service and the Division of Oil, Gas, and Mining.

**Signs, Markers, Fences, and Gates**

Signs of a uniform design, showing the company name, business address, and telephone number as well as the identification number of the current regulatory program permit

authorizing the underground mining activities, have been placed at all access points to the permit area. These signs have been placed to be easily seen, are made of a durable material, and conform to local laws and regulations. The topsoil storage area is clearly marked.

As this is an underground mine, there will be no blasting conducted on the surface with the exception of highwall construction. When blasting for highwall construction does occur, conspicuous signs and flagging will be posted as required by 30 CFR Parts 817.11 (f) and 817.65 (e).

As the Left Hand Fork is classified as a intermittent drainage, stream buffer zone markers will be placed within 100 feet of the drainage disallowing access except for the disturbed site.

As there are no perennial streams or a stream with a biological community on the permit area, buffer zone markers will not be necessary. The perimeters of all areas affected by surface operations and facilities are clearly marked. These signs and markers shall be maintained during all activities and retained and maintained until after the release of all bonds for the permit area.

## R645-301-512.120. SURFACE FACILITIES AND OPERATIONS

See Volume II.

Support structures and buildings are shown on Plates 6 and 7 and LF-1.

### Parking Areas

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

### Storage Areas

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.

## R645-301-512.130. SURFACE CONFIGURATIONS

See Volume II, Plates 6 and 7.

## R645-301-512.140 HYDROLOGY

See Sections R645-301-711, R645-301-722, R645-301-700 through R645-301-731.740

**Drainage Control - Diversions, etc.**

The drainage control plan is presented in this Chapter.

**Sediment Control**

The sedimentation plan is presented in this Chapter.

## R645-301-512.150. GEOLOGIC CROSS SECTIONS AND MAPS

See R645-301-622

## R645-301-512.200 PLANS AND ENGINEERING DESIGNS

## R645-301-512.210. EXCESS SPOIL

N/A

## R645-301-512.220. DURABLE ROCK FILLS

N/A

## R645-301-512.230. COAL MINE WASTE

There has been no development waste or excess spoil to date excepting sedimentation pond material. In the event sediment pont material were to catch fire, it would be compacted. MSHA and the Division have approved the disposal of sediment pond material (coal mine wash) underground. Therefore, inspections are not required.

**Coal Processing Waste**

N/A - Text removed as directed in Technical Analysis Requirements.

**Coal Refuse**

Please refer to Plate 6 for location of disposal areas.

## R645-301-512.240. IMPOUNDMENTS

See R645-301-733.

## R645-301-512.250. PRIMARY ROADS

All Primary Road Design and construction has been certified by a Professional Engineer.

## R645-301-512.260. VARIANCE FROM APPROXIMATE ORIGINAL CONTOUR

Only cut slopes at Apex, Pinnacle and Aberdeen will vary from the AOC. Slopes will be backfilled to the extent possible.

## R645-301-513. COMPLIANCE WITH MSHA REGULATIONS AND MSHA APPROVALS

**Ventilation**

The ventilation plan calls for a fan of sufficient capacity to provide air to each working section to control methane and dust; there has been small amounts only found to date in any of the old works or new faces. The longwall faces will be ventilated with a live brattice system consisting of a line curtains. The conveyor systems will be isolated from intake and return except in 2-entrygate systems when the belt will double as the intake. All ventilation requirements of the Coal Mine Health and Safety Act will be met. This ventilation plan will be strictly adhered to, in order to insure safety of all personnel. Please note that the Centennial Seam mining area is ventilated by the existing Pinnacle Mine fan system.

**General Safety Measures**

A great emphasis is put on assuring a safe mine operation and the mine and surface facilities will be operated within prudent standards to insure the health and safety of all employees. The facilities will be carefully inspected by company-trained safety engineers and state and federal mine inspectors.

The operation will abide by Utah State Coal Mine Regulations and the 1969 Federal Coal Mine Health and Safety Act. In addition, these regulations will be supplemented by a company safety policy. Various training programs will be utilized such

as the following:

Methane Measurements
Roof and Rib Control
Oxygen Deficiency Testing
Ventilation
First Aid
Mine Rescue
Mine Electrical Certification
Self Rescue Training
Use of Personal Protective Equipment
Recognition of Electrical Hazards
General Accident Prevention
Mine Communications
Job Safety Training

Many of the training programs will run continuously, such as those involving roof control and ventilation. Other programs are held annually with many oriented toward new employees.

All Andalex Mines operate under an approved M.S.H.A. roof support plan which calls for bolting on five foot centers with a minimum 42" bolt length in our development entries. Roof control in the longwall faces will be accomplished using hydraulic shields. The roof in all four seams is a massive sandstone (60'+) and offers excellent support in itself. The old mine workings which were rehabilitated for the Pinnacle Mine main entries had stood unsupported for 40 years. This roof control plan will be strictly adhered to, in order to insure the safety of all personnel.

## R645-301-513.100. COAL PROCESSING WASTE DAMS AND EMBANKMENTS

N/A

## R645-301-513.200. IMPOUNDMENTS AND SEDIMENTATION PONDS MEETING MSHA CRITERIA

N/A

## R645-301-513.300. WASTE DISPOSED IN UNDERGROUND MINE WORKINGS

**Return of Coal Processing Waste to Abandoned Underground Workings**

As raw coal is hauled from the permit area, there will be no processing waste and no return of processing waste to underground workings. If in the future it is decided that a processing facility is to be incorporated, waste or reject would taken to an approved refuse disposal site. Please note that underground

development waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

## R645-301-513.400. REFUSE PILES

There has been no development waste or excess spoil to date excepting sedimentation pond material.

### Coal Processing Waste

The only coal processing waste to date is rock material manually separated from Andalex Resources' lump coal product at Wildcat. This is currently placed in an approved area at Wildcat Loadout. This MRP contains an Appendix Q. Appendix Q references the plan for reclamation of the waste rock pile at the Wildcat Loadout and should not be confused with the Centennial Reclamation Plan. Disposal of sediment pond material (temporary and permanent) is shown on Plate 6. Sediment pond waste has already been tested in one case to be non toxic and non acid forming and is being used currently in the Aberdeen Mine fill areas. Other material which is generated will be placed in temporary storage above the Apex Mine as shown on Plate 6 and will be disposed of permanently as back fill in high walls upon final reclamation. This material will be tested prior to final reclamation if used for final reclamation purposes. Based on previous experience, Andalex estimates that up to 3,000 yards of material at most will be generated. This material is included in the earthwork estimates. Please note that the rock tunnels constructed to the Centennial coal seam generated significant amounts of waste rock. One hundred percent of this waste rock was disposed of underground in the existing Pinnacle Mine. None of the waste rock appeared at the surface.

### Coal Refuse

Please refer to Plate 6 for location of disposal areas.

## R645-301-513.500. MINE OPENINGS

### Portals

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used

to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine.

The portal mine pads consist of approximately The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

## R645-301-513.600. DISCHARGES INTO AN UNDERGROUND MINE

Andalex has approved water rights for collection of disturbed area drainage for collection in the underground workings. This is used as needed.

## R645-301-513.700. SURFACE COAL MINING CLOSER THAN 500 FEET TO AN ACTIVE UNDERGROUND MINE

N/A

## R645-301-513.800. COAL MINE WASTE FIRES

N/A

## R645-301-514. INSPECTIONS

N/A

## R645-301-514.100. EXCESS SPOIL

N/A

## R645-301-514.110. QUARTERLY INSPECTIONS AND CRITICAL CONSTRUCTION PERIODS

N/A

## R645-301-514.111. FOUNDATION PREPARATION, TOPSOIL REMOVAL

N/A

## R645-301-514.112. UNDERDRAINS AND PROTECTIVE FILTER SYSTEMS

N/A

## R645-301-514.113. FINAL SURFACE DRAINAGE SYSTEMS

N/A

## R645-301-514.114. FINAL GRADED AND REVEGETATED FILL

N/A

## R645-301-514.120. CERTIFIED REPORTS

N/A

## R645-301-514.130. CERTIFIED REPORTS ON DRAINAGE SYSTEM AND PROTECTIVE FILTERS

N/A

## R645-301-514.131. PHASES OF CERTIFICATION

N/A

## R645-301-514.132. UNDERDRAINS

N/A

## R645-301-514.133. PHOTOGRAPHS

N/A

## R645-301-514.140. INSPECTION REPORTS

N/A

## R645-301-514.200. REFUSE PILES

N/A

## R645-301-514.210. REGULAR INSPECTIONS

N/A

## R645-301-514.220. CRITICAL CONSTRUCTION PERIODS

Construction of the left fork break-out and fan will occur during the Golden Eagle off-nesting period (January 15 through July 15).

## R645-301-514.221. FOUNDATION PREPARATION AND

**TOPSOIL REMOVAL**

N/A

**R645-301-514.222. UNDERDRAINS**

N/A

**R645-301-514.223. FINAL SURFACE DRAINAGE SYSTEMS**

N/A

**R645-301-514.224. FINAL GRADING AND Revegetation**

N/A

**R645-301-514.230. CERTIFIED REPORT**

N/A

**R645-301-514.240. SEPARATE CERTIFICATION FOR EACH PHASE OF CONSTRUCTION**

N/A

**R645-301-514.250. ON-SITE COPY OF CERTIFICATION REPORTS**

N/A

**R645-301-514.300. IMPOUNDMENTS**

See R645-301-733..

**R645-301-514.310. CERTIFIED INSPECTION**

This is performed annually by a registered P.E.

**R645-301-514.311. COMPLETION OF CONSTRUCTION AND YEARLY INSPECTIONS**

See R645-301-514.310.

**R645-301-514.312. CERTIFIED REPORTS**

Certified reports are kept on-site.

**R645-301-514.313. ON-SITE COPY OF CERTIFICATION REPORTS**

See R645-301-514.312.

## R645-301-514.320. WEEKLY INSPECTIONS

N/A

## R645-301-514.330. QUARTERLY INSPECTIONS

These are conducted quarterly by on-site personnel to evaluate erosion, stability, and other items.

## R645-301-515. REPORTING AND EMERGENCY PROCEDURES

## R645-301-515.100. SLIDES AND OTHER DAMAGE

**Schedule of Construction, Mine Development, Mining and Reclamation**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases. There will be no additional construction activities or surface disturbance whatsoever in Hoffman Creek or Alrad Canyon.

However, Andalex does intend to add a fan installation in the left-hand fork of Deadman Canyon at some point in time. This installation will be according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) Andalex will submit detailed plans for this installation at the appropriate time. The location of this breakout is shown on Plate 29 (R.O.W.). Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with three production units and the longwall scheduled to be operating by mid-1994. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market. Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. Although no significant erosion problems have occurred, Andalex

will notify the Division by the fastest available means of any slides or other damage and comply with any remedial measures required by the Division (generally, reporting will be accomplished by telephone).

Andalex will cover acid or toxic forming materials if any are encountered.

Andalex will advise the Division in the event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-515.200. IMPOUNDMENT HAZARDS

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on-site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing (Pond C).

## R645-301-515.300. TEMPORARY CESSATION OF OPERATIONS

Whenever it is known that operations are to be temporarily ceased for more than 30 days, Andalex Resources will submit to the Division a notice of intention to cease or abandon the operations, in accordance with R645-301-515.320 and to MSHA standards.

This notice will describe mitigation measures to be employed in accordance with the terms and conditions of the permit approval, such as a statement of the number of surface areas involved in the cessation, extent of sub-surface strata, prior reclamation efforts accomplished on the property, and identification of all backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

Temporary closing of underground workings will be accomplished with chain link fence material as recommended by MSHA. This prevents access by unauthorized individuals during

idol periods. It is not anticipated that once Andalex reaches its peak production that this will occur.

If underground openings are to remain inactive for a period greater than 90 days, such openings will be temporarily closed off from access. Such closures will consist of a chain link or other substantial wire mesh fabric fence placed over the portals to prevent public access while allowing for air flow. Locked gates may be installed in the portal to allow for mine inspection.

HISTORICAL NOTE: On June 11, 2008 the company requested permission from the BLM to modify the R2P2 to allow the mine to be temporarily idled due to economic factors. The BLM approved the modification on June 20, 2008. The portals were then sealed to prevent public access. The idle status has continued for more than 30 days. The surface facilities are secured by a security guard at all times. At the time of the temporary idling, the permit area included 6516.91 acres, and the total disturbed area included 47.19 acres (minesite = 34.2 acres, Left Fork fan and access road = 1.45 acres, and GVH sites = 11.54 acres). The subsurface strata extends from zero at the outcrop to more than 3000' under the northernmost longwall panels, and the horizontal extent of the subsurface strata over the permit area is about 21,432' measured north-south and about 21,768' measured east-west. There has been no reclamation done at the site as a result of the temporary closure, although two GVH sites were reclaimed in the meantime. There are no water treatment activity going on at the mine.

The normal required environmental monitoring has continued since the mine has been idled, including hydrologic monitoring of springs, seeps and wells, UPDES monitoring, subsidence monitoring, and raptor surveys. The UPDES outfall points continue to be monitored but there has been no reported flow since the mine was shut down and the pumps were shut off. Nearly all water in the mine was created from the floor strata as mining occurred, and would normally dry up after the mine advanced several hundred feet. None of the flow was attributed to geological structures such as faults or dikes. Since all mining was advancing down-dip the water had to be continually pumped out to the surface since there were no sumps constructed below the workings to collect and store the water. Now that mining has stopped there is no reason to believe that the floor strata will continue to make water, especially at the liberation rate of 800 gpm typical of the operational period. Also, since all the water was being made in the extreme down-dip section of the mine, the water that does continue out of the floor will fill up the bottom of the mine until it reaches a level of potentiometric equilibrium. The portals are at the highest end of the mine, and are 1,640' vertically above the impounding area, and more than 14,000' vertically separated. This situation is very different

than, for example the Crandall Mine where water is presently discharging from the portals. There, the mine is essentially flat and the source of the water is likely the Joe's Valley Fault which probably serves as a direct conduit for surface water draining through Joe's Valley above down to the mine workings. At the Tower Mine there is no primary recharge mechanism, and the vertical dip should serve to allow the water level to stabilize within the mine without discharging from the portals.

## R645-301-515.310. TEMPORARY ABANDONMENT

See R645-301-515.300.

## R645-301-515.311. SUPPORT AND MAINTENANCE

See R645-301-515.300.

## R645-301-515.312. SECURING SURFACE FACILITIES

See R645-301-515.300.

## R645-301-515.320. NOTICE OF INTENT TO CEASE OR ABANDON OPERATIONS

See R645-301-515.300.

## R645-301-515.321. STATEMENT OF CONDITIONS PRIOR TO CESSATION OR ABANDONMENT, UNDERGROUND

See R645-301-515.300.

## R645-301-515.322. STATEMENT OF CONDITIONS PRIOR TO CESSATION OR ABANDONMENT, SURFACE

See R645-301-515.300.

## R645-301-516. PREVENTION OF SLIDES

Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. No significant erosion problems have occurred, Andalex will notify the Division in the event of any slides or other damage.

## R645-301-520. OPERATION PLAN

## R645-301-521. GENERAL

Requirements for Reclamation and Operation Plan

Operation Plan: General Requirements

Andalex Resources, Inc. has added 802 acres in the AEP lease #UTU 69600 to its currently approved Centennial Project. The lease contains 3.0 million tons of recoverable coal in the Centennial and Aberdeen Seams. All reserves will be mined simply as an underground extension of the existing, approved, and currently operating Pinnacle and Aberdeen Mines. As such, no additional surface facilities are required. Access to and handling and extraction of all coal will be through the existing Pinnacle and Aberdeen Mines.

All necessary surface and support facilities have been constructed, approved, and are currently in operation for the Pinnacle, Apex and Aberdeen Mines. There will be no change in the currently approved Environmental Protection Plan.

Overview of Project

**Type of Mine**

The initial underground mining operation known as the Pinnacle Mine, located on the Zion's fee property, began production on October 3, 1980. It consisted of a single unit's production with an output projected to be approximately 200,000 tons per year and with 20 employees. The mine moved onto the federal leases and with the addition of the Apex Mine in 1982, the Centennial Project now has a production capacity of 1,200,000 tons per year. As there are four minable seams present, the Aberdeen, Gilson, Centennial, and Lower Sunnyside, in ascending order, mining plans call for simultaneous operation of a mine in each seam. The existing operations are in all four seams. The Centennial Seam has been accessed via rock tunnels from the existing Pinnacle Mines (Gilson Seam).

Mining will consist of the underground method of coal extraction using continuous miners and longwall. Room and pillar longwall panel development will be employed with final overall extraction estimated to be about 80 percent of the reserve.

Coal is presently being loaded into 40-ton coal trucks and hauled to Wildcat Jct. near Helper. All seams will be mined using continuous miners and longwall extraction. Because there is deep cover over the reserves on portions of the Graves Lease,

it is likely that first mining only will be possible. Please refer to Plate 26, 27, 28, & 29 which show depth of cover over the seams.

Area of Operations

**Mine Plan Area**

The mine plan area is limited to and contained within the proposed permit area. Mine plans for each of the minable seams are included as Plates 29, 30, 31 and 41.

**Permit Area**

The permit area consists of seven federal leases and two fee leases, all controlled by Andalex Resources. The Hoffman Creek federal coal Lease (U-52341) has been relinquished although the acreage still remains in the permit area. Presently, mining operations are taking place on five federal coal leases. Federal leases are U-010581, SL-027304, SL-063058, #U-05067 and UTU-66060. These leases are shown on Plate 4. Mining commenced on #U-05067 in July of 1989. Mining commenced on #UTU-66060 in late 1990. Mining will commence on UTU-69600 in June of 1993.

**Disturbed Surface Area**

Surface disturbances are minimal due to the nature of the mining activities. The permit area has been previously impacted by mining. Surface disturbances will be limited to the existing facilities which have been constructed. The total existing surface area disturbed is 34.2 acres. Existing facilities are indicated on Plate 6 and 7.

The land affected by mining operations which shall be reclaimed, in compliance with the Mining and Reclamation Plan and all requirements of the Mined Land Reclamation Act and Rules and Regulations adopted in accordance therewith, can be described as follows:

47.19 acres located in T13S, R11E, S.L.B.&M., Carbon County, Utah and contained within,
SE 1/4 SW 1/4 Section 7
NE 1/4 SW 1/4 Section 7
SW 1/4 SE 1/4 Section 7
NW 1/4 SE 1/4 Section 7
SW 1/4 NE 1/4 Section 7
NE 1/4 NW 1/4 Section 18
NW 1/4 NE 1/4 Section 18

**Reserves, Production, and Life of Mine**

Andalex's most recent reserve estimates, using the longwall mining method, are calculated at 23 million recoverable tons.

This includes all seams on all leases.

If the extraction rate of 1.5 million tons is accomplished according to schedule, the project life will be about 15 years. The theoretical life could be closer to 25 years however due to the existence of unleased federal coal logically accessible through only the existing and future Andalex mine workings.

## R645-301-521.100. CROSS SECTIONS AND MAPS

See R645-301-510, Volume II

## R645-301-532.110. PREVIOUSLY MINED AREAS

See R645-301-510, Volume II

## R645-301-521.111. LOCATION AND EXTENT OF KNOWN WORKINGS

See R645-301-510, Volume II

## R645-301-521.112. EXISTING OR PREVIOUSLY SURFACE MINED AREAS

N/A

## R645-301-521.120. EXISTING SURFACE AND SUBSURFACE FACILITIES AND FEATURES

See R645-301-510.

## R645-301-521.121. BUILDINGS IN AND WITHIN 1000 FEET OF THE PERMIT AREA

There are no buildings within 1,000 feet of the permit area except those used as part of the mining operation. They are shown on Plates 6 and 7.

## R645-301-521.122. SURFACE AND SUBSURFACE MAN-MADE FEATURES WITHIN THE PERMIT AREA

There are no surface or subsurface man-made features within, passing through or passing over the permit area except the powerline, telephone cables, culverts, and etc., installed for the operation of this mine. See Plates 6 and 7 for their locations.

## R645-301-521.123. PUBLIC ROADS IN OR WITHIN 100

## FEET OF THE PERMIT AREA

County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' minesite (Plate 1).

## R645-301-521.124. EXISTING FACILITIES WITHIN THE PERMIT AREAS

There are no surface or subsurface man-made features within, passing through or passing over the permit area except the powerline, telephone cables, culverts, and etc., installed for the operation of this mine. See Plates 6 and 7 for their locations.

## R645-301-521.125. SEDIMENTATION PONDS AND IMPOUNDMENTS

See R645-301-733..

## R645-301-521.130. LANDOWNERS AND RIGHT OF ENTRY AND PUBLIC INTEREST MAPS

The leases for which we have the legal right of entry are shown on Plate 4. See Appendix R.

## R645-301-521.131. SURFACE AND SUBSURFACE OWNERS

**Owners of Record of Surface and Subsurface Contiguous Areas**

See R645-301-112.500

## R645-301-521.132. RIGHT TO ENTER AND CONDUCT MINING ACTIVITIES

See R645-301-114.230.

## R645-301-521.133.1 OPERATIONS WITHIN 100 FEET OF ROAD RIGHT-OF-WAY

County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' minesite (Plate 1).

## R645-301-521.133.2 RELOCATING A PUBLIC ROAD

N/A

## R645-301-521.140. MINE AND PERMIT AREA MAPS

**Cross Sections, Maps, and Plans**

Most of the cross sections, maps, and plans previously

submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal in Volume II.

All categories within this section have been addressed. Specifically,

a) Plates 26, 27, and 28 and 40 show all the test borings locations and elevations. Specific information relating to these drill holes and the strata encountered can be found in Appendix E (coal quality, description of other strata).

b) Monitoring stations for water quality are shown on Figure IV-11. Including the new 12-11 in Alrad Canyon. Fish and wildlife monitoring stations were not set up for this application. However, refer to Plate 34 which depicts wildlife distribution. Air quality monitoring was not required for this application. Figure 6 in Appendix L shows proposed monitoring stations. Andalex has adhered to the locations shown on Figure IV-11 which is included in Andalex's operating plan.

c) Refer to Appendix E for specific drill hole lithologies as well as data on quality and chemical characteristics.

d) Crop lines and strikes and dips can be found on the coal thickness isopachs in Volume II, Plates 26, 27, and 28.

e) All old workings in the three coal seams to be mined are shown on Plates 29, 30, and 31. There are no old workings in the Centennial Seam.

f) All subsurface water on the permit area exists in perched aquifers. The Aberdeen sandstone is the lowest water bearing unit within the permit area and is discussed in Geology. The only water well drilled on the property which has been used with any frequency (well #1) has not depicted any seasonal variation. It is always a low producer.

g) There are no surface waters within the permit area. All drainages (natural) are shown on the topography on Plate 21. All constructed drainages are shown on Plates 6 and 7. There are no irrigation ditches. Appendix L, which is the Hydrologic Inventory, contains Figure 4 which clearly depicts the location of springs in the permit area and adjacent areas. This figure, along with Figures 5 and 6, depict the areal extent of the inventory.

h) N/A

i) Plate 6 shows the location of development waste stored in an area which was previously used as a sediment pond. Plate 6

now also shows the location of a new area above the Apex Mine which can be used for temporary and permanent storage of development waste such as sediment pond material. All dams and impoundments are shown on Plates 6 and 7, and detailed on Plates 11, 12, and 13. There are no other water treatment or air pollution control facilities on the permit area.

j) There are no oil or gas wells within the permit area. Three water wells are shown on Plate 6. Well number 1 is 220 feet deep; number 2 is 100 feet deep, and number 3 is 120 feet deep.

k) Plates 14 and 15 accurately depict the area currently affected by mining as well as the area to be affected. They show the slopes as they exist as well as after construction and upon final reclamation.

Operation Plan: Maps and Plans

1) Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal in Volume II.

   All necessary maps and plans to complete this section are found in Volume II of the submittal and also in the appendices of Volume I specifically,

   a) Underground coal mining activities to be conducted and lands to be affected by surface facilities are shown on Plates 6, 29, 30, 31 and 41.

   b-1) Buildings, utilities, and facilities are depicted on Plates 6 and Plate LF-1.

2) The area to be affected is shown on several plates, including 4, 5, 6, 29, 30, 31 and 41. These last four plates show the sequence of mining in the four seams over the five year term of the permit. Plate 30 has been revised to show immediate development in the Gilson Seam as soon as approval is achieved. Reclamation will not take place until after all four seams are mined out. This activity is depicted on Plates 15, 16, 17, and 20.

3) Plates 5 depict the entire disturbed area for which a performance bond is posted. The acreage is shown on Plate 5.

4) Coal storage and loading areas are shown on Plates 6. No cleaning takes place.

5) Plates 6 show a non-coal waste storage area as well as topsoil storage areas. Plates 36 and 37 show the topsoil piles in detail.

6) All water diversions and other water facilities are shown on Plates 6, 8, 9, 11, 12, and 13. Also, typical diversions for disturbed area and undisturbed areas are shown in the Sedimentation and Drainage Control Plan.

Diversion ditches as they exist are shown on Revised Plate 6. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

Diversions and other hydrologic controls are shown on Plates 6, 7, 8, 11, 12 and 13, for the Aberdeen Mine. Topographic detail has been added to Plate 8 to allow determination of watershed slopes within the disturbed area.

Plate 16 has been revised to show drainage during the reclamation period before and after removal of sediment ponds (Phase I).

Plate 17 shows final drainage details.

Plate 9 shows delineations of watershed areas.

The main culvert will be removed entirely during the reclamation-earthwork phase except under Pond "E". Pond "E" will be enlarged, and the entire drainage area above will flow into the restored channel RC-1 and through Pond "E-PM". Once revegetation and water quality standards have been met, Pond "E-PM" and the culvert will be removed and reclaimed.

7) There is no coal processing waste at the Centennial facility There are no pollution control facilities other than sedimentation ponds on the permit area. Please note that waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

8) Specific facilities are not used to protect or enhance wildlife with the exception of the powerline which was built according to strict guidelines issued by the Division of Wildlife Resources and the U.S. Fish and Wildlife Service regarding raptor protection. The powerline design is included in Volume I as Appendix I (powerline design). Also, speed limits are posted within the permit area.

9) The two powder magazines are shown on Plates 6.

10) Plates 6, 8, and 9 show these facilities associated with protection of the hydrologic balance including sedimentation

ponds and storage of non-coal waste. There are no permanent impoundments, or coal processing wastes. Underground development waste has been generated while putting in the Aberdeen portals, and has been used as stock pile pad material at the Aberdeen Minesite. The volume of this material is minimal.

11) Plates 16 and 17 show the final reclamation contours and configuration of the surface for Phases I and II respectively.

12) Subsidence monitoring points are shown on Plate 25. Additional stations have been added to Plate 25 to cover long wall mining on the new Kenilworth Lease. Water monitoring locations are shown on Plate 7-1.

13) There will be no facilities left on the permit area permanently excepting possibly the road through the site. After the completion of underground mining, all facilities will be removed with the exception of one downstream sedimentation pond. This pond will be removed upon final reclamation.

c) Maps, plans, and cross sections required under b)(5),(6),(10), and (11) have been prepared under the direction of, and certified by a registered professional engineer. Assistance has come from a registered land surveyor.

1) Detailed maps, plans, and cross sections for our sediment ponds, Plates 11, 12, and 13 have been certified by a registered professional engineer.

2) Andalex has not used any excess spoil or underground development waste maps or cross sections. A map (uncertified) depicting the location of non-coal waste storage is included as Plate 6.

## R645-301-521.141. AFFECTED AREA

## R645-301-521.142. UNDERGROUND WORKINGS AND SUBSIDENCE AREAS

See R645-301-510, Volume II.

## R645-301-521.143. WASTE DISPOSAL SITES

See R645-301-510, Volume II.

## R645-301-521.150. LAND SURFACE CONFIGURATION MAPS

See R645-301-510, Volume II.

## R645-301-521.151. REQUIREMENTS

See R645-301-510, Volume II.

## R645-301-521.152. PREVIOUSLY MINED AREAS

See R645-301-510, Volume II.

## R645-301-521.160. MAPS OR CROSS SECTIONS OR PROPOSED FEATURES

See R645-301-510, Volume II.

## R645-301-521.161. BUILDINGS, UTILITY CORRIDORS AND FACILITIES

See R645-301-510, Volume II.

## R645-301-521.162. AREA AFFECTED ACCORDING TO SEQUENCE AND TIMING OF OPERATIONS

See R645-301-510, Volume II.

## R645-301-521.163. BONDED AREA

See R645-301-510, Volume II.

## R645-301-521.164. COAL HANDLING FACILITIES

See R645-301-510, Volume II.

## R645-301-521.165. TOPSOIL AND WASTE STORAGE AREAS

See R645-301-510, Volume II.

## R645-301-521.166. WASTE SOURCES AND DISPOSAL FACILITIES

See R645-301-510, Volume II.

## R645-301-521.167. EXPLOSIVES STORAGE AND HANDLING FACILITIES

See R645-301-510, Volume II.

## R645-301-521.168. AIR POLLUTION CONTROL FACILITIES

N/A

## R645-301-521.169. COAL PROCESSING WASTE FACILITIES

N/A

## R645-301-521.170. TRANSPORTATION FACILITIES MAPS

See R645-301-510, Volume II.

## R645-301-521.180. OTHER INFORMATION

See R645-301-510, Volume II.

## R645-301-521.200. SIGNS AND MARKERS SPECIFICATIONS

Signs of a uniform design, showing the company name, business address, and telephone number as well as the identification number of the current regulatory program permit authorizing the underground mining activities, have been placed at all access points to the permit area. These signs have been placed to be easily seen, are made of a durable material, and conform to local laws and regulations. The topsoil storage area is clearly marked.

As this is an underground mine, there will be no blasting conducted on the surface with the exception of highwall construction. When blasting for highwall construction does occur, conspicuous signs and flagging will be posted as required by 30 CFR Parts 817.11 (f) and 817.65 (e).

As there are no perennial streams or a stream with a biological community on the permit area, buffer zone markers will not be necessary. The perimeters of all areas affected by surface operations and facilities are clearly marked. These signs and markers shall be maintained during all activities and retained and maintained until after the release of all bonds for the permit area.

## R645-301-521.210. PLACEMENT AND REMOVAL

See R645-301-521.200.

## R645-301-521.220. DESIGN

See R645-301-521.200.

## R645-301-521.230. MAINTENANCE

See R645-301-521.200.

## R645-301-521.240. MINE AND PERMIT IDENTIFICATION SIGNS

See R645-301-521.200.

## R645-301-521.241. LOCATION, UNDERGROUND MINING

See R645-301-521.200.

## R645-301-521.242. LOCATION, SURFACE MINING

N/A

## R645-301-521.243. INFORMATION

See R645-301-521.200.

## R645-301-521.244. REQUIREMENTS

See R645-301-521.200.

## R645-301-521.250. PERIMETER MARKERS

See R645-301-521.200.

## R645-301-521.251. SURFACE AFFECTED AREAS FOR UNDERGROUND MINING OPERATIONS

See R645-301-521.200.

## R645-301-521.252. PERMIT AREA PERIMETER FOR SURFACE MINING OPERATIONS

N/A

## R645-301-521.260. BUFFER ZONE MARKERS

N/A

## R645-301-521.261. BOUNDARY MARKERS FOR SURFACE

They consist of orange "Tee" posts which are clearly visible from one marker to the next.

## R645-301-521.262. BOUNDARY MARKERS FOR SURFACE MINING OPERATIONS

N/A

## R645-301-521.270. TOPSOIL MARKERS

See R645-301-521.200.

## R645-301-522. COAL RECOVERY

**Cycle and Sequence of Mining**

The panel-barrier-panel mine design is the only feasible and approvable mine plan. The BLM and MSHA have agreed and the R2P2 reflects this design The R2P2 Plan contains specific timing, sequence and method details for recovery of this resource. The panel-barrier design will minimize probability of subsidence.

## R645-301-523. MINING METHOD

The initial underground mining operation known as the Pinnacle Mine, located on the Zion's fee property, began production on October 3, 1980. It consisted of a single unit's production with an output projected to be approximately 200,000 tons per year and with 20 employees. The mine moved onto the federal leases and with the addition of the Apex Mine in 1982, the Centennial Project now has a production capacity of 1,800,000 tons per year. As there are four minable seams present, the Aberdeen, Gilson, Centennial, and Lower Sunnyside, in ascending order, mining plans call for simultaneous operation of a mine in each seam. The existing operations are in all four seams. The Centennial Seam has been accessed via rock tunnels from the existing Pinnacle Mines.

Mining will consist of the underground method of coal extraction using continuous miners, shuttle cars, roof bolters and feeders and longwall equipment consisting of a shearer, armored face conveyor and shield type roof supports. Room and pillar longwall panel development will be employed with final overall extraction estimated to be about 60 percent of the

reserve. See plate 29 for cover isopachs.

Coal will be loaded into 40-ton coal trucks and hauled to a unit train loadout in the near vicinity.

## R645-301-523.100. SURFACE MINING OPERATIONS WITHIN 500 FEET OF AN UNDERGROUND MINE

N/A

## R645-301-523.200. EXCEPTIONS TO SURFACE MINING OPERATIONS WITHIN 500 FEET OF UNDERGROUND WORKINGS

N/A

## R645-301-523.210. RESOURCE RECOVERY OF ELIMINATION OF HAZARDS

N/A

## R645-301-523.220. APPROVAL BY DIVISION AND MSHA

Appendix B; Appendix J

## R645-301-524. BLASTING AND EXPLOSIVES

All blasting performed underground will conform to both state and federal regulations governing explosives and blasting in underground coal mines.

A powder magazine has been set up on one of the surface pads, located in a remote area. It is built to conform to all regulations, such as segregation, regarding such a structure (see plate 6). All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved and who possess a valid certificate as required by Title 30 of the Code of Federal Regulations. If any additional surface blasting is required, powder magazines at that location will be in a remote site and will comply with all federal and state regulations.

If required, MSHA will be notified if surface blasting will be performed within 500 feet of an active coal mine. If necessary, joint approval will be obtained from the Division and MSHA.

Revised 9/12/95

## R645-301-524.100. BLASTER CERTIFICATION

All blasting conducted on the surface will be performed by a DOGM- certified blaster.

## R645-301-524.110. CERTIFIED BLASTER

See 301-524.100.

## R645-301-524.120. BLASTING CERTIFICATES

Blasting certificates will be kept on site during blasting operations.

## R645-301-524.130. FIRING OF A BLAST

A blaster and at least one other person will be present at the firing of the blast.

## R645-301-524.140. RESPONSIBILITY

The certified blaster will be familiar with the blasting plan and performance standards, and will give on-the-job training to uncertified persons.

## R645-301-524.200. BLAST DESIGN

A blast design will be submitted prior to blasting.

## R645-301-524.210. ALL BLASTING OPERATIONS

See 301-524.200.

## R645-301-524.211. BUILDINGS WITHIN 1000 FEET OUTSIDE THE PERMIT AREA

See 301-524.200.

## R645-301-524.212. WITHIN 500 FEET OF UNDERGROUND MINE

See 301-524.200.

## R645-301-524.220. BLAST DESIGN APPROVAL PRIOR TO

## BLAST

See 301-524.200.

## R645-301-524.230. BLAST DESIGN CRITERIA

See 301-524.200. All blasts will meet the requirements of 301-524.600.

## R645-301-524.240. CERTIFICATION

The blast design will be prepared and signed by a certified blaster.

## R645-301-524.250. CHANGES TO BLAST DESIGN

All blasts will comply with requirements of the Division.

## R645-301-524.300. PRE-BLASTING SURVEY

See 301-524.200

## R645-301-524.310. NOTIFICATION OF RESIDENTS

See 301-524.200

## R645-301-524.320. REQUESTS FOR PRE-BLASTING SURVEY

See 301-524.200

## R645-301-524.330. ASSESSMENT OF FACILITIES

See 301-524.200

## R645-301-524.340. REPORT OF SURVEY

See 301-524.200

## R645-301-524.350. COMPLETION OF SURVEY PRIOR TO BLAST

See 301-524.200

## R645-301-524.400. BLAST SCHEDULE

A schedule will be contained in the permit if required.

## R645-301-524.410. UNSCHEDULED BLASTS

There will be no unscheduled blasts.

## R645-301-524.420. TIME PERIODS FOR BLASTING

All blasting will be conducted between sunrise and sunset hours.

## R645-301-524.430. BLASTING NOTICES FOR UNDERGROUND MINING OPERATIONS

See 301-524.200. Local governments will be notified that blasting may be conducted in the Left Hand Fork.

## R645-301-524.450. BLASTING SCHEDULE PUBLICATION AND DISTRIBUTION

There will be one blast conducted in the Left Hand Fork between sunrise and sunset September 13, 1995.

## R645-301-524.451. NEWSPAPER PUBLICATION

Appropriate publications will be made regarding surface blasting.

## R645-301-524.452. DISTRIBUTION OF NOTICES

There are no requirements for distribution due the remote location (greater than ½ mile) of the blast. Local government will be notified.

## R645-301-524.453. REPUBLISHING AND REDISTRIBUTION

Not applicable. This is a one-time blast and there will be no new requirements for distribution of notices.

## R645-301-524.460. BLASTING SCHEDULE CONTENTS

See 301-524.200

## R645-301-524.461. OPERATOR IDENTIFICATION

See 301-524.200

## R645-301-524.462. BLASTING LOCATION

See 301-524.200

## R645-301-524.463. DATES AND TIME PERIODS OF DETONATIONS

See 301-524.200

## R645-301-524.464. ACCESS CONTROL METHODS

See 301-524.200

## R645-301-524.465. WARNING SIGNALS

See 301-524.200

## R645-301-524.500. DESCRIPTION OF BLASTING SAFEGUARDS

See 301-524.200

## R645-301-524.510. BLASTING SIGNS

See 301-524.200

## R645-301-524.511. CONSPICUOUSLY PLACED SIGNS

See 301-524.200

## R645-301-524.512. ENTRANCES FROM PUBLIC ROADS OR HIGHWAYS

See 301-524.200

## R645-301-524.520. WARNINGS

See 301-524.200

## R645-301-524.530. ACCESS CONTROL

See 301-524.200

## R645-301-524.531. UNUSUAL HAZARDS

No unusual hazards exist.

## R645-301-524.532. ACCESS WITHIN THE BLASTING AREA

See 301-524.200

## R645-301-524.600. CONTROL OF ADVERSE BLASTING EFFECTS

The blast planned in the Left Hand Fork is a one-time blast consisting of a pre-split shot and will be totally contained. The nature of this type of blast will contain both noise and particles. It will have no affect on underground mining, channels, surface or ground water outside the permit area. The location of this blast is a minimum of 7 miles from any public building, church or occupied dwelling.

## R645-301-524.610. GENERAL REQUIREMENTS

See 301-524.600.

## R645-301-524.620. AIR BLAST LIMITS

See 301-524.600.

## R645-301-524.621. MAXIMUM AIR BLAST LIMITS

See 301-524.600. Air blasts will not exceed the maximum limits at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area. The blast will be located in a remote steep-sided canyon and will not allow air blasts to affect any of the above items.

## R645-301-524.622. PREVENTION OF DAMAGE

See 301-524.600. and 621.

## R645-301-524.630. MONITORING

See 301-524.600. Monitoring will be conducted if required by the Division.

## R645-301-524.631. MEASUREMENTS AND LOCATIONS

See 301-524.630.

## R645-301-524.632 MEASURING SYSTEMS

See 301-524.630.

## R645-301-524.633. FLY ROCK

The blast is designed to contain all fly rock and cannot travel beyond the permit boundary.

## R645-301-524.640. GROUND VIBRATION

Due to the location of the blast there is no potential for damage to any structure as the result of ground vibration.

## R645-301-524.641. GENERAL

See 301-524.633.

## R645-301-524.642. MAXIMUM PEAK-PARTICLE VELOCITY

See 301-524.633.

## R645-301-524.643. SEISMOGRAPHIC RECORD

A seismographic record will be kept if required by the Division.

## R645-301-524.650. ALLOWABLE CHARGE WEIGHT

See 301-524.643.

## R645-301-524.652. MODIFIED SCALED-DISTANCE FACTOR

See 301-524.643.

## R645-301-524.660. BLASTING-LEVEL CHART

See 301-524.643.

## R645-301-524.661. GROUND VIBRATION LIMITS

See 301-524.643.

## R645-301-524.662. PARTICLE VELOCITY AND VIBRATION FREQUENCY LEVELS

See 301-524.643.

## R645-301-524.670. DAMAGE PROTECTION

See 301-524.643.

## R645-301-524.680. SEISMIC MONITORING

See 301-524.643.

## R645-301-524.690. STRUCTURES NOT SUBJECT TO AIR BLAST AND GROUND VIBRATION LIMITS

See 301-524.643.

## R645-301-524.700. RECORDS OF BLASTING OPERATIONS

Records will be kept of all blasting operations as required by the regulations.

## R645-301-524.710. RECORDS

See R645-301-524.700

## R645-301-524.711. OPERATOR IDENTIFICATION

See R645-301-524.700

## R645-301-524.712. BLAST LOCATION AND SCHEDULE

See R645-301-524.700

## R645-301-524.713. BLASTER CERTIFICATION

See R645-301-524.700

## R645-301-524.720. NEAREST DWELLING OR FACILITY OUTSIDE THE PERMIT AREA

See R645-301-524.700

## R645-301-524.730. WEATHER CONDITIONS

See R645-301-524.700

## R645-301-524.740. BLASTING RECORD

See R645-301-524.700

## R645-301-524.741. TYPE OF MATERIAL BLASTED

See R645-301-524.700

## R645-301-524.742. BLASTING PATTERN

See R645-301-524.700

## R645-301-524.743. DIAMETER AND DEPTH OF HOLES

See R645-301-524.700

## R645-301-524.744. TYPES OF EXPLOSIVES USED

See R645-301-524.700

## R645-301-524.745. TOTAL WEIGHT OF EXPLOSIVES USED PER HOLE

See R645-301-524.700

## R645-301-524.746. MAXIMUM WEIGHT OF EXPLOSIVES DETONATED IN AN EIGHT-MILLISECOND PERIOD

See R645-301-524.700

## R645-301-524.747. INITIATION SYSTEM

See R645-301-524.700

## R645-301-524.748. STEMMING

See R645-301-524.700

## R645-301-524.749. MATS OR OTHER PROTECTIONS USED

See R645-301-524.700

## R645-301-524.750. SEISMOGRAPHIC AND AIR BLAST INFORMATION

See R645-301-524.700

## R645-301-524.751. INSTRUMENTATION

See R645-301-524.700

## R645-301-524.752. LOCATION OF INSTRUMENTATION

See R645-301-524.700

## R645-301-524.753. PERSONS COLLECTING DATA

See R645-301-524.700

## R645-301-524.754. PERSONS ANALYZING DATA

See R645-301-524.700

## R645-301-524.755. VIBRATION AND/OR AIR BLAST LEVEL RECORDED

See R645-301-524.700

## R645-301-524.760. UNSCHEDULED BLASTS

See R645-301-524.700

## R645-301-524.800. COMPLIANCE WITH OTHER APPROPRIATE REGULATIONS

Andalex Resources will comply with appropriate Utah and federal regulations in the use of explosives.

# R645-301-525. SUBSIDENCE

**Survey of Structures and Renewable Resource Lands**

There are no structures present other than those constructed for mining operations, on the permit area. The land is presently used for grazing and wildlife habitat which constitutes a renewable resource area. It should be noted that geographic areas above Andalex's 5 year mine plan do not include any area suitable for grazing, nor do they contribute significantly to the long-range productivity of water, food or fiber products. Andalex commits to mitigate all subsidence related damage to

renewable resources including, but not limited to water, grazing, and wildlife habitat including raptor nests.

**Mining Method**

Mining will consist of the underground method of coal extraction using the longwall method, continuous miners on fringe areas, and conveyor haulage. Continuous miners will be employed for longwall development with longwall extraction completing the operation.

**Geologic Factors**

The Pinnacle Mine is located within the Blackhawk formation of the upper Cretaceous Mesa Verde Group. As is the case with all the active mines in the Book Cliffs coal field, the Pinnacle Mine drifts in from the outcrop and immediately the cover drastically increases as there are very steep sided canyons. Naturally, the same factors are present in the Lower Sunnyside, Aberdeen and the Centennial Seams. There are small areas of multiple seam extraction where a total thickness of up to 16 feet of coal could be removed. From a geologic standpoint, the following conclusion can be drawn: as mining progresses and the longwall panels are pulled the roof will cave in behind the shields as they advance. This is the normal scheme in this type of mining. In our longwall mining sequence, average cover over the coal seams is 2,700 feet or more. Use of longwall mining on the Andalex property will minimize the surface disturbance while enhancing safety underground.

Subsidence has not been detected at any monitoring location currently in place at Andalex, including two pillar extraction sections in close proximity to our initial longwall panel in the Gilson Seam. These pillar sections extracted 90% of the coal which is similar to longwall (See IBC PHC for additional comments on subsidence. The panel-barrier design will minimize the probability of subsidence. This fact, in combination with research performed by the Bureau of Mines will justify Andalex using a maximum angle of draw on this property of 20°. The Bureau of Mines performed extensive research at Price River Coal Co. (AEP) in the early 1980's at the #5 and #3 Mines where longwall mining was taking place.

That mining property is in the Book Cliffs Coal field as is Andalex's and is within seven miles. The Bureau's data showed a maximum draw angle over longwall extraction of (+) 15.2° and a minimum of (-) 7.4°. (See App. T.) The massive sandstones and geologic conditions above the Price River Coal mine are the same as those found above the Andalex permit area. Therefore, similar subsidence results will occur.

**Preventive Measures**

Subsidence due to mining on the Andalex property will not occur outside of the approved permit area. Stations have been set up as required for constant monitoring of subsidence movements. (See 6., Monitoring.) The only absolute preventive measure possible is to leave coal in place. This is in direct contrast to maximum economic coal recovery.

Resources on the lands above Andalex's mining plan consist only of wildlife habitat with very limited grazing access.

Subsidence monitoring stations will be established were established along the first proposed longwall mining (Plate 25). The results of this monitoring program define monitoring and permitting needs in the future.

**Mitigative Measures**

If minor subsidence would occur, there would be no material damage or diminution of valuable or foreseeable use of lands including wildlife habitat. It should be noted that subsidence has been occurring in the Book Cliffs coal field for decades with no diminution of resources. The Bureau of Mines Subsidence Study over the #3 Mine longwall panels has substantiated this. (See App. T.) There are no man-made structures or hydrologic concerns located within the affected area of Andalex's mining plan. It has been demonstrated that broad areas of subsidence over longwall panels do not represent adverse impact, if they are even noticeable. Smaller cracks, should they occur, heal themselves quickly and thoroughly.

The one spring located in Hoffman Creek was located stratigraphically well below the lowest coal to be mined. Springs above the seams outside the permit area will not be affected due to their distance from mining activity. Andalex has committed to replacing water should it be proven that mining has disrupted water flow at any location.

In the event mining related subsidence should cause material damage to the land, Andalex Resources, Inc. Will take appropriate steps to mitigate or repair such damage. Such repairs or mitigation may consist of one or more of the following steps:

(1) Filling of hazardous subsidence cracks;
(2) Leveling or regrading of subsidence damaged areas;
(3) Reseeding of repaired areas;
(4) Purchase of damaged site

In the event mining related activities should be shown to adversely affect State-appropriated water supplies, Andalex Resources, Inc. will attempt to repair and restore the affected supply; however, in the event, the supply cannot be restored, the loss may be mitigated by replacement of equivalent water rights from the 19 shares of primary water owned by Andalex

Resources, Inc.

Methods to be used to repair damaged supplies may include installation of pipes and/or spring boxes, concreting or filling of cracks with impervious material, reconstructing ponds or damaged channels, or other methods of repair found to be acceptable and based on consultation with the Division and water right owner. It should be noted that any work performed on such hydrologic structures will be first permitted as necessary (i.e. Stream Alteration Permits, etc.).

**Monitoring**

There are no structures or surface features which could be affected adversely by subsidence. Monitoring stations, however, have been set up at the locations shown on Plate 7-1. Locations over the first longwall mining are also shown on Plate 28.

The purpose of the detailed monitoring program over the initial longwall mining is to establish baseline information which is useful in the long-term operation of the Andalex mines. This program will consist of surveyable monuments (nail, rebar, etc.) established on 100-foot centers (where possible) over the lines designated on Plate 28. Where 100-foot spacing is not possible due to topographic or other obstacles, spacing will be as near 100-foot as possible, particularly along potential tension areas above the panel. Distances between points within the compression area of the longwall panel may be increased up to 500-feet depending on accessibility. Also, Andalex will conduct visual inspections over the first panel prior to and subsequent to mining the panel.

In addition, Andalex is committed to establishing subsidence monitoring programs over successive longwall panels which will consist of up to two monuments per panel and will also include visual inspections annually on active panels.

## R645-301-525.100.

## SUBSIDENCE CONTROL PLAN

See R645-301-525.

## R645-301-525.110. MINING METHODS

See R645-301-525.

## R645-301-525.120. LIKELIHOOD OF SUBSIDENCE

See R645-301-525.

## R645-301-525.130. SUBSIDENCE CONTROL MEASURES

See R645-301-525.

**R645-301-525.131. BACKSTOWING OR BACKFILLING OF VOIDS** N/A

**R645-301-525.132. LEAVING SUPPORT PILLARS OF COAL**

See R645-301-525.

**R645-301-525.133. BARRIER PILLARS**

See R645-301-525.

**R645-301-525.134. MEASURES TO PREVENT DAMAGE**

See R645-301-525.

**R645-301-525.140. MONITORING**

See R645-301-525.

**R645-301-525.150. ANTICIPATED EFFECTS OF PLANNED SUBSIDENCE**

See R645-301-525.

**R645-301-525.160. MITIGATION OR REMEDY OF SUBSIDENCE-RELATED DAMAGE**

See R645-301-525.

**R645-301-525.170. OTHER INFORMATION**

Upon completion of mining and following all required subsidence monitoring, subsidence monitoring stations (which consist of cemented rebar) will be removed.

**R645-301-525.200. SUBSIDENCE CONTROL**

See R645-301-525.

**R645-301-525.210. SUBSIDENCE DESIGN**

N/A

**R645-301-525.220. COMPLIANCE WITH SUBSIDENCE CONTROL PLAN**

See R645-301-525.

**R645-301-525.230. OPERATOR REQUIREMENTS**

See R645-301-525.

**R645-301-525.231. SUBSIDENCE MITIGATION**

See R645-301-525.

## R645-301-525.232. COMPENSATION

N/A

## R645-301-525.240. RESTRICTED FACILITIES

N/A

## R645-301-525.241. PUBLIC BUILDINGS AND FACILITIES

N/A

## R645-301-525.242. CHURCHES, SCHOOLS AND HOSPITALS

N/A

## R645-301-525.243. IMPOUNDMENTS WITH A VOLUME OF 20 ACRE-FEET OR MORE

N/A

## R645-301-525.244. SIGNIFICANT WATER SOURCE FOR ANY PUBLIC WATER SUPPLY SYSTEM

N/A

## R645-301-525.250. SUSPENSION OF MINING TO MODIFY SUBSIDENCE CONTROL PLAN

N/A

## R645-301-525.260. SUSPENSION OF MINING DUE TO IMMINENT DANGER

N/A

## R645-301-525.270. DETAILED UNDERGROUND MINE PLANS

Underground Operation and Facilities

**Mine Layout (Refer to Plate 29).**

Multiple Seam Considerations

There was four economic seams present on the property. The uppermost seam is the Lower Sunnyside which varies from four to six feet thick. The second highest seam is the Centennial Seam which varies from four to eight feet thick. The third seam is the Gilson Seam which also varies from 4' to 8' thick. The lowermost seam is the Aberdeen, the only seam with coal remaining, which varies from four to thirteen feet in thickness. The bottom two seams are separated by a 200 foot interval which includes a massive sandstone. The Gilson and the Centennial Seams are separated by approximately 130' and the Centennial and Lower Sunnyside Seams are separated by 80' including a massive sandstone. It should be noted that the area in which the Centennial Seam is to mined does not contain any reserves in

either the Lower Sunnyside nor the Gilson Seams. Only the Aberdeen Seam is present where the Centennial Seam is to be mined. The mine plan for the aberdeen seam is shown on Plate 29.

**Portals**

Portals for the present mining operations in the Aberdeen, Gilson and Lower Sunnyside seams are located in Deadman Canyon as shown on Plate 6. The portal areas consist of a conveyor portal, two air intake portals, and an 88" fan portal.

Portals have been enlarged above the coal seam to facilitate men and equipment at the mine opening. Steel sets have been used to support mine roof in the portal areas. The Aberdeen portals have been constructed in a similar fashion, facilitating air intake, conveyor, and an exhaust fan.

The portals are generally 6' high and 20' wide in the Pinnacle and Aberdeen Mines and 4.5' high in the Apex Mine.

The portal mine pads consist of approximately The portal mine pads consist of approximately one acre. Located on these pads are the fans, conveyor portals, air intake portals, and mine water storage tanks. It should be noted that the mining of the Centennial Seam did not require new portals on the surface. The Centennial Seam is accessed via rock tunnels from the existing Pinnacle Mine.

**Mains, Submains, and Slopes**

A five to seven entry system is being used (two intake portals) and using a continuous miner, the entries are being driven to the property line. Generally, entries on 80 foot centers with crosscuts every 80 feet are being driven on the strike and dip of the coal seam. Development mining for the longwall panels are on 5th entry and 3rd entry systems. Refer to Plates 26 through 29. There exists only one return air portal on the surface, however, two exist underground making the five entry system.

**Shafts and Interconnecting of Slopes**

Mining plans called for rock tunnels to be constructed from the existing Pinnacle Mine up to the Centennial Seam mining area. These rock slopes are each approximately 500' in length. The three tunnels consist of an intake air tunnel, a return air tunnel, and a belt tunnel. Coal is transported via the belt tunnel and transferred on to the existing Pinnacle Mine conveyor belts. These tunnels were constructed in the Spring of 1990 and mining has commenced.

**Longwall Panels**

The mining sequence calls for the development of panels longwall using 2, 3 and 5 entry systems. These panels will be

generally 650 to 800 feet in width and up to 8,000 feet in length.

**Barrier Pillars**

A barrier pillar will be left between the bleeders and the longwall panels. A barrier will also be left wherever old mine workings are skirted such as the Olsen Mine on the east side of Deadman Canyon in the Gilson Seam. The approved R2P2 also places barrier pillars between longwall panels to maintain safe working conditions. This was the only mine design approvable by ANDALEX and the BLM.

**Bleeder System**

A bleeder system will be maintained and pillars left to provide for ventilation, eventually extending around all mined out areas.

## R645-301-525.300. PUBLIC NOTICE OF PROPOSED MINING

A copy of the newspaper advertisement of this Mining and Reclamation Plan and proof of publication of the advertisement is filed with the Division and made part of the complete application.

## R645-301-526. MINE FACILITIES

**Support Structures and Buildings**

Support structures and buildings are shown on Plates 6 and 7.

**Parking Areas**

Parking areas have been covered with gravel and magnesium chloride and will be maintained. These are shown on Plate 6. The main office parking area is paved.

**Storage Areas**

There are several storage areas at the site. These include the Material Storage Area No. 1, Raw Coal Pile Area, Material Storage Area No. 2, and the Topsoil Storage Area. All areas are shown on Plate 6.

## R645-301-526.100. MINE STRUCTURES AND FACILITIES

See Volume II.

## R645-301-526.110. EXISTING STRUCTURES

**Operation Plan: Existing Structures**

**Construction and Design of Surface Facilities**

**Existing Structures**

It should be noted that there are no existing structures located in the Mathis Tract I.B.C. area or on adjacent proposed Federal Lease Applications shown on Plate I-A.

All existing structures are situated on the Zion's fee land, on federal lease SL-027304, or on right-of-way UTU-62045 and are shown on Plate 6. There are no structures existing as part as Andalex's facility which were constructed prior to 1980. Originally it was anticipated that all buildings and structures were to be completed during the first five year permit term. Obviously this is not the case since the Aberdeen Mine has only recently been completely finished to this date. Plate 6 depicts the Aberdeen Mine with the surface facilities completed in early 1990. No new structures on the surface will be required to mine the Kenilworth Lease.

Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4. Existing structures include the following:

| | |
|---|---|
| Bathhouse (5) | 14' x 60' |
| Mine Water Storage Tanks (3) | 12' x 16' |
| Warehouse (1) | 14' x 60' |
| Lamphouse (2) | 40' x 40' |
| Substations (2) | 60' x 100' |
| Office Building | 28' x 60' |
| Mine Fans (4) | 88" |
| Portals (15) | 6' x 20' |
| Culinary Water Tanks (3) | 12' x 10' |
| Shop | 80' x 120' |
| Guard Shack | 8' x 8' |

The Aberdeen Mine surface facilities will include one additional bathhouse, and one lamphouse.

Upon completion of mining activities, the portals will be sealed according to existing state and federal regulations and all buildings and structures not being utilized as part of the reclamation sequence, will be removed.

## R645-301-526.111. LOCATION

See R645-301-110.

## R645-301-526.112. PLANS OR PHOTOGRAPHS

See R645-301-110.

## R645-301-526.113. DATES OF CONSTRUCTION OF EXISTING

## STRUCTURES

See R645-301-110.

## R645-301-526.114. MONITORING DATA

N/A

## R645-301-526.115. COMPLIANCE PLAN

N/A

## R645-301-526.115.1 DESIGN SPECIFICATION

See R645-301-525.110.

## R645-301-526.115.2 CONSTRUCTION SCHEDULE

**Construction Schedule**

All of the above structures have been completed. The earthwork for the Aberdeen Mine was completed in 1989. The surface facilities were in early 1990. Construction has been located and carried out so as to prevent and control erosion, siltation, water pollution, and damage to property. All facilities have been designed and constructed and will be maintained and used in a manner which prevents damage to wildlife and related environmental values. Any future construction will be conducted in a similar manner according to regulations regarding protection of the hydrologic system, etc. The rock tunnels for the Centennial Seam development were constructed in the spring of 1990 and completed late in 1990. As previously discussed this mining will require no new surface facilities.

## R645-301-526.115.3 MONITORING SCHEDULES

**General Requirements**

Most of the maps and plans previously submitted as part of the approved Mining and Reclamation Plan, are applicable. Where necessary, the original maps have been revised to indicate the lease in Hoffman Creek and the revisions are included in this submittal as figures or as plates in Volume II.

All categories within this section have been addressed, primarily in Volume II of the MRP which contains most of the plates.

a) Surface and subsurface ownership of lands contiguous to the permit area are shown on Plates 2 and 3.

b) The leases for which we have the legal right of entry are

shown on Plate 4.

c) At this time all plates and maps have been revised to include all new leases and beyond these leases Andalex does not anticipate making application for additional permits in this five year permit term with the possible exception of a breakout and fan installation on a newly acquired right-of-way in the left fork of Deadman Canyon. The sequence of mining for the next five year permit term as it relates to the entire permit area is shown on revised Plates 29, 30, 31, 41 to include the Hoffman lease, the Graves Lease and the AEP Lease.

d) There are no buildings within 1,000 feet of the permit area except those used as part of the mining operation. They are shown on Plates 6 and 7.

e) There are no surface or subsurface man-made features within, passing through or passing over the permit area except the powerline, telephone cables, culverts, and etc., installed for the operation of this mine. See Plates 6 and 7 for their locations.

f) These reference areas are shown on Plate 9 as R-1, R-3 and R-4. They are each 200 feet square approximately.

g) The only user of surface water within this hydrologic area is Andalex. The intake location for this water into the mine is located on Plate 6. Disturbed area runoff is collected in a culvert and taken directly into the mine. Andalex controls this water right. If a discharge were to occur from any sediment pond (this has yet to occur), it would discharge into the Deadman Canyon drainage (Plate 21) which is ephemeral.

h) County Road 299 starts at highway 6 in Price and terminates at Andalex Resources' minesite (Plate 1).

i) There are no public parks nor any cultural or historical sites eligible for listing in the National Register in or adjacent to the mine plan area.

j) There are no cemeteries or burial grounds in or within 100 feet of the permit area.

k) There is no land which is within the boundaries of any units of the National System of Trails or the Wild and Scenic Rivers System including study rivers.

## R645-301-526.115.4 MINIMIZING RISK OR HARM TO ENVIRONMENT, HEALTH OR PUBLIC SAFETY

## R645-301-526.116. PROTECTION OF PUBLIC AND LANDOWNERS

See R645-301-525 and R645-301-510.

## R645-301-526.116.1 MINING OPERATIONS WITHIN 100 FEET OF THE RIGHT-OF-WAY OF A PUBLIC ROAD

County Road 299 begins at Highway 6 in Price and terminates at the minesite.

## R645-301-526.116.2 RELOCATING A PUBLIC ROAD

N/A

## R645-301-526.200. UTILITY INSTALLATION AND SUPPORT FACILITIES

Appendices G & I

## R645-301-526.210. DESCRIPTION

Appendices G & I

## R645-301-526.220. COMPLIANCE REQUIREMENTS

Appendices G & I

## R645-301-526.221. PROTECTION

Appendices G & I

## R645-301-526.222. MINIMIZATION OF ENVIRONMENTAL IMPACT AND COMPLIANCE WITH EFFLUENT LIMITATIONS

Appendices G & I

## R645-301-526.300. WATER POLLUTION CONTROL FACILITIES

See R645-301-733..

## R645-301-526.400. AIR POLLUTION CONTROL FACILITIES

Air Pollution Control Plan and Compliance with Air Quality Laws

**Existing Environment**

The permit area is located in a Class II air quality area.

**Air Quality Impact Analysis**

Please see the following section on Emission Estimates.

**Emission Estimates**

Emission estimates are included as Appendix F in the form of an emission inventory. This inventory has been reviewed and approved by the Utah Bureau of Air Quality and the E.P.A. It has been reapproved to increase our production restriction on the basis the haul road has been paved by Carbon County. Air quality permit in appendix F.

**Proposed Controls**

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, pavement, and other fugitive dust control practices outlined in 30 CFR 817.95.

There will be no additional fugitive emissions or air pollution associated with the newly acquired AEP Lease.

**PSD Permit and Compliance with Air Quality**

**Laws**

The Environmental Protection Agency has determined that this project does not need a PSD air quality permit. This is based on our fugitive and non fugitive dust emissions inventory which assumes facilities necessary for 1.5 mm tons per year production. Further, the mine is not subject to the PSD regulations because of the new definition of a major source. (Refer to letter dated March 21, 1980 in Appendix J). All applicable air quality laws will be complied with and fugitive dust control practices, as required under 30 CFR 817.95, will be followed.

Andalex has been issued a new approval order for the mines and the Wildcat Loadout for 1.5 million tons per year. These were inspected and met compliance during the summers of 1989-1992.

Since this is an underground operation, no air quality problems are anticipated. The only changes in air quality will be attributable to minor road dust and exhaust mine dust. Methods of control are spray systems, chemical treatment, enclosures, pavement, and other fugitive dust control practices outlined in 30 CFR 817.95.

There will be no additional fugitive emissions or air pollution associated with the newly acquired AEP Lease.

## R645-301-527. TRANSPORTATION FACILITIES

## R645-301-527.100. ROAD CLASSIFICATION

All roads within the permit area are classified as "Primary Roads" in accordance with R614-301-527.100 or "Ancillary Roads" in accordance with R645-301-527.130. Roads on the site are of 2 typical designs:

1. Single-lane, gravel or asphalt surfaced roads approximately 12 - 15' wide; and

2. Double-lane, either gravel or asphalt surfaced roads, approximately 26' wide.

Although all roads on site are not used for coal hauling, each primary road is constructed to the respective typical design and dimensions shown on Plate 35.

All roads are shown on Plate 6 and Plate 8. Specifics about the road are described individually and include road widths, gradients and surfaces. Drainage ditches and drainage structures for each road (disturbed area ditches or culverts) can be found in Tables IV-2 through IV-8.

Because of the variance in road types, widths and lengths, the roads have been designated on Plate 6 with numbers (i.e. PR-1= Primary Road 1, Ar-1= Ancillary Road 1) to facilitate the description of each:

Primary Road 1 (PR-1) - This road connects Carbon County Road 199 to the two lane paved road which travels past the Aberdeen Mine facilities, past the office driveway and bath house drive ways and past the Pinnacle truck loadout. This is an asphalt surfaced road approximately 26 feet wide and 2700 feet long. The grade on PR-1 ranges from 4% to 8%. It is used for hauling coal and for men and material access to the mines.

Primary Road 2 (PR-2) - This road begins at the end of PR-1 and continues north past the shop/warehouse and ends at the eastern side of the Apex Mine stockpile. This is a two lane gravel surfaced road which is approximately 26 feet wide and 1400 feet long. It is treated annually with Magnesium Chloride. The grade on this stretch of road ranges from 5% to 9%. It is used for hauling coal and equipment as well as providing men and materials access to the mines.

Primary Road 3 (PR-3) - This road provides access to the Aberdeen Mine truck loadout. It is a single lane gravel

surface road approximately 15 feet wide and 590 feet long. It is treated with Magnesium Chloride annually. The grade on this road ranges from 0% to 4%.

Primary Road 4 (PR-4) - This road provides access for the coal haul trucks to the Pinnacle Mine truck loadout. It is also crossed to access the bath house parking area. This is a single lane, paved surface road which is approximately 15 feet wide and 500 feet long. The grade on this loop ranges from 0% to 9%.

Primary Road 5 (PR-5) - This road provides access for the coal haul trucks coming off of PR-2 to the Apex Mine truck loadout. It is a single lane gravel surfaced road approximately 15 feet wide and 425 feet in length. The grade on this road ranges from 0% to 7%. It is treated annually with Magnesium Chloride. The three truck loadout roads are also accessed by front-end loaders for the purpose of cleaning up occasional coal spills.

Primary Road 6 (PR-6) - This is an access road which leads to the main office parking area. It is a single lane, paved surface road which is approximately 15 feet wide and 600 feet long. The average grade of this road is 5% to 7%.

Primary Road 7 (PR-7) - This is an access road for mining equipment. It provides heavy equipment access to and from the Aberdeen Mine. It begins at the south inlet to pond C and it ends at the bath house parking area. It is a gravel surfaced road and is approximately 12 feet wide and 450 feet long. It has grades which range from 4% to 14%. Magnesium Chloride is applied annually.

Primary Road 8 (PR-8) - This road leads from the fuel storage area at the Pinnacle Mine facility to the oil storage area near the upper Pinnacle portals. This is a single lane, gravel surface road approximately 15 feet wide and 325 feet long. The grade on this road has a range of 9% to 11%. It is treated with Magnesium Chloride annually.

Primary Road 9 (PR-9) - This road leads from PR-2 and turns west over the top of the Apex Mine conveyor belt. The road leads to the Apex Mine material storage area, adjacent to the mine fan. This is a single lane gravel surfaced road which is approximately 15 feet wide and 200 feet long and includes a steel deck bridge over the mine conveyor. The grade on this road ranges between 0% and 8%, and the gravel is treated with Magnesium Chloride.

Primary Road 10 (PR-10) - This is an access road which leads from the upper Aberdeen Mine material storage area down to the Aberdeen Mine stockpile pad. This is a short stretch of

road which is approximately 12 feet wide and 150 feet long. It is a single lane road with an average grade of 12% to 15%.

Primary Road 11 (PR-11) - This is a very short access road which accesses the bath house pad from two directions; both from PR-1 and from PR-4. This road is approximately 12 feet wide and 150 feet long. It is a single lane road with a grade of 0% to 6%. This road is treated with magnesium chloride annually.

Ancillary Road 1 (AR-1) - This is an access road which leads from the south Aberdeen intake portal to the Aberdeen mine fan. It is a single lane road which has a surface of sandstone. The road is used primarily for access to the fan, water system and conveyor. This road is approximately 20 feet wide and 400 feet long. There is a steel deck bridge over the Aberdeen mine conveyor. The grade on this road ranges from 8% to 10%.

Ancillary Road 2 (AR-2) - This road leads from the upper Pinnacle Mine intake portals to the Pinnacle Mine fan. It is a single lane gravel surfaced road which has a steel deck bridge where the road crosses the Pinnacle Mine conveyor. Its primary use is to access the Pinnacle Mine fan. It is approximately 12 feet wide and 250 feet long. The grade on this road ranges from 0% to 12%.

Ancillary Road 3 (AR-3) - This road leads from PR-2 up to the Apex
material storage area (Gun range). This is a single lane gravel surface road which is approximately 12 feet wide and 175 feet long. The grade on this road is on an average of 9%. It is treated with Magnesium Chloride annually. It is used primarily for access.

Ancillary Road 4 (AR-4) - This road is access from the upper Apex material storage area to the Powder Magazines. This road continues beyond the north end of our permit area but it becomes a private road beyond the permit area. This is a single lane dirt road which is approximately 12 feet wide and 150 feet long. The grade on this short stretch of road is 5% to 8%.

Ancillary Road 5 (AR-5) - This road is access from Carbon County Road 299 to the left hand fork installation. This existing road will be upgraded adequately for maintenance and emergency access only. It will be equipped with a locked gate. This is a single lane dirt road which is approximately 15 feet wide and 4000 feet long. There will be 3 or 4 locations specifically widened so that two vehicles may pass. The grade on this stretch of road ranges

from 0% to 15%. This road will be reclaimed upon cessation of mining pending the approval of Mrs. Gladys Artman.

Andalex commits to repair roads damaged by a catastrophic event as soon as practical according to R645-301-527.240. According to R645-301-534.100 Andalex has located, designed, constructed, used and maintained Primary Roads so as to prevent or control damage to private and public property. Andalex has used non-acid or non-toxic forming materials in road surfacing. Roads have, at a minimum a static safety factor of 1.3 on embankments. Andalex has a schedule and plan to remove roads that will not be retained as part of the approved post mining land use. Ancillary roads will be traveled only by light vehicles for routine access. Occasionally, they will be traveled by larger equipment but probably only in emergency or repair situations, as 2 of the 4 Ancillary Roads lead to fan installations. All Primary Roads will meet the requirements of R645-301-358, R645-301.527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-542.600 and R645-301-762. Primary Roads will be located in so far as practical on the most stable available surfaces. The roads are surfaced with rock, gravel or asphalt according to R645-301-534.320. They will be routinely maintained, and have culverts which are designed and installed as necessary according to the requirements of R645-301-534.340.

**Railroad**

There are no existing or proposed railroad spurs on the property.

**Other Transportation Facilities**

The conveyor structures at the minesite are very standard cross member, bent designs. The Pinnacle conveyor is 180 feet in length and uses a 42" conveyor belt. It is covered with galvanized corrugated sheeting. The Pinnacle Truck Loadout is an under pile gravity feed reclaim system in 8 foot diameter sectioned steel tunnel for 90 feet and surfaces on the typical bent, steel structure for an additional 110 feet. The Apex truck loadout is identical to Pinnacle. The mine conveyor is also the same bent/cross member design with a 42" conveyor; however, it is 250 feet in length. The Aberdeen facility is equipped with conveyor facilities similar to that of Pinnacle with only slight variations in exact length anticipated or possible. These facilities will be completed in early 1990.

Revised 8/8/95

Transportation facilities such as roads have been addressed. The roads, Class II and I are to be removed upon cessation of mining by simple regrading and re-establishment of contours, unless surface owners request access through the mine area might remain.

Protection of the environment through the use of these facilities is achieved by speed controls (20 mph minesite). The conveyor structures as such do not impose environmental problems. Public safety obviously is a requirement of law including MSHA but also public safety is a requirement of Andalex Resources. Also the minesite is not frequented by any public outside of normal, weekly business hours.

## R645-301-527.110. DESIGNATION OF ALL ROADS

See R645-301-527.

## R645-301-527.120. PRIMARY ROADS

See R645-301-527.

## R645-301-527.122. FREQUENT USE OR FOR PERIODS IN EXCESS OF 6 MONTHS

See R645-301-527.

## R645-301-527.123. RETAINED FOR POSTMINING LAND USE

See R645-301-527.

## R645-301-527.130. ANCILLARY ROADS

See R645-301-527.

## R645-301-527.200. TRANSPORTATION FACILITIES

Revised 8/8/95

## R645-301-527.210. DESIGNS AND SPECIFICATIONS

See R645-301-527.

## R645-301-527.220. RELOCATION OF A NATURAL DRAINAGEWAY

N/A

## R645-301-527.230. MAINTENANCE AND REPAIRS

N/A

## R645-301-527.240. GEOTECHNICAL ANALYSIS

Roads and road cuts in this permit area are typical of others within the county and other mine access roads. No alternative specifications have been requested, therefore the geotechnical analysis is not required.

## R645-301-528. HANDLING AND DISPOSAL OF COAL, OVERBURDEN, EXCESS SPOIL, AND COAL MINE WASTE

As raw coal is hauled from the permit area, there will be no processing waste and no return of processing waste to underground workings. If in the future it is decided that a processing facility is to be incorporated, waste or reject would taken to an approved refuse disposal site. Please note that underground development waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.
See R645-301-528.300.

## R645-301-528.100. COAL REMOVAL, HANDLING, STORAGE, CLEANING, AND TRANSPORTATION AREAS AND STRUCTURES

Coal Handling Facilities

**Stockpiles**

Coal is discharged from the conveyor onto a coal stockpile in the Raw Coal Stockpile Area indicated as on Plate 6. This is a live stockpile as opposed to a storage pile. It should be noted that when the Centennial Seam is mined it is transferred underground to existing Pinnacle Mine conveyors and therefore, ends up in the Pinnacle Mine stockpile.

**Loadout**

Coal is loaded from the stockpile by an electronic automatic loadout into 40 ton coal trucks and hauled to Wildcat Jct. which is on the Utah Railroad.

**Preparation Plant**

A coal cleaning facility will not be used. However, by the new definition of a preparation plant, the Wildcat Loadout now comes under the SMCRA and a plan has been approved under ACT 007/033.

**Removal of Surface Structures**

Upon completion of mining activities, all surface facilities will be removed. The coal pile area will be filled, the slope contoured, compacted, topsoil replaced, regraded, and revegetated. In the materials storage and building areas, all structures and foundations including the shop, office building, bathhouse, substation, and water storage tanks, will be removed, re-contoured, compacted, topsoil replaced and graded, and

revegetated according to revegetation procedures described in this chapter.

## R645-301-528.200. OVERBURDEN

## R645-301-528.300. SPOIL, COAL PROCESSING WASTE, MINE DEVELOPMENT WASTE, AND NON-COAL WASTE REMOVAL

Underground Development Waste

There has been no development waste or excess spoil to date excepting sedimentation pond material.

Coal Waste

**Coal Processing Waste**

The only coal processing waste to date is rock material manually separated from Andalex Resources' lump coal product at Wildcat. This is currently placed in an approved area at Wildcat Loadout. This MRP contains an Appendix Q. Appendix Q references the plan for reclamation of the waste rock pile at the Wildcat Loadout and should not be confused with the Centennial Reclamation Plan. Disposal of sediment pond material (temporary and permanent) is shown on Plate 6. Sediment pond waste has already been tested in one case to be non toxic and non acid forming and is being used currently in the Aberdeen Mine fill areas. Other material which is generated will be placed in temporary storage above the Apex Mine as shown on Plate 6 and will be disposed of permanently as back fill in high walls upon final reclamation. This material will be tested prior to final reclamation if used for final reclamation purposes. Based on previous experience, Andalex estimates that up to 3,000 yards of material at most will be generated. This material is included in the earthwork estimates. Please note that the rock tunnels constructed to the Centennial coal seam generated significant amounts of waste rock. One hundred percent of this waste rock was disposed of underground in the existing Pinnacle Mine. None of the waste rock appeared at the surface.

**Coal Refuse**

Please refer to Plate 6 for location of disposal areas.

**Acid and Toxic-Forming Materials**

The only spoil material which has been developed from the minesite is sediment pond waste. It has been determined that this material is non-toxic or acid-forming and that it may be used in a fill situation (see Appendix H). Samples are currently being further analyzed to determine whether they are toxic or acid forming. These materials include mid seam, roof, and floor material. Appendices E and H currently contain the majority of

the information necessary to determine whether roof, floor, or mid seam material is acid or toxic forming. If any roof rock from the Aberdeen Mine is developed, it will be disposed of underground or in one of the underground development waste storage areas depicted on Plate 6. Some coal development waste has been used as a stock pile pad for the Aberdeen Mine. This material will be treated as coal mine development waste upon reclamation and back filled into our high wall areas.

Future pond accumulations for the entire mine site will be stored at least temporarily on the material storage site located above the Apex Mine or in the now defunct Pond A. depicted as "temporary excess spoil and mine development waste" and shown on plate 6. Please see Plate 6.

Andalex will analyze the mid-seam of all four coal seams in addition to the roof and floor material on an annual basis or more frequently if mining operations change which could result in a modification to the roof floor or the mid-seam. Andalex will use this monitoring program in conjunction with the new AEP Lease. Andalex will make an effort to sample the material in the vicinity of section corners which occur within our leases.

Andalex agrees to monitor for acid or toxic forming materials according to Table 6, "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining". These parameters will prove pH, Electrical Conductivity, Saturation Percentage, Particle Size Analysis, Soluble Ca, Mg and Na, Sodium Adsorption Ratio, Selenium, Total N, Nitrate-N, Boron, Maximum Acid Potential, Neutralization Potential, Organic Carbon, Exchangeable Sodium, Available Water Capacity, and Rock Fragments. These parameters will be measured by acceptable methods at a qualified commercial testing laboratory.

There is no equipment located within our permit area which contain any of the substances listed by the Toxic Substances and Control Act, particularly PCB's. All transformers and OCB's are relatively new and are PCB free.

The storage of petroleum products on site is done in such a manner that hazards from spillage are minimal. Andalex operates with an SPCC Plan approved by a registered professional engineer (Appendix S). It is inevitable that during the course of operations, small amounts of oil and fuel will be accidently spilled and soaked up by soils and gravels. Andalex proposes to designate a specific area within our disturbed area at which contaminated soils or gravels will be brought, spread out, and aerated using only solar heat. We propose this area to be south of the Aberdeen truck loadout. The area will be small, however, it will be bermed to avoid runoff while the aeration process is ongoing. Once the aeration process is complete and the material is satisfactorily decontaminated, it will be used again as fill or hauled to our waste disposal area. Another possibility is the use of bioremediation. As this process is still being tested, Andalex does not propose to use this method at this time. However, should the method prove successful and acceptable, Andalex will consider using the process.

At the time of final reclamation, Andalex will need to treat or dispose of small quantities of soils and gravels which have been contaminated with oil and/or fuel. At final reclamation, Andalex will utilize the best available technology (BAT) to treat this quantity of soil and gravel in order that it is suitable for fill material. This would include methods for removing volatile matter and other contaminants. Should it prove at that time that best available technology is inadequate for decontamination, Andalex will dispose of this material at an approved disposal site (not within the permit area). This site would be approved by State Health and EPA for the disposal of this type of material.

**Non-Coal Waste**

Non-coal waste consists of lubricants, paints garbage, timber, and other waste generated during mining. Please refer to Plate 6 for the location of non-coal waste disposal (dumpsters).

**Combustible Materials**

No special measures are required. All combustibles (paper, etc.), are collected in trash containers and hauled to local city and land fill areas. Andalex currently operates under an SPCC Plan approved by a registered professional engineer. All materials such as oil and grease will be disposed of according to specific local requirements. All used motor oil is collected in 55 gallon drums and is recycled by local oil distributors. All used oils are recycled.

**Contingency Plans to Prevent Sustained Combustion**

All which could burn would be small in quantity and consist of mine trash. The trash facility is segregated and if ignited accidentally, could be extinguished using either water or fire extinguishers.

## R645-301-528.310. EXCESS SPOIL

See R645-301-528.300.

## R645-301-528.320. COAL MINE WASTE

See R645-301-528.300.

## R645-301-528.321. RETURN OF COAL PROCESSING WASTE TO ABANDONED UNDERGROUND WORKINGS

See R645-301-528.300.

## R645-301-528.322. REFUSE PILES

N/A

## R645-301-528.323. BURNING AND BURNED WASTE UTILIZATION

N/A

## R645-301-528.323.1 COAL MINE WASTE FIRES

In the unlikely event that any coal mine waste, including boney material or fine coal waste, were to ignite the fire would be extinguished in the same way that coal stockpile fires are extinguished. That is, the material will be dug out with front-end loaders, spread out on the ground inside the permit area, and be compacted. The material would then be returned to the waste storage area.

## R645-301-528.323.2 BURNING OR BURNED COAL MINE WASTE REMOVAL PLAN

N/A

## R645-301-528.330. NON-COAL MINE WASTE

See R645-301-528.300.

## R645-301-528.331. DESIGNATION OF NON-COAL MINE WASTE MATERIALS

See R645-301-528.300.

## R645-301-528.332. FINAL DISPOSAL OF NON-COAL MINE WASTES

See R645-301-528.300.

## R645-301-528.333. RESTRICTIONS ON DISPOSAL ON NON-COAL MINE WASTE MATERIAL

See R645-301-528.300.

## R645-301-528.334. HAZARDOUS WASTE MATERIALS

See R645-301-528.300.

## R645-301-528.340. UNDERGROUND DEVELOPMENT WASTE

See R645-301-528.300.

## R645-301-528.350. DISPOSAL REQUIREMENTS

See R645-301-528.300.

## R645-301-528.400. DAMS, EMBANKMENTS AND OTHER IMPOUNDMENTS

See R645-301-528.300.

## R645-301-529. MANAGEMENT OF MINE OPENINGS

See R645-301-528.300.

## R645-301-529.100. CLOSURE OF MINE OPENINGS

Abandonment of Portals and Underground Workings

**Introduction**

Upon completion of mining activities, the portals will be sealed according to existing state and federal regulations. Conveyors will be removed and pads filled. The slope will be contoured, compacted, and topsoil replaced and graded.

The final sealing of mine openings will be accomplished by placing a recessed concrete block seal 25 to 50 feet from the mouth of the portal. Since a portion of the mine slopes towards the portals, and mine water is present, seals will be constructed with at least one drainage pipe in the lowest portal. This pipe shall be a schedule 80 - 4" PVC, with a U-tube water trap and a valve or cap on the end. The pipe will be extended beyond the portal backfill. The area from the seals to the mouth of the portals will be backfilled. The portal structures will be removed and the exposed coal seam, including portal area, will be covered during reclamation. Please note that the Centennial Seam Mine will not require any new portals on the surface.

If a discharge is found to occur after sealing, the water will be sampled quarterly for compliance with effluent standards of 817.42 and treated (if necessary) during the liability period. See Figures IV-1 and IV-2 for portal sealing details.

It is very unlikely that a mine discharge will occur from any of the permanently sealed mine portals, although each seal will be equipped with a drainage pipe described above. To date, Andalex has encountered dry mining conditions and all portals in all three mines drift into the mountain in a down dip direction. If a discharge were to occur, it would only be after the entire pillared out workings had filled first. Then only would the static head against the seal allow any discharge. There is no way of knowing or estimating the mine discharge rate.

As maintained above, Andalex will monitor any discharge. Andalex's existing NPDES allows for a certain volume of mine discharge. This permit will be maintained after cessation of mining for the liability period until the bond is released.

The blowing fan ventilation shaft will be sealed by completely backfilling it from bottom to top. This shaft is 370' deep by 16' diameter, and will require approximately 2,755 cubic yards of backfill material. This backfill material will be hauled in from an offsite commercial gravel pit. See Appendix Y for reclamation information regarding the Ventilation Shaft/Blowing Fan Installation.

**Temporary Cessation**

Whenever it is known that operations are to be temporarily ceased for more than 30 days, Andalex Resources will submit to the Division a notice of intention to cease or abandon the operations, in accordance with MSHA standards.

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Figure IV-1
Typical Portal Sealing

INSERT ORIGINAL DRAWING

Typical Portal Seal
Figure IV-2

INSERT ORIGINAL DRAWING

This notice will describe mitigation measures to be employed in accordance with the terms and conditions of the permit approval, such as a statement of the number of surface areas involved in the cessation, extent of sub-surface strata, prior reclamation efforts accomplished on the property, and identification of all backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

Temporary closing of underground workings will be accomplished with chain link fence material as recommended by MSHA. This prevents access by unauthorized individuals during idol periods. It is not anticipated that once Andalex reaches its peak production that this will occur.

If underground openings are to remain inactive for a period greater than 90 days, such openings will be temporarily closed off from access. Such closures will consist of a chain link or other substantial wire mesh fabric fence placed over the portals to prevent public access while allowing for air flow. Locked gates may be installed in the portal to allow for mine inspection.

**Casing and Sealing of Drill Holes**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-529.200. UNDERGROUND MINING OPERATIONS

## R645-301-529.210. TEMPORARILY INACTIVE OPERATIONS

See R645-301-515.300.

## R645-301-529.220. RETURN UNDERGROUND DEVELOPMENT WASTE, COAL PROCESSING WASTE OR WATER TO UNDERGROUND WORKINGS

See R645-301-515.300.

## R645-301-529.300. HOLES USED FOR BLASTING

N/A

## R645-301-529.400. SURFACE MINING OPERATIONS

N/A

## R645-301-530. OPERATIONAL DESIGN CRITERIA AND

# PLANS

## R645-301-531. GENERAL

**Schedule of Construction, Mine Development, Mining and Reclamation**

All surface facilities have been constructed for the Pinnacle, Apex and Aberdeen Mines. Earthwork for the Aberdeen Mine was completed in 1989. The surface facilities for the Aberdeen Mine were completed in early 1990. No additional surface facilities are required for any new leases. There will be no additional construction activities or surface disturbance whatsoever in Hoffman Creek or Alrad Canyon.

However, Andalex does intend to add a fan installation in the left-hand fork of Deadman Canyon at some point in time. This installation will be according to measures outlined by the Bureau of Land Management as part of Right-of-Way U-64158. (Copy of Right-of-Way is included in Appendix B.) Andalex will submit detailed plans for this installation at the appropriate time. The location of this breakout is shown on Plate 29 (R.O.W.).

Mining in the Gilson seam began in October, 1980 with a single unit's production. As mining progresses, additional units will be added with three production units and the longwall scheduled to be operating by mid-1994. A systematic mining plan will be followed to assure maximum recovery. All planning and scheduled production, however, will be contingent upon the coal market. Upon the conclusion of mining activities in the area, the scheduled reclamation phase will begin immediately.

Andalex will fill, regrade and stabilize rills and gullies over 9 inches in depth. Further, Andalex has agreed to interim stabilization of all slopes and embankments within the disturbed area and has done so. One slope located at the bottom of the office driveway, has been attempted through hydroseeding, fertilizing and mulching techniques on three separate occasions. No significant erosion problems have occurred, Andalex will notify the Division in the event of any slides or other damage immediately by telephone and in writing.

Andalex will cover acid or toxic forming materials if any are encountered.

Andalex will advise the Division in the event of a temporary shutdown, such as a letter sent to the Division when Andalex's Apex Mine was temporarily closed.

## R645-301-532. SEDIMENT CONTROL

See R645-301-733.

## R645-301-532.100. MINIMIZING DISTURBANCES

Surface disturbances are minimal due to the nature of the mining activities. The permit area has been previously impacted by mining. Surface disturbances will be limited to the existing facilities which have been constructed. The total existing surface area disturbed is 47.19

Existing facilities are indicated on Plate 6 and 7.

The land affected by mining operations which shall be reclaimed, in compliance with the Mining and Reclamation Plan and all requirements of the Mined Land Reclamation Act and Rules and Regulations adopted in accordance therewith, can be described as follows:

47.19 acres located in T13S, R11E, S.L.B.&M., Carbon County, Utah and contained within,
SE 1/4 SW 1/4 Section 7
NE 1/4 SW 1/4 Section 7
SW 1/4 SE 1/4 Section 7
NW 1/4 SE 1/4 Section 7
SW 1/4 NE 1/4 Section 7
NE 1/4 NW 1/4 Section 18
NW 1/4 NE 1/4 Section 18

## R645-301-532.200. STABILIZING BACKFILLED MATERIAL

**Backfilling, Grading, and Soil Replacement and Stabilization**

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor. Refer to Appendix K for this study done at the Pinnacle Mine. Andalex has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and revegetation. Steep slopes will be reclaimed according to the approved plan shown on Plates 14 and 15.

Areas to be regraded include the portal site, surface facility siteand roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess

spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final reclamation is completed, slope stability studies will be performed as necessary. All information for slope stability studies will be included as part of the final reclamation package.

Where possible, all final grading and placement of topsoil will be done along the contour to minimize erosion. In all cases, grading will be conducted in a manner which minimizes erosion and provides a stable surface for the placement of topsoils.

Topsoil existing on site will be spread using a grader. Where possible, the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history, 6".

Andalex will rip the subsurface material to 6" using most likely a toothed motor grader or a disc, prior to soil redistribution.

Andalex will mix one ton of alfalfa per acre with its topsoil material to aid in aeration, microbiological community development, and water holding capacity.

Andalex will distribute topsoil to a minimum depth of 6" as previously stated.

Andalex has already committed to testing of redistributed soil and fill material and has committed to use proper additives if it is discovered necessary. Specifically, Andalex will test for organic matter, phosphorous, potassium, pH, conductivity, and texture. The samples will be taken at 0-6 inches, 6-12 inches, and 12-24 inches at least 90 days prior to final reclamation.

## R645-301-533. IMPOUNDMENTS

See R645-301-733..

## R645-301-533.100. STABILITY

See R645-301-733..

## R645-301-533.200. FOUNDATION DESIGN

Appendix K

## R645-301-533.210. STABILITY

Appendix K

## R645-301-533.220. PREPARATION

Appendix K

## R645-301-533.300. SLOPE PROTECTION

See R645-301-532.200.

## R645-301-533.400. VEGETATION OF EMBANKMENTS

See R645-301-532.200.

## R645-301-533.500. SUBMERGED HIGHWALLS

N/A

## R645-301-533.600. MSHA IMPOUNDMENTS

N/A

## R645-301-533.610. GEOTECHNICAL INVESTIGATIONS

N/A

## R645-301-533.620. ENGINEERING DESIGN

See R645-301-733..

## R645-301-533.700. NON-MSHA IMPOUNDMENTS DESIGN REQUIREMENTS

See R645-301-733..

## R645-301-534. ROADS

See R645-301-512.250.

## R645-301-534.100. DESIGN, USE AND RECLAMATION

See R645-301-512.250.

## R645-301-534.110. DAMAGE TO PUBLIC OR PRIVATE PROPERTY

See R645-301-512.250.

## R645-301-534.120. NON-ACID OR NONTOXIC FORMING SUBSTANCES IN ROAD SURFACING

No acid or toxic-forming substances will be used for road surfacing.

## R645-301-534.130. FACTOR OF SAFETY FOR ROAD EMBANKMENTS

See R645-301-512.250.

## R645-301-534.200. SAFETY AND ENVIRONMENTAL PROTECTION

See R645-301-512.250.

## R645-301-534.300. PRIMARY ROADS

See R645-301-512.250.

## R645-301-534.310. LOCATION

See R645-301-512.250.

## R645-301-534.320. SURFACING

See R645-301-512.250.

## R645-301-534.330. MAINTENANCE

See R645-301-512.250.

## R645-301-534.340. CULVERT DESIGN

See R645-301-512.250.

## R645-301-535. SPOIL

See R645-301-513.300.

## R645-301-535.100. DISPOSAL OF EXCESS SPOIL

See R645-301-513.300.

## R645-301-535.110. MINIMUM FACTOR OF SAFETY

N/A

## R645-301-535.111. LOCATION

N/A

## R645-301-535.112. FOUNDATION INVESTIGATIONS

N/A

## R645-301-535.113. KEYWAY CUTS OR ROCK TOE BUTTRESSES

N/A

## R645-301-535.120. EXCESS SPOIL DISPOSED OF IN UNDERGROUND MINE WORKINGS

**Return of Coal Processing Waste to Abandoned Underground Workings**

As raw coal is hauled from the permit area, there will be no processing waste and no return of processing waste to underground workings. If in the future it is decided that a processing facility is to be incorporated, waste or reject would taken to an approved refuse disposal site. Please note that underground development waste rock generated by the Centennial Seam rock tunnels was disposed of underground in the existing Pinnacle Mine workings.

## R645-301-535.130. PLACEMENT OF EXCESS SPOIL

There has been no development waste or excess spoil to date excepting sedimentation pond material.

**Coal Processing Waste**

The only coal processing waste to date is rock material manually separated from Andalex Resources' lump coal product at Wildcat. This is currently placed in an approved area at Wildcat Loadout. This MRP contains an Appendix Q. Appendix Q references the plan for reclamation of the waste rock pile at the Wildcat Loadout and should not be confused with the Centennial Reclamation Plan. Disposal of sediment pond material (temporary and permanent) is shown on Plate 6. Sediment pond waste has already been tested in one case to be non toxic and non acid forming and is being used currently in the Aberdeen Mine fill areas. Other material which is generated will be placed in temporary storage above the Apex Mine as shown on Plate 6 and will be disposed of permanently as back fill in high walls upon final reclamation. This material will be tested prior to final reclamation if used for final reclamation purposes. Based on previous experience, Andalex estimates that up to 3,000 yards of material at most will be generated. This material is included in the earthwork estimates. Please note that the rock tunnels constructed to the Centennial coal seam generated significant amounts of waste rock. One hundred percent of this waste rock was disposed of underground in the existing Pinnacle Mine. None of the waste rock appeared at the surface.

**Coal Refuse**

Please refer to Plate 6 for location of disposal areas.

**R645-301-535.140. SURFACE COAL OPERATIONS**

N/A

**R645-301-535.141. GEOLOGIC CONDITIONS**

N/A

**R645-301-535.142. SEEP AND SPRING SURVEY**

N/A

**R645-301-535.143. EFFECTS FROM SUBSIDENCE**

N/A

**R645-301-535.144. ROCK CHIMNEY CORES OR DRAINAGE BLANKETS**

N/A

**R645-301-535.145. STABILITY ANALYSIS**

N/A

**R645-301-535.150. SURFACE MINING OPERATIONS**

N/A

**R645-301-535.151. TEST BORINGS**

N/A

**R645-301-535.152. ENGINEERING SPECIFICATIONS FOR ROCK TOE BUTTRESS OR KEYWAY CUTS**

N/A

**R645-301-535.200. DISPOSAL OF EXCESS SPOIL: VALLEY FILLS / HEAD-OF-HOLLOW FILLS**

N/A

**R645-301-535.210. ROCK CORE CHIMNEY DRAINS**

N/A

**R645-301-535.220. DESIGN AND CONSTRUCTION OF THE**

## FILL

N/A

## R645-301-535.221. DESIGN REQUIREMENTS

N/A

## R645-301-535.222. FILTER SYSTEM

N/A

## R645-301-535.223. GRADING AND DRAINAGE

N/A

## R645-301-535.300. DISPOSAL OF EXCESS SPOIL: DURABLE ROCK RILLS

N/A

## R645-301-535.310. RESTRICTION

N/A

## R645-301-535.320. REQUIREMENTS

N/A

## R645-301-535.330. FACTOR OF SAFETY

N/A

## R645-301-535.340. UNDERDRAIN SYSTEMS

N/A

## R645-301-535.400. DISPOSAL OF EXCESS SPOIL: PRE-EXISTING BENCHES

N/A

## R645-301-535.410. PLACEMENT

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor. Refer to Appendix K for this study done at the Pinnacle

Mine. Andalex has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and revegetation.

Areas to be regraded include the portal site, surface facility site and roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final reclamation is completed, slope stability studies will be performed as necessary. All information for slope stability studies will be included as part of the final reclamation package.

Where possible, all final grading and placement of topsoil will be done along the contour to minimize erosion. In all cases, grading will be conducted in a manner which minimizes erosion and provides a stable surface for the placement of topsoils.

Topsoil existing on site will be spread using a grader. Where possible, the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history, 6".

Andalex will rip the subsurface material to 6" using most likely a toothed motor grader or a disc, prior to soil redistribution.

Andalex will mix one ton of alfalfa per acre with its topsoil material to aid in aeration, microbiological community development, and water holding capacity.

Andalex will distribute topsoil to a minimum depth of 6" as previously stated.

Andalex has already committed to testing of redistributed soil and fill material and has committed to use proper additives if it is discovered necessary. Specifically, Andalex will test for organic matter, phosphorous, potassium, pH, conductivity, and texture. The samples will be taken at 0-6 inches, 6-12 inches, and 12-24 inches at least 90 days prior to final reclamation.

## R645-301-535.420. DESIGN

N/A

**R645-301-535.430. GRADING AND HIGHWALL ELIMINATION**

See R645-301-535.410.

**R645-301-535.440. GRAVITY TRANSPORTATION**

N/A

**R645-301-535.441. HAZARDS**

See R645-301-535.410.

**R645-301-535.442. STABILITY**

See R645-301-535.410.

**R645-301-535.443. SAFETY BERMS**

Appendix K

**R645-301-535.444. FINAL DISPOSITION**

See R645-301-535.410.

**R645-301-535.500. FACEUP OPERATIONS**

See R645-301-535.410.

**R645-301-536. COAL MINE WASTE**

See R645-301-528.300.

**R645-301-536.100. DISPOSAL FACILITY**

See R645-301-528.300.

**R645-301-536.110. STABILITY**

N/A

**R645-301-536.120. FOUNDATION DESIGN**

N/A

**R645-301-536.200. PLACEMENT**

See R645-301-528.300.

**R645-301-536.210. CONSTRUCTION**

See R645-301-528.300.

## R645-301-536.220. PUBLIC HAZARDS

See R645-301-528.300.

## R645-301-536.230. PREVENT COMBUSTION

See R645-301-528.300.

## R645-301-536.300. COAL MINE WASTE DISPOSED OF IN EXCESS SPOIL FILLS

See R645-301-528.300.

## R645-301-536.310. REQUIREMENTS

See R645-301-528.300.

## R645-301-536.320. NONTOXIC AND NON-ACID FORMING

See R645-301-528.300.

## R645-301-536.330. DESIGN STABILITY

See R645-301-528.300.

## R645-301-536.400. OTHER REQUIREMENTS

See R645-301-528.300.

## R645-301-536.410. RESTRICTIONS

N/A

## R645-301-536.420. DESIGN PLAN

See R645-301-528.300.

## R645-301-536.500. DISPOSAL OF COAL MINE WASTE IN SPECIAL AREAS

N/A

## R645-301-536.510. OUTSIDE A PERMIT AREA

N/A

## R645-301-536.520. UNDERGROUND DISPOSAL

See R645-301-528.300.

**R645-301-536.600. UNDERGROUND DEVELOPMENT WASTE**

See R645-301-528.300.

**R645-301-536.700. COAL PROCESSING WASTE**

See R645-301-528.300.

**R645-301-536.800. COAL PROCESSING WASTE EMBANKMENTS**

N/A

**R645-301-536.810. REQUIREMENTS**

N/A

**R645-301-536.820. MSHA REQUIREMENTS**

N/A

**R645-301-821. BORINGS AND TEST PITS**

N/A

**R645-301-536.822. FOUNDATION DESIGN**

N/A

**R645-301-536.823. SEEP AND SPRING SURVEYS**

N/A

**R645-301-536.824. HAZARDS**

N/A

**R645-301-536.900. REFUSE PILES**

N/A

**R645-301-537. REGRADED SLOPES**

See R645-532.200.

**R645-301-537.100. GEOTECHNICAL ANALYSIS**

See R645-532.200.

**R645-301-537.200. REGRADING SETTLED AND REVEGETATED FILLS**

See R645-532.200.

**R645-301-537.210. RESTRICTIONS**

N/A

**R645-301-537.220. LOCATION**

See R645-532.200.

**R645-301-537.230. STABILITY**

See R645-532.200.

**R645-301-537.240. VEGETATION AND SURFACE RUNOFF CONTROL**

See R645-532.200.

**R645-301-537.250. HAZARDOUS CONDITIONS**

See R645-532.200.

**R645-301-540. RECLAMATION PLAN**

See R645-532.240.

**R645-301-541. GENERAL**

See R645-532.240.

**R645-301-541.100. CESSATION OF MINING OPERATIONS**

See R645-532.240.

**R645-301-541.200. REMOVAL OF FACILITIES**

See R645-532.240.

**R645-301-541.300. POSTMINING FACILITIES AND MONITORING**

See R645-301-711.500

**R645-301-541.400. COMPLIANCE REQUIREMENTS FOR RECLAMATION**

See R645-301-240.

**R645-301-542. NARRATIVES, MAPS AND PLANS**

See R645-301-510.

## R645-301-542.100. TIMETABLE

See R645-301-240.

## R645-301-542.200. BACKFILLING AND GRADING PLAN

See R645-301-532.200.

## R645-301-542.300. FINAL SURFACE CONFIGURATION MAPS

Plates 16 & 17

## R645-301-542.310. CERTIFICATION REQUIREMENTS

The maps and cross sections found in R645-301-521.140 have been certified as required.

## R645-301-542.320. PERMANENT FACILITIES

## R645-301-542.400. FINAL ABANDONMENT OR BOND RELEASE

## R645-301-542.500. IMPOUNDMENTS AND EMBANKMENTS

See R645-301-733.

## R645-301-542.600. ROADS

Roads not to be retained for use under an approved post mining land use will be reclaimed immediately after it is no longer needed for mining and reclamation operations.

## R645-301-542.610. CLOSURE

See R645-301-240.

## R645-301-542.620. REMOVAL OF BRIDGES AND CULVERTS

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases including the left fork fan installation:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are

shown in the Sedimentation and Drainage Control Plan).

All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-542.630. TOPSOIL REPLACEMENT AND Revegetation

**Backfilling, Grading, and Soil Replacement and Stabilization**

All disturbed areas will be backfilled and graded to as near as possible the approximate original contour, and to the most moderate slope possible. Slopes shall not exceed the angle of repose or such lessor slopes as required by the regulatory authority to maintain stability. Fill material will be compacted to assure stability.

Andalex has had a slope stability study performed on a fill pad with a slope greater than 2h:1v and it was determined, even prior to compaction, that the fill had an adequate safety factor. Refer to Appendix K for this study done at the Pinnacle Mine. Andalex has committed to five years of monitoring of this site or whatever amount of time is necessary to assure stability of slopes has been achieved. It should be noted that all highwalls on Andalex's minesite are in or will be in bedrock. This is a steep sided, narrow canyon and Andalex will not be relieved of liability until reasonable stability has been achieved through compaction and revegetation.

Areas to be regraded include the portal site, surface facility site and roads. Because of the diversity of these areas, all regrading will conform to the specific site. Specific to high wall areas, some of the back filling will include excess spoil and underground development waste. We estimate this may be as much as 3000 yards of material. Please refer to Plate 15 addendum for a detailed drawing on the high wall areas. The Aberdeen Mine high wall has been redrawn and back fills recalculated. Where slopes are greater than 2 to 1, before final reclamation is completed, slope stability studies will be performed as necessary. All information for slope stability studies will be included as part of the final reclamation package.

Where possible, all final grading and placement of topsoil will be done along the contour to minimize erosion. In all

cases, grading will be conducted in a manner which minimizes erosion and provides a stable surface for the placement of topsoils.

Topsoil existing on site will be spread using a grader. Where possible, the soil will be distributed along the contour. The thickness of the re-established soil will be consistent with soils in the vicinity and will be sufficient to support vegetation equal to or superior to pre-mining history, 6".

Andalex will rip the subsurface material to 6" using most likely a toothed motor grader or a disc, prior to soil redistribution.

Andalex will mix one ton of alfalfa per acre with its topsoil material to aid in aeration, microbiological community development, and water holding capacity.

Andalex will distribute topsoil to a minimum depth of 6" as previously stated.

Andalex has already committed to testing of redistributed soil and fill material and has committed to use proper additives if it is discovered necessary. Specifically, Andalex will test for organic matter, phosphorous, potassium, pH, conductivity, and texture. The samples will be taken at 0-6 inches, 6-12 inches, and 12-24 inches at least 90 days prior to final reclamation.

## R645-301-542.700. FINAL ABANDONMENT OF MINE OPENINGS AND DISPOSAL AREAS

Plates 6, 16, & 17

## R645-301-542.710. DESCRIPTION

See R645-301-515.300.

## R645-301-542.720. DISPOSAL OF EXCESS SPOIL

See R645-301-513.300.

## R645-301-542.730. DISPOSAL OF COAL MINE WASTE

See R645-301-513.300.

## R645-301-542.740. DISPOSAL OF NON-COAL MINE WASTES

See R645-301-513.300.

## R645-301-542.741. PLACEMENT AND STORAGE

See R645-301-513.300.

## R645-301-542.742. FINAL DISPOSAL

See R645-301-513.300.

## R645-301-542.800. RECLAMATION COST ESTIMATE

See R645-301-240.

## R645-301-550. RECLAMATION DESIGN CRITERIA AND PLANS

See R645-301-240.

## R645-301-551. CASING AND SEALING OF UNDERGROUND OPENINGS

**Casing and Sealing of Drill Holes**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

See R645-301-529.100.

## R645-301-552. PERMANENT FEATURES

N/A

## R645-301-552.100. SMALL DEPRESSIONS

Plates 16 & 17

## R645-301-552.200. PERMANENT IMPOUNDMENTS

N/A

## R645-301-553. BACKFILLING AND GRADING

See R645-301-532.200.

## R645-301-553.100. DISTURBED AREAS

See R645-301-532.200.

## R645-301-553.110. AOC REQUIREMENTS

See R645-301-532.200.

## R645-301-553.120. HIGHWALL AND SPOILS PILE

## ELIMINATION

See R645-301-532.200.

## R645-301-553.130. SLOPE PROTECTION AND STABILITY

See R645-301-532.200.

## R645-301-553.140. EROSION AND WATER POLLUTION

See R645-301-532.200.

## R645-301-553.150. SUPPORT POSTMINING LAND USE

Upon completion of Andalex Resources' mining operation, the land will continue to be used for grazing and hunting. The limited resources, both physical and scenic, will dictate no future change in the land status. The nature of an underground mine of this size requires minimal surface disturbance. All disturbed areas shall be restored in a timely manner to conditions that are capable of supporting the uses which they were capable of supporting before any mining including high priority wildlife habitat. Andalex is not proposing an alternate post-mining land use. Andalex is not requesting an approval for an alternate post-mining land use. The anticipated post-mining land use is likely to be achieved and does not present any actual or probable hazard to public health or safety or threat of water diminution or pollution. The post-mining land use is practical and can be implemented immediately following reclamation and will not result in any violation of federal, state, or local law.

## R645-301-553.200. SPOIL AND WASTE

See R645-301-513.300.

## R645-301-553.210. REQUIREMENTS FOR DISPOSAL

See R645-301-513.300.

## R645-301-553.221. CLEARING AND GRUBBING

N/A

## R645-301-553.222. TOPSOIL REMOVAL AND STORAGE

See R645-301-231, -234.

## R645-301-553.223. BACKFILLING AND GRADING

See R645-301-532.200.

## R645-301-553.230. FINAL SURFACE GRADING

See R645-301-532.200.

**R645-301-553.240. FINAL CONFIGURATION**

Plates 16 & 17

**R645-301-553.250. REFUSE PILES**

N/A

**R645-301-553.251. FINAL CONFIGURATION**

N/A

**R645-301-553.252. COVER REQUIREMENTS**

N/A

**R645-301-553.260. DISPOSAL OF COAL PROCESSING WASTES IN MINED-OUT SURFACE AREAS**

N/A

**R645-301-553.300. RESTRICTIONS AND REQUIREMENTS**

N/A

**R645-301-553.400. CUT-AND-FILL TERRACES**

N/A

**R645-301-553.410. COMPATIBILITY**

N/A

**R645-301-553.420. SPECIALIZED FACILITIES FOR IMPLEMENTING POSTMINING LAND USE**

N/A

**R645-301-553.500. PREVIOUSLY MINED AREAS**

N/A

**R645-301-553.510. RE-MINING AREAS CONTAINING HIGHWALLS**

N/A

**R645-301-553.520. HIGHWALL ELIMINATION**

See R645-301-532.200.

## R645-301-553.521. SPOIL AVAILABILITY

Old coal pads will be used for backfilling highwalls.

## R645-301-553.522. BACKFILLING COMPATIBILITY

This is compatible with our refuse elimination plan.

## R645-301-553.523. HIGHWALL REMNANTS

See R645-301-532.200.

## R645-301-553.524. SPOIL PLACEMENT

See R645-301-553.221.

## R645-301-553.600. APPROXIMATE ORIGINAL CONTOUR

See R645-301-523.200.

## R645-301-553.610. VARIANCE REQUIREMENTS

See R645-301-523.200.

## R645-301-553.620. INCOMPLETE HIGHWALL ELIMINATION

See R645-301-523.200.

## R645-301-553.630. MOUNTAINTOP APPROVAL

N/A

## R645-301-553.640. SURFACE MINING OPERATIONS

N/A

## R645-301-533.641. THIN OVERBURDEN

N/A

## R645-301-533.642. THICK OVERBURDEN

N/A

## R645-301-553.650. UNDERGROUND MINING OPERATIONS

See R645-301-511.100.

## R645-301-553.651. RETAINED HIGHWALLS

See R645-301-532.200.

## R645-301-553.652. COMPATIBILITY

See R645-301-532.200.

## R645-301-553.653. GEOMORPHIC PROCESS

See R645-301-532.200.

## R645-301-553.700. BACKFILLING AND GRADING: THIN OVERBURDEN

N/A

## R645-301-553.710. AVAILABLE SPOIL MATERIALS

N/A

## R645-301-553.720. REQUIREMENTS

N/A

## R645-301-553.800. BACKFILLING AND GRADING: THICK OVERBURDEN

N/A

## R645-301-553.810. FINAL GRADING

N/A

## R645-301-553.820. REQUIREMENTS

N/A

## R645-301-553.830. EXCESS SPOIL

N/A

## R645-301-553.900. SETTLED AND REVEGETATED FILLS

N/A

## R645-301-560. PERFORMANCE STANDARDS

See R645-301-511.100.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 6

## Geology

## C/007/019

(Revised)
June, 2014

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## R645-301-600. GEOLOGY

As the Mathis Tract and New Federal Summit Creek Lease boundary change is simply an extension of underground mine workings under roughly 2,500 feet of cover there will be absolutely no effect on geology other than as we proceed further to the north, the depth of cover increases.

~~* SEE ALSO APPENDIX E~~

The Kenilworth Tract will not require any changes to engineering practices currently employed at the Aberdeen Mine. The change simply involves an extension of underground mine workings and does not involve the surface in any way.

## R645-301-610. INTRODUCTION

## R645-301-611. GENERAL REQUIREMENTS

## R645-301-611.100. GEOLOGY WITHIN AND ADJACENT TO THE PERMIT AREA

### Introduction

The proposed permit area is in Book Cliffs which is the major physiographic feature in the region. The cliffs rise from a base at approximately 5,500 feet in elevation, to over 8,500 feet. Numerous canyons dissect the Book Cliffs. Soldier Creek and Coal Creek are the major area drainages. The permit area exhibits extreme topographic relief and is mountainous with steep cliffs and deeply incised drainages. With the exception of the Mancos Shale Formation, the Fiasco, Deadman, Straight Canyons, Hoffman Creek Canyon, Graves Lease and AEP Lease exhibit similar stratigraphic and topographic characteristics.

### Tectonic Setting

The major coal seams of the Book Cliffs Coal Field lie within the Cretaceous Mesa Verde group which overlies the thick shales of the Cretaceous Mancos formation. The Mesa Verde group consists of the Star Point Sandstone, Blackhawk formation and Price River formation. The major coal seams lie within the Blackhawk formation.

The Tertiary Wasatch and Green River formations, along with the Price River formation, form the Roan Cliffs, the Tavaputs

Plateau and the southern rim of the Uintah Basin. Lithologies present include fluvial, deltaic, and marine sandstones, mudstones, and shales.

**Geologic History**

During the Triassic and Jurassic periods, the area of the Book Cliffs was relatively stable, but gradually subsided and received sediments. The area, assumed to have been a relatively flat lowland, was occasionally covered by a shallow sea of short geologic duration. A thick red bed sequence suggests tropical conditions and the great thickness of sand accumulation suggests


acid conditions. During Triassic times, the sediments probably came from all directions but, during the Jurassic time, the major source areas lay to the south and west.

During the early Cretaceous time, a trough developed in the Colorado Rockies area and the sea invaded. Gradually the sea crept westward as the trough continued to subside, reaching the east edge of the Colorado Plateau by the beginning of the Upper Cretaceous age.

Unconformities and thinning of various members indicate that volcanic activity to the west caused sediments to fill the basin faster than it could subside, causing the shoreline to be pushed eastward. When lulls in this activity developed, the incoming sediments diminished and the sea moved westward once more. With each pulse, the boundaries of the depositional environments moved eastward and then returned westward. The sandstone tongues of the Mesa Verde, which project into the Mancos, were deposited at these times.

After the sea retreated, the area continued to receive sediments under continental conditions which lasted well into Eocene time. In Oligocene time, the area began to rise in earnest. Erosion attacked the newly formed formation creating the present mountain ranges and cliffs.

**Stratigraphy**

The ~~main~~ coal ~~bearing beds in the region occur~~seams in the Blackhawk formation~~. There are various more or less distinct coal beds or zones as listed below from top to bottom according to stratigraphic position.~~
~~——~~ are listed stratigraphically:

Upper Sunnyside Bed
Lower Sunnyside Bed
Centennial Bed
Rock Canyon Bed
Fishcreek Bed
Gilson Bed
Kenilworth Bed
Castlegate "B" Bed

~~———~~
~~Text Moved Here: 1~~
Castlegate "A" Bed (Aberdeen)

Only the Lower Sunnyside, Centennial, Gilson, and Castlegate "A" beds are formed in commercial thickness on the Centennial Property. Andalex has discovered a new coal seam which is referred to as the Centennial Seam. This coal was originally thought to have been in the Lower Sunnyside Seam. This coal has been accessed through rock tunnels from the existing Pinnacle Mine. Waste from these rock tunnels was disposed of in the Pinnacle Mine. The Mine in the Centennial Seam as well as the Mine in the Aberdeen Seam will both progress onto the Graves Lease. Andalex is applying for approval for the new AEP Lease in the Centennial and Aberdeen Seams only.
~~End Of Moved Text~~
~~——— Castlegate "A" Bed~~

~~These zones~~
Stratigraphic sections of the coal beds are ~~lenticular~~shown in Figures III-1 and ~~reach minable thickness only in certain areas. The Lower Sunnyside Bed is the major bed in the area~~III-2. Seam thicknesses are shown on Plates 26, 27, 28, and 29.

**Structure**

The Book Cliffs are basically a homocline (dip slope) dipping into the Uintah Basin with the cliff front roughly paralleling the strike of the feature. The strike of the beds is generally parallel to the face of the Book Cliffs. The beds are mostly

~~Stratigraphy~~

~~The coal seams in the Blackhawk formation are listed stratigraphically:~~

- ~~Upper Sunnyside Bed~~
- ~~Lower Sunnyside Bed~~
- ~~Centennial Bed~~
- ~~Rock Canyon Bed~~
- ~~Fishcreek Bed~~
- ~~Gilson Bed~~
- ~~Kenilworth Bed~~
- ~~Castlegate "B" Bed~~

~~Text Was Moved From Here.~~

~~Stratigraphic sections of the coal beds are shown in Figures III-1 and III-2. Seam thicknesses are shown on Plates 26, 27, 28, and 29.~~

**Structure**

The structure between Deadman and Soldier Canyons is relatively simple. Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are thought to exist in the Deadman Canyon area.

**History of Mining**

Several small operations have mined a considerable amount of coal over the past 70 years in the Deadman Canyon Area. Mining ceased in the area in 1964. These mines, however, merely scratched the surface of the reserve. The remaining recoverable reserve is estimated to be greater than twenty-eight million tons and ranging in cover from 0 to 2,700 feet.

**Identification of Strata**

Strata disturbed by surface operations consist of sandstone and siltstone of a colluvial nature.

TABLE III-2
Andalex Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 77-1-CP | NE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,555 ft. | 675 ft. | Gilson<br>Aberdeen |
| 77-2-CP | SE1/4 NE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,520 ft. | 690 ft. | Gilson<br>Aberdeen |
| 77-3-CP | SE1/4 SE1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,425 ft. | 868 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |
| 77-4-CP | SE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,070 ft. | 105 ft. | Aberdeen |

Table III-2 (Continued)

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 77-5-CP | SE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,085 ft. | 85 ft. | Aberdeen |
| 77-6-CP | NE1/4 NE1/4 NW1/4<br>Sec. 18 T13S, R11E, SLBM<br>Elevation - 7,080 ft. | 80 ft. | Aberdeen |
| 77-7-CP | NE1/4 NE1/4 NW1/4<br>Sec. 18 T13S, R11E, SLBM<br>Elevation - 7,010 ft. | 45 ft. | Aberdeen |
| 89-1-AP | SW1/4 SE1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,239 ft. | 460 ft. | Centennial<br>Aberdeen |
| 89-2-AP | NE1/4 NW1/4 SW1/4 | 90 ft. | Centennial |

~~Table III-2 (Continued)~~

| ~~Number~~ | ~~Location~~ | ~~Total Depth~~ | ~~Coal Seams~~ |
|---|---|---|---|
| 89-2-PIN | SW1/4 NW1/4 SW1/4<br>Sec. 8 T13S, R11E, SLBM<br>Elevation - 7,014 | 250 ft. | Aberdeen |
| 89-3-PIN | NW1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,483 ft. | 240 ft. | Aberdeen |
| 89-1-CP | SE1/4 SE1/4 SW1/4<br>Sec. 6 T13S, R11E, SLBM<br>Elevation - 8,307 ft. | 1,880 ft. | Centennial<br>Aberdeen |

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 6

## Geology

**C/007/019**

(Revised)
July, 2014

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# R645-301-600. GEOLOGY

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The Kenilworth Tract will not require any changes to engineering practices currently employed at the Aberdeen Mine. The change simply involves an extension of underground mine workings and does not involve the surface in any way.

## R645-301-610. INTRODUCTION

## R645-301-611. GENERAL REQUIREMENTS

## R645-301-611.100. GEOLOGY WITHIN AND ADJACENT TO THE PERMIT AREA

### Introduction

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**Geologic History**

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Unconformities and thinning of various members indicate that volcanic activity to the west caused sediments to fill the basin faster than it could subside, causing the shoreline to be pushed eastward. When lulls in this activity developed, the incoming sediments diminished and the sea moved westward once more. With each pulse, the boundaries of the depositional environments moved eastward and then returned westward. The sandstone tongues of the Mesa Verde, which project into the Mancos, were deposited at these times.

After the sea retreated, the area continued to receive sediments under continental conditions which lasted well into Eocene time. In Oligocene time, the area began to rise in earnest. Erosion attacked the newly formed formation creating the present mountain ranges and cliffs.

**Stratigraphy**

The coal seams in the Blackhawk formation are listed stratigraphically:

Upper Sunnyside Bed
Lower Sunnyside Bed
Centennial Bed
Rock Canyon Bed
Fishcreek Bed
Gilson Bed
Kenilworth Bed
Castlegate "B" Bed
Castlegate "A" Bed (Aberdeen)

Only the Lower Sunnyside, Centennial, Gilson, and Castlegate "A" beds are formed in commercial thickness on the Centennial Property. Andalex has discovered a new coal seam which is

referred to as the Centennial Seam. This coal was originally thought to have been in the Lower Sunnyside Seam. This coal has been accessed through rock tunnels from the existing Pinnacle Mine. Waste from these rock tunnels was disposed of in the Pinnacle Mine. The Mine in the Centennial Seam as well as the Mine in the Aberdeen Seam will both progress onto the Graves Lease. Andalex is applying for approval for the new AEP Lease in the Centennial and Aberdeen Seams only.

Stratigraphic sections of the coal beds are shown in Figures III-1 and III-2. Seam thicknesses are shown on Plates 26, 27, 28, and 29.

**Structure**

The Book Cliffs are basically a homocline (dip slope) dipping into the Uintah Basin with the cliff front roughly paralleling the strike of the feature. The strike of the beds is generally parallel to the face of the Book Cliffs. The beds are mostly uniform with dips of from 3° to 8° to the north and northeast toward the Uintah Basin.

Occasional faults cut the coal measures but are of small displacement and have been of little consequence in mining. The most serious group of faults lies in the Sunnyside area. These faults, which have a maximum separation of 200 feet, effect mining, but, fortunately, are not closely spaced.

**History of Mining**

Mining has been the major industry in the region for many years. Coal was discovered in the Wasatch Plateau in 1874 and exploration soon spread to the Book Cliffs. Mines began operating in the area in 1889. The Castlegate and Sunnyside area was first developed, the areas in between being developed later. Coal was usually discovered away from settled areas and towns were built for employees by the companies.

Production from mines generally increased until 1920, but began to decline in the 1920's and 1930's. World War II brought production back to the 1920 levels and production continued to increase until 1957 when production again declined.

Book Cliff mines to present have produced about 75 percent of Utah's coal annually. Well over 200 million tons of coal have been extracted from the coal measures of the area. Much coal remains and numerous mines are presently operating in the area.

**Geologic Hazard**

There are occasional faults cutting the coal measures of the area. They are of relatively small displacement. The most serious faults occur in the Sunnyside area. There is no indication of faulting within our lease area.

Faults in the Sunnyside district of the Book Cliffs field have been thought, by some, to have a causative relationship to the bounces experiences there. The outcrops on the lease premises and our own aerial photos have been carefully studied. In our judgement, no faults cut the lease area. The bulk of the tonnage to be mined is under less than 1,500 feet of cover, with only a very limited amount of coal under cover, up to 2,700 feet. Water inflows have never been a problem in the Book Cliffs field. The dip of the coal measures prevents entrapment of personnel, in any event.

**Structure**

The structure between Deadman and Soldier Canyons is relatively simple. Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are thought to exist in the Deadman Canyon area.

**History of Mining**

Several small operations have mined a considerable amount of coal over the past 70 years in the Deadman Canyon Area. Mining ceased in the area in 1964. These mines, however, merely scratched the surface of the reserve. The remaining recoverable reserve is estimated to be greater than twenty-eight million tons and ranging in cover from 0 to 2,700 feet.

**Identification of Strata**

Strata disturbed by surface operations consist of sandstone and siltstone of a colluvial nature.

**Statement of Borings and Samplings**

**Design of Boring and Sampling Program**

**Sites - Numbers, Location and Relationship to the Disturbed Area**

The number, locations, and relationship of drill holes and sampling are indicated on Plates 26, 27, and 28.

**Methodology - Sample Collection, Compositing of Samples for Each Strata, Laboratory**

Samples of the immediate floor and roof below and above each seam were sampled using conventional core drilling equipment. Also, samples of the overburden which was disturbed in surface

operation has been sampled by "grab" methods, as well as auger drilling.

Data

**Field Log and Description of Samples - Lithologic Classification, Description, and Hydrologic Aspects**

In November and December, 1971, a five-hole drilling program was conducted by Centennial Coal Associates, supplemented by mine samples and outcrop information, and the results used to estimate the coal reserves of the leases. Pertinent information on these drill holes is given in Table III-1 and Appendix E. Complete lithologic logs of each drill hole are included in Appendix E. Numerous samples were taken from the outcrops of the Lower Sunnyside, Gilson, and Aberdeen seams, as well as from mine faces in the Hileman, Olsen, Star Point, and Blue Flame No. 1 mines. Information from those samples as well as the location of the drill holes is shown on Plates 26, 27, and 28.

TABLE III-1

Centennial Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| DH-1 | NW1/4 NW1/4 SE1/4<br>Sec. 8 T13S, R11E, SLBM<br>Elevation - 7,230 ft. | 516 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |
| DH-2 | SW1/4 NW1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,275 ft. | 580 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |
| DH-2-A | SW1/4 NW1/4 SE1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,165 ft. | 303 ft. | Gilson<br>Aberdeen |
| DH-5 | SE1/4 SW1/4 NE1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,275 ft. | 832 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |
| DH-6 | NW1/4 SE1/4 SW1/4<br>Sec. 5 T13S, R11E, SLBM<br>Elevation - 8,558 ft. | 2,275 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |

In October and November, 1977, a seven-hole drilling program was conducted by Andalex in order to better define the coal reserves for mine planning on the Zion's fee. Pertinent information on these drill holes is presented in Table III-2. Complete lithologic logs of each drill hole are included in Appendix E. Locations are indicated on Plates 26, 27, and 28. Andalex drilled six holes underground and one on the surface in the summer of 1989 (Drill hole numbers 89-1-AP, 89-2-AP, 89-3-AP, 89-1-PIN, 89-2-PIN, 89-3-PIN, 89-1-CP). These holes were primarily to substantiate the existence of the new Centennial Seam.

Andalex has also acquired lithologic logs of two drill holes completed by North American Coal Corp., in 1948 and one by Pacific Gas & Electric in 1980. Although these holes are not located within the permit area, but to the west and east of its boundary, the information has been utilized in estimating reserves. Pertinent information is given in Table III-3. Complete lithologic logs are included in Appendix E and their location is indicated on Plates 26, 27, 28, and 29.

TABLE III-2
Andalex Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 77-1-CP | NE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,555 ft. | 675 ft. | Gilson<br>Aberdeen |
| 77-2-CP | SE1/4 NE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,520 ft. | 690 ft. | Gilson<br>Aberdeen |
| 77-3-CP | SE1/4 SE1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,425 ft. | 868 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |
| 77-4-CP | SE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,070 ft. | 105 ft. | Aberdeen |

Table III-2 (Continued)

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| 77-5-CP | SE1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,085 ft. | 85 ft. | Aberdeen |
| 77-6-CP | NE1/4 NE1/4 NW1/4 | 80 ft. | Aberdeen |

| | | | |
|---|---|---|---|
| | Sec. 18 T13S, R11E, SLBM<br>Elevation - 7,080 ft. | | |
| 77-7-CP | NE1/4 NE1/4 NW1/4<br>Sec. 18 T13S, R11E, SLBM<br>Elevation - 7,010 ft. | 45 ft. | Aberdeen |
| 89-1-AP | SW1/4 SE1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,239 ft. | 460 ft. | Centennial<br>Aberdeen |
| 89-2-AP | NE1/4 NW1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,283 ft. | 90 ft. | Centennial |
| 89-3-AP | SW1/4 SE1/4 NW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,169 ft. | 90 ft. | Centennial |
| 89-1-PIN | SE1/4 NE1/4 SE1/4<br>Sec. 8 T13S, R11E, SLBM<br>Elevation - 6,951 ft. | 260 ft. | Aberdeen |
| 89-2-PIN | SW1/4 NW1/4 SW1/4<br>Sec. 8 T13S, R11E, SLBM<br>Elevation - 7,014 | 250 ft. | Aberdeen |
| 89-3-PIN | NW1/4 SE1/4 SW1/4<br>Sec. 7 T13S, R11E, SLBM<br>Elevation - 7,483 ft. | 240 ft. | Aberdeen |
| 89-1-CP | SE1/4 SE1/4 SW1/4<br>Sec. 6 T13S, R11E, SLBM<br>Elevation - 8,307 ft. | 1,880 ft. | Centennial<br>Aberdeen |

TABLE III-3

North American Drill Holes

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| DH-NACC-6 | SE1/4 SE1/4 SE1/4<br>Sec. 1 T13S, R10E, SLBM<br>Elevation - 7,460 ft. | Approx.<br>1,020 ft. | Centennial<br>Gilson<br>Aberdeen |
| DH-NACC-7 | SW1/4 NE1/4 SE1/4<br>Sec. 12 T13S, R10E, SLBM<br>Elevation - 7,192 ft. | | Gilson<br>Aberdeen |

Pacific Gas and Electric Drill Hole

| Number | Location | Total Depth | Coal Seams |
|---|---|---|---|
| CC9-1 | NW1/4 NW1/4 NW1/4<br>Sec. 9 T13S, R11E, SLBM<br>Elevation - 7,225 ft. | Approx.<br>930 ft. | Lower Sunnyside<br>Gilson<br>Aberdeen |

**Laboratory Analyses - Chemical Acidity, Toxicity, Alkalinity, and Physical (Erodibility and Compaction) Properties**

Complete laboratory analysis is included in Appendix E. Appendix E has been updated to include coal quality information pertaining to the Centennial Seam.

**Identification of Potential Acid, Toxic or Alkaline Producing Horizons**

Refer to Appendix E for the laboratory analyses. Andalex has committed to sampling roof and floor material in all four coal seams in the most recently mine areas. This material will be analyzed for identification of Potential Acid, Toxic or Alkaline Producing Horizons. As this material is collected it will be placed into Appendix E with the rest of the laboratory data.

**Location of Subsurface Water at Face-Up Areas**

No water was encountered at face-up areas.

Description of Coal Seams and Overburden - Mine Plan Area

General Description

**Stratigraphy**

There are four coal seams of minable thickness in the mine plan area. All four are part of the Blackhawk Formation of the Cretaceous Mesa Verde Group. The Blackhawk consists of three members. Stratigraphically, from bottom to top, they are the Aberdeen Member, the Kenilworth Member, and the Sunnyside Member (see Figure III-2).

The bottom coal seam is the Aberdeen (also known as the Castlegate "A" Seam). It is found in the Aberdeen Member of the Blackhawk. This coal seam rests directly on approximately 150 feet of basal sandstone. This sandstone is of littoral marine origin and is known as the Aberdeen Sandstone. The coal seam ranges from 4 feet to 13 feet in thickness over the property. Above the seam is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale containing coal riders.

The second seam is the Gilson Seam and ranges in thickness from 4 feet to 8 feet over the property. The Gilson is part of the Kenilworth Member of the Blackhawk. Directly below the Gilson is approximately 90 feet of interbedded sandstone, siltstone, and carbonaceous shale with coal riders. Below this is approximately 70 feet of barrier beach sandstone known as the Kenilworth Sandstone. Above the Gilson is approximately 100 feet of interbedded sandstone, siltstone, shale, and coal riders.

The third seam is the Centennial Seam ranging from 4' to 8' in thickness. The Centennial Seam is part of the Sunnyside member of the Blackhawk. The Centennial Seam lies approximately 40' below the Lower Sunnyside Sandstone. Below the Centennial Seam is approximately 130' of interbedded sandstone, siltstone, shale, and coal riders.

The top seam is the Lower Sunnyside Seam, ranging from 4 feet to 5 feet in thickness. The Lower Sunnyside is part of the Sunnyside Member of the Blackhawk. Below the coal seam is approximately 50 feet of barrier beach sandstone known as the Lower Sunnyside Sandstone. Above the coal seam is about 250 feet of interbedded sandstone, siltstone, shale, and coal riders.

Above the Blackhawk, the Castlegate Sandstone and Price River Formation of the Mesa Verde Group can be found over various parts of the property. The North Horn Formation is also present in certain areas of the property. Total overburden on the mine plan area ranges from 0 to 2,700 feet.

There are unleased federally owned coal reserves adjacent to the permit area. Andalex has assumed ownership on part of this coal contained in the Graves Tract which is now a part of this MRP. Andalex will access this lease from the existing underground workings as has been done in the past when Andalex has added new leases. In addition to the Graves Tract there is still some unleased federal adjacent to the Centennial property which is of

questionable value. The Centennial coal seam is accessed from the existing Pinnacle Mine which is in the Gilson Seam. It is accessed via rock tunnels which are approximately 500' in length. The Centennial and Aberdeen Seams on the AEP Lease will be accessed through an extension of existing underground workings.

The Aberdeen sandstone in our vicinity is 80 to 100 feet thick. Its lateral extent is from Castlegate to well east of the Centennial property. It is a very well known geologic marker in the Book Cliffs coal field. It is a medium grained, tightly cemented, cross bedded sandstone which contains very little or no water. It has been drilled into in every exploration hole in our leases. All other aquifers or water tables within our leases are perched.

**Structure**

Structure contours are aligned basically east-west. The coal beds dip northward at approximately six degrees. No faults are known to exist in the mine plan area. Overburden ranges from 0 to 2,700 feet.

**Hydrologic Aspects**

All groundwater exists as perched aquifers in the mine plan area. Due to the lenticular nature of the geology in the area, any groundwater is isolated and very limited. Please see Water Quality Data in Appendix L. Also, please note that the Sunedco property recently acquired by Andalex was included in the Vaughn Hansen/Andalex Hydrologic Inventory prepared for the original PAP and the emergency lease (please see Appendix L). Also included in Appendix L are the Graves and AEP PHC's.

The occurrence the Division has referred to where Andalex intercepted groundwater was actually not groundwater per se but water which had accumulated in old mine workings over a number of years (45 to 50 years). This was a one time occurrence. Water accumulates in small burned out voids because they are down dip from the burned outcrop. Andalex uses the practice of advanced drilling to avoid these areas. This is the only water which has been or will be encountered as the Andalex permit area is free from faulting or any other means of water conveyance.

**Location of Subsurface Water**

Some of the sandstone beds of the Blackhawk Formation are water bearing in the mine plan area. Most of the beds are dry however, and partially drained of water near the cliff faces. Groundwater is perched due to the lenticular geology and any groundwater is isolated. The geology and specifically the lenticular nature of the beds on the new AEP lease are the same as

what has been described in the original permit area. Also, any water bearing units are small in areal extent. The lowermost aquifer known in this area is the Aberdeen Sandstone, which is monitored below the lowermost coal seam. The newly acquired AEP Lease is included in the Andalex Hydrologic Inventory.

Detailed Analyses of Coal Seams and Surrounding Strata

**Source of Data**

Analysis was performed on rib samples and core samples obtained during the exploration activities described. Results of these analyses are listed according to seam in Appendix E.

Analysis was performed by: Commercial Testing and Engineering Company, 10775 East 51st Avenue, Denver, Colorado 80239, and other commercial testing laboratories.

Coal Seams

**Total Sulfur Content**

Please see Appendix E.

**Other Characteristics**

Please see Appendix E.

Stratum Immediately Overlying each Coal Seam to be Mined

**Lithology (See Figure III-2)**

Aberdeen Coal Seam (Castlegate "A") - overlying this seam is interbedded sandstone, siltstone, and carbonaceous shales of the Aberdeen Member of the Blackhawk.

Gilson Coal Seam - overlying this seam is interbedded sandstone, siltstone, and shale with coal riders of the Kenilworth Member of the Blackhawk.

Centennial Coal Seam - overlying is interbedded sandstone, siltstone, and shale, and coal riders of the Sunnyside Member of the Blackhawk.

Lower Sunnyside Seam - overlying this seam is interbedded sandstone, siltstone, shale and coal riders of the Sunnyside Member of the Blackhawk.

It should be noted however, that the immediate "roof" over each seam is a sandstone unit, over which is found the silts, shales, and various coal riders.

**Pyritic Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Potential Alkalinity (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

Stratum Immediately Underlying Each Coal Seam to be Mined

**Lithology (See Figure III-2)**

Aberdeen (Castlegate "A" Seam) - underlying this seam is basal sandstone of littoral marine sandstone, the Aberdeen Sandstone of the Aberdeen Member.

Gilson Seam - underlying this seam is interbedded sandstone, siltstone, shale, and coal riders of the Kenilworth Member.

Centennial Seam - underlying this seam is interbedded sandstone, siltstone, and shale, and coal riders of the Kenilworth Member.

Lower Sunnyside Seam - underlying this seam is barrier beach sandstone, the Lower Sunnyside Sandstone of the Sunnyside Member.

It should be noted however, that the immediate "floor" below the seams is sandstone in the case of the Lower Sunnyside and Aberdeen; and beneath the Gilson, and Centennial, siltstone.

**Pyritic Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Potential Alkalinity (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

**Clay Content (Laboratory Analyses)**

Complete analyses of these strata are included in Appendix E.

## R645-301-611.200. PROPOSED OPERATIONS

See R645-301-551. and R645-301-529.100.

## R645-301-612. CROSS SECTION, MAPS AND PLANS

See R645-301-510.

## R645-301-620. ENVIRONMENTAL DESCRIPTION

See R645-301-510.

**R645-301-621. GENERAL REQUIREMENTS**

See R645-301-510.

**R645-301-622. CROSS SECTIONS, MAPS AND PLANS**

Plates 21, 22, 23 & 24

**R645-301-662.100. TEST BORINGS AND CORE SAMPLINGS**

Appendix E

**R645-301-622.200. COAL SEAMS AND BURDEN**

Appendix E

**R645-301-622.300. COAL OUTCROPS**

Plates 26, 27, 28, 29.

**R645-301-622.400. GAS AND OIL WELLS**

N/A

**R645-301-623. GEOLOGIC INFORMATION**

See R645-301-611.100.

**R645-301-623.100. POTENTIALLY ACID OR TOXIC FORMING STRATA**

Appendix E

**R645-301-623.200. RECLAMATION REQUIREMENTS**

See R645-301-240.

**R645-301-623.300. SUBSIDENCE CONTROL PLAN**

See R645-301-525.

**R645-301-624. GEOLOGIC INFORMATION**

See R645-301-611.100.

**R645-301-624.100. DESCRIPTION**

See R645-301-611.100.

## R645-301-624.110. CROSS SECTIONS, MAPS AND PLANS

See R645-301-510.

## R645-301-624.120. OTHER INFORMATION

**Alternative Water Supply Information**

The underground coal mining activities will not result in any contamination, diminution, or interruption of any underground or surface water sources within the proposed mine plan or adjacent areas for domestic agricultural industry or any other legitimate use as the underground mining activities will not encounter any aquifers and there are no springs to interrupt.

There have been no changes in Andalex Resources' water rights. The wells, however, could be left open if a need other than Andalex's arose, with the permission of the State Engineer. Other water rights controlled by Andalex could be dedicated to a water right proven to be affected by Andalex's activities. Andalex controls 19 shares of primary water which could be used to supplement any interrupted water rights. There are no oil and gas wells in the vicinity of Andalex's permit area. There are no water wells in the area except on Andalex's surface facility, these are shown on figure 5 Appendix L, also in Appendix L tables 1 and 5 depict current existing water rights.

## R645-301-624.130. GEOLOGIC LITERATURE AND PRACTICES

See R645-301-611.100.

## R645-301-624.200. SAMPLING AND ANALYSIS

Appendix E

## R645-301-624.210. LOGS

Appendix E

## R645-301-624.220. CHEMICAL ANALYSES

Appendix E

## R645-301-624.230. ACID OR TOXIC FORMING MATERIALS

Appendix E, R645-301-513.300.

## R645-301-624.300. TEST BORINGS AND DRILL CORES

Appendix E

## R645-301-624.310. LOGS

Appendix E

## R645-301-624.320. ACID OR TOXIC FORMING MATERIALS

Appendix E, R645-301-513.300.

## R645-301-624.330. CHEMICAL ANALYSES

Appendix E

## R645-301-624.340. ROOF AND FLOOR MATERIALS

The Andalex mine property rarely encounters clays or clay-like rock in either the immediate roof or floor. The only clays encountered to date have been in the Aberdeen Seam where upon contact with water, the floor material became soft. The clay material in the floor has been local and temporary. To date, there has been no clay or clay-like material in the immediate roof of any of the coal seams.

Appendix E

## R645-301-625. ADDITIONAL INFORMATION

Appendix E

## R645-301-626. WAIVER FROM COLLECTION AND ANALYSIS

N/A

## R645-301-627. OVERBURDEN

N/A

## R645-301-630. OPERATION PLAN

See R645-301-511.100.

## R645-301-631. CASING AND SEALING OF EXPLORATION HOLES AND BOREHOLES

See R645-301-551.

## R645-301-631.100. TEMPORARY CASING AND SEALING OF DRILLED HOLES

N/A

## R645-301-631.200. PERMANENT CASING AND SEALING OF EXPLORATION HOLES AND BOREHOLES

See R645-301-551.

## R645-301-632. SUBSIDENCE MONITORING

See R645-301-525.

## R645-301-632.100. DEGREE OF SUBSIDENCE

See R645-301-525.

## R645-301-632.200. MONITORING LOCATIONS

See R645-301-525.

## R645-301-640. PERFORMANCE STANDARDS

See R645-301-551 and R645-301-529.100.

## R645-301-641. ALL EXPLORATION HOLES AND BOREHOLES

See R645-301-551 and R645-301-529.100.

## R645-301-642. MONUMENTS AND SURFACE MARKERS

See R645-301-525.170

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 7

## Hydrology

## C/007/019

(Revised)
June, 2014

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## List of Attachments


Attachment 7-1 Hydrology Calculations

## R645-301-700. HYDROLOGY

The ~~Mathis Tract and New Federal Summit Creek~~Kenilworth Lease boundary change will not encroach into any new hydrologic basins which are not addressed in the existing MRP (see plate 29). Seeps located within this boundary change have been addressed in the new ~~Summit Creek and North Mathis~~Kenilworth Lease PHC. (see PHC for the entire lease area).

SEE ALSO APPENDICES L, N, AND O

## R645-301-710. INTRODUCTION

## R645-301-711. GENERAL REQUIREMENTS

Hydrologic Protection Facilities

**Sewage System**

The nature of the overburden in the area offers excellent drainage. As a result, a septic system with drain fields conforming to the state codes has been established to handle the waste water disposal from the bathhouse and office facilities. The drain fields are located in native material (valley fill) cast of the bath houses in the parking area. Enclosed as Appendix G are the two septic system plans as designed by a Utah Registered Professional Engineer and approved by the State of Utah Department of Health.

**Water Treatment**

Based on the State of Utah, Department of Health review of the septic systems, water treatment is not needed. (Personal communication, Mr. Gerald Story, Utah Department of Health, Price, Utah).

**Drainage Control - Diversions, etc.**

See ~~R645-301-512.240~~R645-301-733.

**Sediment Control**

See ~~R645-301-512~~R645-301-733.~~240.~~

## R645-301-711.100. EXISTING HYDROLOGIC RESOURCES

Appendix L

## R645-301-711.200. POTENTIAL IMPACTS TO THE HYDROLOGIC BALANCE

Appendix L - Potential Hydrologic Consequences

## R645-301-711.300. COMPLIANCE WITH HYDROLOGIC DESIGN CRITERIA

**Protection of Hydrologic Balance and Compliance with Water Quality Laws**

Andalex will follow its approved "Sedimentation and Drainage Control Plan" and comply with the U.P.D.E.S. Permit UT0025674 (see Appendix J). Currently, this permit authorizes four discharge points; two from sedimentation ponds (001, 003) and two from the underground mine (002 and 004). See IV-11

Andalex has approval from the State Engineer, Division of Water Rights, to collect runoff water from the disturbed area for use as a dust suppressant in the underground mining operation. This runoff is a result of direct precipitation with the runoff area.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

Surface and Groundwater Monitoring

## R645-301-711.500. RECLAMATION ACTIVITIES

**Post Mining Hydrology**

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

   All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

   It should be noted that the main road going through the minesite and continuing on will be left intact as part of the post-mining use.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

~~Figure IV 11~~
~~Location of Ground Water &~~
~~Surface Water Monitoring Station~~

~~INSERT ORIGINAL MAP~~

Surface water monitoring will continue during this time as described. Please see Figure IV-11.

Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-712. CERTIFICATION

**Construction Specifications for Sedimentation Ponds**

All construction of sedimentation ponds have been performed under the direction of a qualified registered professional engineer.

Dams are constructed with primary overflows at least 2 ft. from the top, and emergency overflows at least 1.5 ft. from the top.

The areas of the pond construction had been examined for topsoil, and if present in removable quantities such soil was removed separately and stored in an approved topsoil storage location.

In areas where fill was to be placed, natural ground was removed for at least 12" below the base of the structure.

Figure IV-11
Location of Ground Water &
Surface Water Monitoring Station

INSERT ORIGINAL MAP

## R645-301-721. GENERAL REQUIREMENTS

Appendix L

## R645-301-722. CROSS SECTIONS AND MAPS

See R645-301-510.

## R645-301-722.100. LOCATION AND EXTENT OF SUBSURFACE WATER

Appendix L

## R645-301-722.200. LOCATION OF SURFACE WATER BODIES

Appendix L

## R645-301-722.300 MONITORING STATIONS

**Protection of Hydrologic Balance and Compliance with Water Quality Laws**

Andalex will follow its approved "Sedimentation and Drainage Control Plan" (please see ~~R645-301-512.240~~R645-301-733.) and comply with the N.P.D.E.S. Permit No. UTG-040007 issued July, 1989 (see Appendix J). Please note this permit authorizes three discharge points; two from sedimentation ponds (001, 003) and one from the underground mine (002). See IV-11 and R645-301-711.300.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

## R645-301-722.400. WATER WELLS

See R645-301-711.300.

## R645-301-722.500. EXISTING LAND SURFACE CONFIGURATION

Plate 6

**R645-301-728.300. PHC DETERMINATION FINDINGS**

Appendix L

**R645-301-728.310. ADVERSE IMPACTS TO HYDROLOGIC BALANCE**

Appendix L

**R645-301-728.320. ACID FORMING OR TOXIC FORMING MATERIALS**

Appendix L

**R645-301-728.331. SEDIMENT YIELD FROM DISTURBED AREA**

~~R645-301-512.240~~R645-301-733.

**R645-301-728.332. WATER QUALITY PARAMETERS**

~~R645-301-512.240~~R645-301-733.

**R645-301-728.333. FLOODING OR STREAM-FLOW ALTERATION**

N/A

**R645-301-728.334. GROUND WATER AND SURFACE WATER AVAILABILITY**

Appendix L

**R645-301-728.335. OTHER CHARACTERISTICS**

Appendix L

**R645-301-728.340. IMPACT ON SURFACE OR GROUND WATER**

Appendix L

**R645-301-728.400. PERMIT REVISIONS**

## R645-301-731.611. VIOLATION OF WATER QUALITY STANDARDS OR EFFLUENT LIMITATIONS

Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water quality standards and will not adversely affect the water quantity and quality of other environmental resources of the stream.

## R645-301-731.612. STREAM DIVERSIONS

See ~~R645-301-512.240~~R645-301-733, Culvert Design

This diversion will comply with all the requirements of R645-301-742.300 (diversion structures). Also, please refer to culvert sizing calculations in Appendix O.

## R645-301-731.620. BUFFER ZONE SIGNS AND MARKERS

This buffer zone will be marked as specified in R645-301-521.260. Signs will be clearly marked to prevent additional disturbance by operations.-

## R645-301-731.700. CROSS SECTIONS AND MAPS

Plate 6.

## R645-301-731.710. WATER SUPPLY INTAKES

N/A

## R645-301-731.720. WATER HANDLING AND STORAGE FACILITIES

Water is trucked from Price for culinary use and is stored in one of four 12,000-gallon tanks on the property. Each mine is equipped with a 12,000-gallon surface tank. All other mine water storage is underground.

## R645-301-731.730. MONITORING LOCATIONS

Figure IV-11

## R645-301-731.740. MAPS

See Volume II, R645-301-510.

## R645-301-731.750. CROSS SECTIONS

See Volume II, R645-301-510.

## R645-301-731.760. OTHER RELEVANT DRAWINGS

Figure IV-2 through IV-12

## R645-301-731.800. WATER RIGHTS AND REPLACEMENT

Appendix L

## R645-301-732. SEDIMENT CONTROL MEASURES

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.100. SILTATION STRUCTURES

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.200. SEDIMENTATION PONDS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.210. COMPLIANCE REQUIREMENTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.220. MSHA REQUIREMENTS

N/A

## R645-301-732.300. DIVERSIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.400. ROAD DRAINAGE

See ~~R645-301-512.240~~R645-301-733., also R645-301-512.250.

## R645-301-732.410. ALTERATION OR RELOCATION OF A NATURAL DRAINAGEWAY

See ~~R645-301-512.240~~R645-301-733.

## R645-301-732.420. INLET PROTECTIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-733. IMPOUNDMENTS

See ~~R645-301-512.240.~~

R645-301-733.

Three sedimentation ponds have been constructed so far as shown on Plate 6. Pond A, as its capacity was not required, is now being used for snow storage and topsoil storage. The sedimentation and drainage control plan has been designed according to OSM regulations and the design and construction certified by a Utah Registered Professional Engineer. No other embankments, or other impoundments have been built nor are any proposed.

**General Description**

The Andalex Deadman Canyon Project is comprised of three mines located closely together in Deadman Canyon. The Pinnacle Mine, Apex Mine, and the Aberdeen Mine are all presently in operation mining the Gilson and Lower Sunnyside Seams and the A Seam. The Centennial Seam is mined via rock tunnels from the existing Pinnacle Mine. Surface runoff from the Pinnacle Mine and Apex Mine is controlled by Settling Basin B and Pond C. Engineering Design for these ponds have been presented to the Division of Oil, Gas, and Mining on 4-3-80 and 8-21-81. Surface runoff from the Aberdeen Mine is controlled by Pond E. Designs for these basins and ponds are shown on Plates 11, 12, and 13 included herein.

The mines are located in the Right Fork of Deadman Canyon. This is an ephemeral drainage flowing only from direct runoff and eventually reaches the Price River some 12 miles to the south. The major drainages in the minesite area will be routed under the site through large culverts. The existing minesite has a disturbed area of 34.2 acres. Please note that a certain percentage of the disturbed area does not report to sedimentation ponds. Please refer to Plates 7 and 8 for these areas. Actual disturbed area reporting to basins and ponds is approximately 26 acres. Sediment pond designs include undisturbed areas reporting to ponds. In order to minimize additional sediment loading to the main drainage, these ponds and basins will collect runoff from these approximately 27 acres. Berms will be placed on the lower edge of all disturbed areas to prevent runoff from reaching natural drainages before it has passed through the sedimentation ponds except in small area exemptions. Ponds are designed for maximum runoff including the chidister water. Areas draining to Pinnacle and Apex portals are to be included.

Sedimentation Pond Specifications

**Location**

The ponds are located over the main drainage of the Right Fork of Deadman Canyon. The main canyon drainage is routed through a 36-42" culvert located under the ponds. The sites are located downslope of the disturbed areas to simplify collection of runoff water (please see Plate 8).

**Design**

The ponds are designed to fully contain the expected runoff and sediment load from a 10-year 24-hour precipitation event in this area. Pond "C" has additionally been shown to fully contain the runoff from a 100-year 6-hour storm. The design has been certified by a registered professional engineer. A certification statement for the ponds can be found at the end of Appendix N.

**Construction**

The construction of the ponds have been completed as per the specifications set forth in the Construction Specifications sheet (part 2.3).

**Capacity**

Each pond is designed to contain the runoff and sediment load from a 10-year 24-hour precipitation event in the area of drainage.

In addition, each pond has an overflow capacity in excess of that required for a 25-year 6-hour event. Pond "C" has been designed to contain and pass the runoff from a 100-year 6-hour event.

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on-site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing. (Pond C)

**Monitoring**

Water monitoring stations will be established at the outlet of the ponds. Sample parameters and frequencies shall be as per specification of the NPDES permit.

**Maintenance**

The ponds shall be inspected after each storm and the sediment cleaned as necessary. In no event shall sediment be allowed to build beyond 60% of sediment design capacity.

**Seeding**

An approved seed mix will be applied to all feasible disturbed areas in an effort to minimize erosion and sediment loading to the ponds. The proper seed mixture for this area has been obtained through the local BLM.

**Culverts**

All culverts are shown on Plate 9. Calculations for sizing are also included. It should be noted that all culvert sizes were arrived at and approved through consultation with the DOGM hydrologic engineer.

**Calculations**

The following reflects the calculations for sizing and details of each separate pond. Plates 6 through 13 show pond locations and volumes as well as watershed areas.

**Construction Specifications for Sedimentation Ponds**

All construction of sedimentation ponds have been performed under the direction of a qualified registered professional engineer.

Dams are constructed with primary overflows at least 2 ft. from the top, and emergency overflows at least 1.5 ft. from the top. The areas of the pond construction had been examined for topsoil, and if present in removable quantities such soil was removed separately and stored in an approved topsoil storage location.

In areas where fill was to be placed, natural ground was removed for at least 12" below the base of the structure.

Native materials were used where practical. Fill was placed in lifts not exceeding 15" and compacted prior to placement of the next lift. Compaction of all fill materials is at least 95%.

Grouted rip-rap or culverts have been placed at all inlets and outlets to prevent scouring. Each pond is fitted with an inverted inlet to the primary overflow, to prevent the passage of oil into the discharge.

Slopes of the dams are not steeper than 2.0:1, inside and outside, with a total of the inslope and outslope not less than 5:1. The inside slope of Pond E exceeded the steepness of 2:1. In part these slopes are incised and in part are constructed in from fill. Because of the steepness of these side slopes an investigation of stability was performed by Palmer Wilding Engineers. The conclusion was that the stability analysis is adequate and a stable section with respect to shear under static loading conditions is indicated. Please Appendix K.

Tops and external slopes of the dams were planted with an approved seed mix to prevent erosion and promote stability. Compaction of the slopes were at least 95%. Top width of dams are not less than (H + 35)/5.

Primary Settling Basins (Formerly Pond B)

**General Notes**

The primary settling basins (formerly Pond B) are located above Pond "C". A disturbed area of 9.42 acres drain into the settling basins as shown on Plate 8. These basins collect sediment and runoff from this area; however, since they are a series of cells, any overflow from the basins will be cleaned and go into Pond "C".

It is proposed that 18" culverts be added between cells B-1 and B-2, and between B-2 and B-3. An 18" culvert already exists between cells B-3 and B-4. These culverts will prevent breaching of the dikes between cells during major runoff events. The inflow to the basins is from culverts CD-12 and CD-13, which is a total of 2.79 cfs, as shown on Table IV-3C. Based on the Manning's Equation for culverts (p.169-C), the required diameter to carry a flow of 2.79 cfs is only 0.95 feet; therefore, the 18" culvert overflows are more than adequate to pass the design flow. The placement of the culverts will not affect the maximum water levels or sediment storage capacity of the basins.

The basins are cleaned when sediment accumulations reach 50% of the original volume. The original volume was 0.540 acre feet, and the sediment cleanout level (0.270 acre feet) is at the culvert inlet level between cells B-2 and B-1 as shown on certified Plate 11.

Pond C

1. Use 1.82" for 10 year - 24 hour event
   Use 1.91" for 100 year - 6 hour event

*2. Disturbed Watershed - 14.79 acres

3. Runoff Curve No. = CN = 90

4. Area Runoff = Q (in.) = $(P-0.2S)^2/(P+0.8S)$; Where:

   S = (1,000/CN) - 10

   $Q_{10/24}$ = 0.942 in./12 = 0.0785 ft.

   $Q_{100/6}$ = 1.018 in./12 = 0.0848 ft.

   Disturbed Volume $_{10/24}$ = 14.79 ac. x 0.0785 ft. = 1.161 ac. ft.

   Disturbed Volume $_{100/6}$ = 14.79 ac. x 0.0848 ft. = 1.254 ac. ft.

5. Undisturbed Watershed - 30.89 acres

6. Runoff Curve No. = CN = 70

7. Area Runoff:

   $Q_{10/24}$ = 0.180 in./12 = 0.0150 ft.

   $Q_{100/6}$ = 0.208 in./12 = 0.0173 ft.

   Undisturbed Volume $_{10/24}$ = 30.89 ac. x 0.0150 ft. = 0.463 ac. ft.

   Undisturbed Volume $_{100/6}$ = 30.89 ac. x 0.0173 ft. = 0.534 ac. ft.

8. Sediment Storage:

   **Disturbed Area 14.79 ac. x 0.05 ac. ft./ac. = 0.740 ac. ft.

   ***Undisturbed Area 30.89 ac. x 0.016 ac. ft./ac. = 0.494 ac. ft.

   Total Sediment Storage Volume Required = 1.234 ac. ft.

   60% Cleaning Point = 0.740 ac. ft.

9. Direct Precipitation into Pond

Area of Ponds = 0.39 acres

$Volume_{10/24}$ = 0.39 ac. x 1.82 in./12 in./ft. = 0.059 ac. ft.

$Volume_{100/6}$ = 0.39 ac. x 1.91 in./12 in./ft. = 0.062 ac. ft.

ft.

10. Total Required Pond Volume

$Volume_{10/24}$ = 1.161 + 0.463 + 1.234 + 0.059 = 2.917 ac. ft.

$Volume_{100/6}$ = 1.254 + 0.534 + 1.234 + 0.062 = 3.084 ac. ft.

11. Pond Volume at Outlet

18" cmp oil skimmer = 3.321 ac. ft.

36" cmp overflow = 4.264 ac. ft.

12. Conclusions:

A. Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event.

B. Pond size is also adequate to contain the runoff and sediment load from a 100 year - 6 hour precipitation event.

* Includes runoff to "Primary Settling Basins" (Formerly Pond B)

** Does not include sediment to "Primary Settling Basins". The sediment factor of 0.05 acre-ft./acre is considered conservative due to the extensive paving (roads and loadout area), and the grouted or paved ditches to the pond.

The USLE calculation for Disturbed Areas (Table IV-9) shows the actual expected sediment yield to be much lower than the 0.05 figure used.

*** Sediment yield taken from the USLE calculations on Table IV-10, "Sediment Yield for Undisturbed Areas".

## POND C
## 1STAGE - VOLUME DATA

| Stage | Elevation | Volume (Ac. Ft.) | Acc. Vol. (Ac. Ft.) |
|---|---|---|---|
| Bottom | 7040.0 | - | - |
| | 7042.0 | 0.082 | 0.082 |
| | 7044.0 | 0.162 | 0.244 |
| | 7046.0 | 0.293 | 0.537 |
| 60% Sed. | 7046.9 | 0.203 | 0.740 |
| Cleanout | | | |
| | 7048.0 | 0.266 | 1.006 |
| Max. Sed. | 7048.7 | 0.228 | 1.234 |
| Level | | | |
| Decant | 7049.7 | 0.330 | 1.564 |
| Level | | | |
| | 7050.0 | 0.099 | 1.663 |
| | 7052.0 | 0.862 | 2.525 |
| 10 yr.-24 hr. | 7052.7 | 0.392 | 2.917 |
| Volume | | | |
| 100 yr.-6 hr. | 7053.1 | 0.167 | 3.084 |
| Volume | | | |
| 18" Oil | 7053.5 | 0.237 | 3.321 |
| Skimmer | | | |
| | 7054.0 | 0.297 | 3.618 |
| 36" CMP | 7055.0 | 0.646 | 4.264 |
| Overflow | | | |
| Crest of | 7056.5 | 0.969 | 5.233 |
| Embankment | | | |

INSERT P.E. STAMPED ORIGINAL

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Pond C
Stage - Volume Curve

INSERT ACTUAL DRAWING, P.E. STAMPED ORIGINAL

## Pond "C" - General Notes

The sizing of Pond C is based on the drainage areas delineated on Plate 8 - "Drainage Map". As can be seen from this Plate, a portion of the minesite drainage goes into the Pinnacle Mine, the old Chidister Portal, and the Apex Mine. The actual disturbed area draining directly to Pond "C" was planimetered from this Plate and determined to be 10.72 acres. The disturbed area flowing to the "Primary Settling Basins" was measured to be 4.07 acres. This flow drains to Pond "C" and is therefore considered in the sizing; however, the projected sediment load to the Primary Settling Basins is not considered in sizing Pond "C", since the basins could be completely full of sediment before it could impact Pond "C". As stated earlier, the Primary Settling Basins will be cleaned when sediment accumulation reaches one-half of the total basin volume; therefore, sediment from this area will not impact Pond "C".

In addition, a certain amount of undisturbed area does not flow into the undisturbed drainage culverts, and thus drains onto the mine site (see plates 8 and 9). The portion of this drainage that flows to Pond "C" was measured at 30.89 acres, and is included in the Pond "C" sizing calculations.

Runoff Curve numbers used in the calculations were: 90 for disturbed areas and 70 for undisturbed areas.

An "As-Constructed" plan and profile of Pond "C" is shown on Plate 12. This plate has been certified by a registered, professional engineer. Also shown on this plate is a proposed sediment marker, and maximum and cleaning point depths for sediment. The cleaning point for sediment is at 60% of the maximum design depth for sediment storage. This point will be clearly marked on the sediment marker.

Also shown on Plate 12 is the location of each of the pond inlets. Inlets are either grouted concrete or culvert, and do not require rip-rap or other additional erosion protection.

Pond "C" will be removed during the earthwork portion of reclamation. The culvert will also be removed and the main channel restored throughout the area. All reclaimed area above will then drain into Pond "E" below.

Decanting for Pond C, as needed, will be accomplished with pumps located at the minesite. Decanted water will be pumped into the primary spillway once the 24 hour retention time has been met. An access ramp will be constructed to allow for inspection and sampling at the overflow riser pipe.

Pond E

1. Use 1.82" for 10 year - 24 hour event

2. Disturbed Watershed - 12.21 acres

3. Runoff Curve No. = CN = 90

4. Area Runoff = Q (in.) = $(P-0.2S)^2/(P+0.8S)$; Where:

   S = (1,000/CN) - 10

   P = 1.82"

   Q (in.) = $[1.82-0.2(1.11)]^2/[1.82+0.8(1.11)]$ =

   $\frac{2.553}{2.709}$ = .94 in. = .0785 ft.

   Volume = 12.21 acres x 0.0785 ft. = 0.959 acre-ft.

5. Undisturbed Watershed - 12.20 acres

6. Runoff Curve No. = CN = 70

7. Area Runoff = 12.20 ac. x 0.2 in./12 = 0.203 acre-ft.

8. Sediment Storage Volume

   12.21 acres x 0.1 acre-ft./acre = 1.221 acre-ft. *

   60% Cleaning Point = 0.733 acre-ft.

9. Direct Precipitation into Pond

   Area of Ponds = 0.500 acres

   0.500 acres x 1.82 in. x 1/12 ft./in. = 0.076 acre-ft.

10. Total Required Pond Volume

    0.959 + 0.203 + 1.221 + 0.076 = 2.459 acre-ft.

11. Pond Volume @ Outlet (Principle Spillway)

    Total Pond Volume = 2.569 acre-ft. (As constructed)

12. Conclusion: Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event in the area of drainage to the pond.

* Due to the elevation of the decant inlet, the maximum sediment storage volume is .930 ac-ft. However the 60% cleanout level will not be exceeded and the total pond volume takes into account the disturbed area of 12.21 acres.

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Stage-Volume Data
for
Pond "E"

INSERT ORIGINAL P.E. STAMPED TABLE

Pond "E" - PM

**Post Mining Sediment Control**

1. Use 1.82" for 10 year - 24 hour event.
2. Disturbed (Reclaimed) Watershed - 34.2 acres
   a. Runoff Curve No. = 90
   b. Runoff Volume = 2.740 ac. ft.
3. Undisturbed Watershed = 805.50 acres
   a. Runoff Curve No. = 70
   b. Runoff Volume = 13.425 ac. ft.
   4. Sediment Storage Volume = 0.150 ac. ft. (Upper Cell)
5. Direct Precipitation into Pond
   a. Use 0.5 acres
   b. 0.5 ac. x 1.82 in. x 1/12 = 0.076 ac. ft.
6. Expected Flow (10 yr. - 24 hr. event) = 88.94 cfs
7. Inflow Velocity (from RC-1) = 8.78 fps
8. Pond Configuration
   3 cells: 2 Gravel Filter Dikes and 1 Compacted Earthen Dam
9. Pond Capacity - 1.592 ac. ft.

Note: Pond is designed to clean and discharge runoff. Sediment will be removed by gravel filter dikes, and cleaned from pond when maximum sediment storage level is reached. Ponds will be cleaned when the 0.150 acre feet capacity of the upper cell is reached.

**Pond "E" - General Notes**

Pond "E" is to control runoff from the Aberdeen Mine. The disturbed area to drain to this pond is 12.21 acres. Pond E for the Aberdeen minesite was constructed prior to any other disturbance of the drainage area which report to the ponds.

Plate 13 shows the plan and profile of the pond. Also shown on this plate is a sediment marker and the level of the sediment 60% cleaning point. The constructed height of the dam includes a 5% settling factor. The elevations on Plate 13 are final.

Grouted rip-rap or culvert is used on all pond inlets; therefore, additional rip-rap or energy dissipators are not required.

Twelve 60" x 60" anti-seepage collars were installed on the main culvert beneath the pond. The collars are of concrete or a standard, manufactured design. Collar sizes and numbers are based on the following:

Flow length = 340'
Increase in flow length = 10% or 34'
Use 60" x 60" anti-seep collars
Each collar increases flow length by 2 x 8" or 3'; therefore, use 12 anti-seep collars.

An emergency spillway has been constructed to convey overflow from the pond into undisturbed diversion UD-4 as shown on Plates 8 and 13. This spillway consists of 12" D50 grouted rip-rap as shown on Figure IV-6. The dimensions of this spillway are shown of Figure IV-6.

Pond E was constructed prior to any disturbance of the drainage area to the pond.

As built certified drawings of Sediment Pond E have been submitted.

**Pond "E" - PM - General Notes**

Upon reclamation, Pond "E" will be enlarged and left in place until revegetation standards are met, as shown on Plate 16. The culvert will be removed, and the pond will be reconstructed to clean and discharge the entire runoff from the drainage area above. Pond sizing calculations are shown on the page entitled "Pond E - PM", "Post-Mining Sediment Control". Andalex will commit to the concept of allowing the entire undisturbed and reclaimed area to drain into this one structure if approved.

The rationale for removing all upper ponds and diversions is based on the following:

1. Pond E is the lowermost structure, and can be rebuilt and later removed and reclaimed with minimum damage to the reclaimed site.

2. The upper site can be reclaimed in a more natural and permanent manner, as shown on the post-mining topography map, Plate 17, without leaving temporary structures such as diversions, ponds, etc. Once vegetation is established, it will not have to be re-disturbed.

3. The extensive use of loose-rock check dams in the restored drainages will serve as effective sediment and erosion control, and will promote the establishment of a riparian area along the drainage.

Because of the large size of the undisturbed drainage above (805.5 acres), upon reclamation, it is proposed to construct a series of filtering ponds to clean and discharge the water rather than try to fully contain the runoff. The expected flow from a 10-year 24-hour event for the entire undisturbed and reclaimed area is 88.94 cfs at a velocity of 8.78 fps. The total volume of water would be approximately 16.2 acre-ft. It is proposed to build a 3-celled system with 2 gravel filter dikes and concrete grouted overflows. The upper 2 cells will act as filters for sediment removal, and the lower cell will become a settling basin for final cleaning prior to discharge. The pond discharge will be sampled per NPDES requirements to check for compliance with effluent standards.

It is expected that effluent standards will be met by this structure; similar filtering ponds have cleaned and discharged up to 1,000,000 gallons per day of sediment-laden mine water and remained in compliance.

The rationale for proposing such a filtering discharge system is based on the following:

1. The main purpose of sediment ponds or any other treatment facility is to control and minimize water pollution by causing the water to meet effluent standards; this type of system will accomplish this purpose:

2. Acceptable practices to control and minimize water pollution include:

(i) Stabilizing the disturbed area through land shaping;

(ii) Diverting runoff;

(iii) Achieving vegetation standards;

(iv) Regulating channel velocity of water;

(v) Lining channels with rock or vegetation;

(vi) Mulching;

(vii) Selectively placing and sealing acid-forming and toxic-forming materials;

(viii) Designing mines to prevent gravity drainage of acid waters;

(ix) Sealing;

(x) Controlling subsidence; and

(xi) Preventing acid mine drainage.

The planned reclamation at this site will meet the above criteria;

3. All surface drainage from the disturbed area, including areas that have been graded, seeded, or planted, shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility before leaving the permit area.

The proposed pond will be equipped with a sediment marker, and cleaned as needed. The pond will also be fitted with a combined primary and emergency spillway, sized and protected to handle the 25-year 6-hour event.

When revegetation standards are met on the reclaimed site, the Pond "E -PM" will be removed, the main channel restored, and the area reseeded according to the approved plan.

Pond Discharge Structures

**Principle Spillways**

Pond C has a single spillway consisting of a 36" cmp riser pipe located 1.5' below the top of the dam at elevation 7,055.0. This pipe discharges directly into the main 42" culvert located beneath the pond. An 18" cmp skimmer pipe is located in the side of the 36" riser 1.5' below the riser inlet at an elevation of 7,053.5. This pipe will be the first to discharge, and will act as an oil skimmer since the pipe inlet is inverted with the intake approximately 1' below water level. Pond C will be decanted as needed by the use of a pump. Decanted water will go into the 36" riser and be discharged into the 42" cmp passing beneath the disturbed area.

The Pond E principle spillway consists of a 30" riser pipe, connected to the 42" culvert beneath the ponds. A decant device is also attached to the riser pipe for de-watering, and is controlled by a hand-operated valve. Both the riser pipe and decant are constructed to minimize oil from entering the discharging water. Please see Plate 13 for details on the spillway structures for Pond E.

**Emergency Spillways**

The emergency spillway for Pond E is the open notch type with a trapezoidal cross section. The spillway is of grouted rip-rap as shown on Figure IV-6. The spillway dimensions are as shown on the Figure IV-6. This is located 12" above the principal spillway and 2' below the top of the dam. This structure is rip-rapped through the point of discharge and into the main channel. This spillway provides an added safety factor to protect the dam in the event of overlad on the culvert discharge.

**Pond E - PM Spillway**

Pond E - PM will be constructed with an open-notch spillway in the lower cell to allow for safe discharge of runoff from the reclaimed area as well as the contributing undisturbed area. The spillway will be of grouted rip-rap and dimension as shown on Figure IV-6. Calculations for the spillway are shown.

The spillway for Pond C consists of an open 36" culvert which empties directly into the main 42" culvert which drains the main canyon. This spillway is open at the top and extends to within 2.5' of the top of the dam. At right angle to this spillway culvert is an 18" culvert to handle pre-design overflow conditions. This 18" pipe has an inverted inlet to skim oil and grease and flotsam from the water. This is considered a single spillway; however, the following discussion will explain how the pond meets the criteria for exemption of combination spillways required by R645-301-742-223.

**Pond C - Exemption from R645-301-742-223**

The following will describe how Pond C meets the criteria for exemption of the combination spillway requirements of R645-301-742.223 as provided in R645-301-742.225.2:

1 - Storage - The pond has been shown to be adequately sized to safely control the 100 year - 6 hour precipitation event. The pond will not only contain the 100 year - 6 hour event (including sediment), but the overflow will safely pass the runoff from such an event if necessary.

2 - Dewatering - Water can be safely removed from the pond in accordance with current, prudent engineering practices. For this pond, water will be removed by the use of a portable pump system. The following is a description of details relating to the dewatering operation:

a - The pump to be used is an electric 220 volt unit. The pump will be powered by a portable generator set. These units will be available on an as-needed basis.

b - The pump will dewater at a rate of approximately 350 gallons per minute. At 1.0' above the maximum sediment elevation, the 10 year - 24 hour volume is 1.683 acre-feet. At the proposed pumping rate, the pond would be dewatered in approximately 26 hours.

c - The decant water will be discharged directly into the 36" cmp overflow. Any discharge will be done in accordance with the UPDES permit conditions. Samples will also be taken as required.

d - The pump inlet line will be equipped with a floating intake and an oil skimming device. A typical drawing is included as Figure IV-13.

e - The 36" outlet pipe will be visibly marked to show the limit of the decant level. This marker will be placed 2' above the maximum sediment level. This allows for the 18" oil skimmer shown on Figure IV-13, plus the required 1' shutoff above maximum sediment elevation. The pump will be turned off when the water level is drawn down to this marker.

f - All storm water will be retained in the pond for a minimum of 24 hours, or until effluent limitations will be met prior to decanting.

g - Sedimentation Pond C to this date has never discharged. It is unlikely at any future date that the pond will discharge water. However, if a discharge ever occurs Andalex will construct an access ramp at that time. The access ramp will consist of a walk- way from the bank to the top of the stand-pipe. It will be equipped with hand rails and safety chains.

**Certification Statement**

A certification statement by a qualified, registered professional engineer that the pond will safely control the 100 year - 6 hour precipitation event, is included with this section.

**Location**

The pond is located where failure could be expected to cause loss of life or serious property damage. In accordance with the requirements, the pond is designed and constructed to safely control the runoff from a 100 year - 6 hour precipitation event. (See related table and certification with this section for designs, and Plates 8 and 12 for location and "As-Constructed" details of the pond).

**Calculations:**

The following pond spillway calculations have been shown separately for each sediment pond at this site. Each of the sheets is separately certified by a registered professional engineer, as required. (appendix N)

Pond C - Spillway Calculations

Design Parameters

| | |
|---|---|
| (1) Disturbed Drainage Area (a.c.) | 14.79 |
| (1) Undisturbed Drainage Area (a.c.) | 30.89 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.176 |
| Land Slope (%) | 6.25 |
| Hydraulic Length (ft.) | 1200 |

Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 27.56 |
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 18.06 |

| | | |
|---|---|---|
| | 100 yr. - 6 hr. Event (in.) | 1.91 |
| | Peak Flow 100/6 (cfs) | 30.35 |
| (3) | Oil Skimmer Diameter (in.) | 18 |
| | Overflow Diameter (in.) | 36 |
| (4) | Required Head 10/24 (ft.) | 0.98 |
| (4) | Required Head 25/6 (ft.) | 0.74 |
| (4) | Required Head 100/6 (ft.) | 1.05 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV-3A; Total Flows from DD-1, DD-2, & DD-3
(3) Reference Only - Not included in calculations.
(4) Taken from Stage Volume Curve - 36" riser only.

# Pond E - Spillway Calculations

## Design Parameters

| | |
|---|---|
| (1) Disturbed Drainage Area (ac.) | 12.21 |
| (1) Undisturbed Drainage Area (ac.) | 12.20 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.289 |
| Land Slope (%) | 8.00 |
| Hydraulic Length (ft.) | 1200 |

## Primary Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 14.55 |
| Riser Diameter (in.) | 30" |
| Required Head (ft.) | 0.73 |

## Emergency Overflow

| | |
|---|---|
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 9.96 |
| Structure Area Used ($ft.^2$) | 18.00 |
| Required Structure Area ($ft.^2$) | 2.40 |
| Depth of Flow (ft.) | 0.41 |
| Slope (%) | 5.00 |
| Velocity (fps) | 4.15 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV-3A; DD-4.

## Pond E - PM - Spillway Calculations

### Design Parameters:

| | |
|---|---|
| (1) Disturbed Drainage Area (ac.) | 34.91 |
| (1) Undisturbed Drainage Area (ac.) | 805.50 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 1.02 |
| Land Slope (%) | 19.83 |
| Hydraulic Length (ft.) | 10,200 |

(3) Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 88.94 |
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 45.77 |
| Structure Area Used ($ft.^2$) | 18.0 |
| Slope of Spillway (%) | 33.3 |
| Required Structure Area 10/24 ($ft.^2$) | 5.58 |
| Required Structure Area 25/6 ($ft.^2$) | 3.54 |
| Depth of Flow 10/24 (ft.) | 0.84 |
| Depth of Flow 25/6 (ft.) | 0.58 |
| Velocity 10/24 (fps) | 15.94 |
| Velocity 25/6 (fps) | 12.94 |

Notes: (1) From Plates 8 & 9; Includes B.T.C.A. Areas
(2) Taken from Table IV-4
(3) Single, open channel spillway

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Stage-Discharge Data
for
Sediment Pond "C"

INSERT ORIGINAL P.E. STAMPED TABLE

Stage-Discharge
Centennial Pond C

INSERT ORIGINAL P.E. STAMPED GRAPH

## Certification Statement

INSERT ORIGINAL P.E. STAMPED STATEMENT

## CHANNEL FLOW CALCULATIONS

## FOR: POND "E" - EMERGENCY SPILLWAY

| | | |
|---|---|---|
| Bed Slope = | .05 | |
| Manning's N = | .04 | |
| Bottom Width = | 5 | feet |
| Channel Side Slope = | .5 | |
| Flow Depth = | .6950414 | feet |
| Cross Sectional Area = | 4.441372 | square feet |
| Wetted Perimeter = | 8.10832 | feet |
| Hydraulic Radius = | .547755 | feet |
| Discharge = | 24.74 | cubic feet / sec |
| Velocity = | 5.570351 | feet / sec |

Culverts

## General

Culverts have been sized as per the designations on Plates 8 and 9, and are placed to drain on a minimum of .0556 (1 ft./18 ft.) slope. Undisturbed drainage culverts (shown on Plate 9) are fitted with trash racks in drainages where introduction of rocks and other debris into the main culvert is foreseen as a problem. The main culvert inlet (C-1a) is fitted with a trash rack. All disturbed area culverts are designated with a CD- number as shown on Plate 8. These culverts handle much smaller flows and are thus not fitted with trash racks in most cases.

The undisturbed area culverts (C-0 through C-13) flow into the main culvert. The main culvert outlets at section C-15, which is protected from erosion as described on Table IV-7. Disturbed area culverts (CD-1 through CD-7) as shown on Plate 8 discharge onto grouted rip-rap surfaces for protection from erosion. Energy dissipators are also employed where necessary to reduce velocities and prevent erosion from culvert discharges (see Plate 8).

## Maintenance

Culverts shall be inspected regularly, and cleaned as necessary to provide for passage of designed flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

## Size Justification

The following note on the undisturbed culverts is for reference only, to show the original design criteria. Due to the complicated nature of the undisturbed culvert flows, it was decided that a drainage system analysis would be used to demonstrate the ability of the system to pass the design event. This system analysis is provided in Appendix O and shows the existing system to be more than adequate for the design storm event.

## Undisturbed Area Culvert Size Determination*

Source:

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Peak Flow - SCS-TR-55 Method For Type II Storms:

$qp = qp^1AQ$;

A = Watershed in square miles;

Q = Runoff volume in inches;

$qp^1$= Discharge from Fig. 2.40

qp = Peak Discharge in cfs.

Source:

B.L.M. State Engineer

Manning Equation:

$$D = \frac{2.16Qn^{0.375}}{\sqrt{s}}$$

D = Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = roughness factor (0.02 for steel culvert)

s = slope (0.0556% = 1 foot for 18 feet)

Using the above formulas, minimum culvert sizes were calculated based on 100% runoff from a 10 year - 24 hour storm.

* Reference Only - See Appendix O for justification of culvert sizes.

**Watershed and Culvert Sizing Map (Plate 9)**

TABLE IV-2

| Culvert | Watershed Area (acres) | Culvert Needed (in.) | Culvert Used (in.) |
|---|---|---|---|
| C-0 | 36.65 | 13 | 18 |
| C-1a | 469.51 | 22 | 36 |
| C1 | 506.16 | 22 | 36 |
| C2 | 23.03 | 12 | 18 |
| C3 | 529.19 | 23 | 36 |
| C4 | 77.29 | 16 | 30 |
| C5 | 606.48 | 23 | 36 |
| C6 | 26.87 | 12 | 18 |
| C7 | 633.35 | 24 | 42 |
| C8 | 45.25 | 14 | 30 |
| C9 | 678.60 | 25 | 42 |
| C10 | 18.16 | 10 | 18 |
| C11 | 696.73 | 25 | 42 |
| C12 | 55.31 | 14 | 18 |
| C13 | 752.04 | 27 | 42 |
| C15 | 752.04 | 27 | 42 |

Note: Culvert C14 flow has been routed to diversion UD-4, and C14 has been eliminated.

Diversion Structures

## General

Diversion ditch locations are shown on the Surface Facilities Map and Drainage Map, Plate 8. The direction of flow is also shown. All diversions are classed as temporary, and will be removed upon final reclamation.

Note: (1) The runoff curve number of 65 was used only for calculation of the undisturbed culvert diversions. All other diversions, culverts, and pond designs are based on a more conservative runoff curve number of 70 for undisturbed drainages.

(2) Brycan is Hydrologic Soil Group B, Datino (stoney) is also Hydrologic Soil Group B; reference "SCS, National Engineering Handbook, Section 4, 1972".

## Specifications

Diversions along the upslope side of the road will be as per specifications on the haul road design. At a minimum, these, and any other diversions shown, will meet the minimum size specifications on the Diversion Ditch Summary sheet (Table IV-3B). Disturbed divisions DD-1 and DD-8 through DD-11 are sized to carry the runoff from a 2 year - 6 hour precipitation event in the area, per requirements of R645-301-742.330 "Division of Miscellaneous Flow". There are no divisions of intermittent or perennial flows.

Undisturbed diversions and drainage control for primary roads are sized to carry runoff from a 10 year - 6 hour precipitation event in the area.

Calculations for the 10 year - 24 hour runoff are included only for sediment pond sizing purposes.

## Maintenance

All diversions will be maintained so as to pass the volumes of water for which they were designed. Sloughage will be cleaned out along with regular road maintenance procedures, and any blockage will be removed as soon as practicable after occurrence. Velocities will be controlled as needed to prevent excessive scouring.

## Diversions and Conveyance of Overland Flow

There are two types of diversions at this property: undisturbed and disturbed. The undisturbed diversions are labeled UD-1, through UD-5, and C-1 through C-15, and carry undisturbed drainage around and under the disturbed area. All undisturbed diversions are in place, and are shown on Plate 8, along with respective drainage areas. Cross sections of the undisturbed diversions are shown on the "Undisturbed Diversion Ditch Typical" (Figure IV-4). Design calculations are shown on the tables entitled "Diversion Design" (Table IV-3), "Diversion Ditch Summary Sheet" (Table IV-3B) "Main Channel Culvert Design" (Table IV-4), and "Side Drainage Culvert Design" (Table IV-5).

The disturbed diversions carry disturbed drainage to the sediment ponds. The existing disturbed diversions are labeled DD-1, through DD-11 and are shown on Plate 6 "Support Facilities - As Constructed" and on Plate 8 "Support Facilities - Surface Area Drainage and Topography". The diversion DD-4 is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". Cross sections of the disturbed diversions are shown on the Division Ditch Typical" (Figure IV-3) Design calculations are shown on the table entitled "Disturbed Diversion Design" (Table IV-3A) and on the "Diversion Ditch Summary" (Table IV-3B).

Peak flows for all diversions were calculated by the SCS-TR55 Method for Type II storms using the computer program: Office of Surface Mining Watershed Model, Version: Storm 6.20, by Gary E. McIntosh.

A runoff curve number of 70 was used for all undisturbed areas, except for the undisturbed culvert diversions, which use a CN of 65. A CN of 90 was used for the disturbed area.

The curve numbers are based on Table 2.20 "Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Land Use" (Antecedent Moisture Condition II), page 82 of "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.

A runoff curve number of 65 was selected for the undisturbed culvert diversion areas, based on the following:

(1) Land Use Description - Wood or Forest Land: thin stand, moderate to poor cover, no mulch.

(a) The above description was selected from SCS soils and vegetation data in Appendix M, wherein the site is described as not-desirable as rangeland due to the steep slopes and moderately sparse vegetative cover. The predominant vegetation is trees or large shrubs (pine, juniper, oak, sagebrush) with a mixture of grasses (wildrye, bluegrass, etc.). This land form and vegetation type best fits the Wood or Forest Land Category.

(2) Hydrologic Soil Group - B.

(a) The undisturbed soils of the permit area are predominantly bouldery loam or bouldery fine sandy loam, as described in the SCS report in Appendix M. These soils are further defined as deep and well-drained with moderate permeability and infiltration rates. This description fits the SCS Hydrologic Soil Group B very well.

(3) The runoff curve number of 65 is further supported by an on-site visit and professional judgement of a respected professional engineer/hydrologist from Horrocks, Carollo Engineers. In his opinion, a curve number of 65 best fits the site conditions, based on the site visit, and Richard H. McCuen's, "A Guide to Hydrologic Analysis Using SCS Methods".

(4) Appendix O, which is the calculations performed by Horrocks Engineering reflects a curve number of 65. Tables IV-4 and IV-5 are also included and use a curve number of 70. Both calculations show adequately sized culverts; the curve number of 70 is slightly more conservative.

The Curve Number of 90 for the disturbed area is based on Hydrologic Soil Group B, Streets and Roads, with a weighted average of 40% paved area and 60% gravel area.

The outlet of C-15 (Main-Channel Culvert) shows a velocity of 7.28 fps, which could be slightly erosive in this area; however, existing boulders at this outlet range from 12 to 36 inches in diameter and function as an adequate energy dissipator and erosion control device. Based on past history of storms with little or no evidence of erosion, at this point

it is not felt necessary to install additional protection. Erosion protection parameters are shown on the "Erosion Protection" (Table IV-7), for reference only, to show that the existing natural rock is adequate size for erosion control.

The culvert outlet will be visually examined after each major storm to ensure that erosion is not occurring. If erosion does become evident as determined by visual observation, protection will be installed according to the design on the table entitled "Erosion Protection" (Table IV-7).

Velocities on undisturbed diversions UD-1, UD-3 and UD-5 and portions of UD-2 and UD-4 are less than 6.0 fps, and are not considered erosive. Velocities on disturbed diversions DD-1, through DD-11 are also less than 6.0 fps, and are not considered erosive on this site.

Velocities on the upper and lower portion of UD-2 and the lower 150' of UD-4 and are greater than 6.0 fps, and are considered potentially erosive; therefore, rip-rap will be placed at these locations (see Plate 8). Rip-rap or liner is placed as described in Table IV-7, and is sized according to Figure IV-12. Diversion UD-2 has been observed to be non-erosive.

Undisturbed diversion UD-2 was resurveyed in November 1992. Based on this survey, the division can be divided into four separate components, as follows:

Upper Section - This is the extreme upper end of the division near the disturbed area boundary. This is a fairly steep, rocky area, and is quite inaccessible to equipment. The average grade through this section is 12.33%. the ditch is protected by a liner, which appears to have been effective in preventing erosion over the last 10 years. The liner will be maintained throughout this section;

Undisturbed Section - This is an area below the upper (lined) section and the office pad section. The drainage flows through an undisturbed, vegetated area for approximately 100 feet, at an average slope of 12.11%. There is no evidence of erosion through this area;

Office Pad Section - This is an extremely flat portion of the diversion with an average grade of 3.50% for approximately 200 feet. Velocities through this section are non-erosive, and this is the only portion of the diversion which has required periodic maintenance for silt cleaning;

Lower Section - This section is approximately 100 feet in length with an average slope of 41.60%. The ditch is rip-rapped through this section.

Flow calculations are provided in Table IV-3 for the various sections, and erosion protection requirements are provided in Table IV-7. The diversion has been in place for approximately 10 years, and has required only minimal maintenance for silt clean out in that time. It has been designed, located, constructed, maintained, used and will be removed in accordance with requirements of R645-301-742.300.

A loose rock check dam will be placed at the discharge point of UD-4 for energy dissipation. The dam will be constructed as described in Figure IV-9 and located as shown on Plate 8.

All diversion ditches are sized and maintained to at least the minimum requirements of R645-301-742.330 "Diversion of Miscellaneous Flows" and R645-301-742.423 "(Road) Drainage Control". There are no diversions of intermittent or perennial drainages at this minesite. Ditch sizes, including flow depths and minimum size for maintenance are summarized on Table IV-3B, "Division Ditch Summary". Computer backup sheets for all calculations are provided in Appendix O.

**Stream Channel Diversions**

Re-establishment of drainages is shown on Plates 15 and 16 which are reclamation contours and cross sections. The cross sections show cut and fill which has occurred on-site versus the original contours and reclaimed contours.

The reclamation plans for the drainage in the area consist of replacing each of the culverts C-1 through C-15 with restored channels. The undisturbed diversions UD-1 and UD-2 will also be removed and replaced with appropriate sized channels, corresponding to the channels at culverts C-4 and C-12 respectively. The restored channels are all sized to carry the runoff from a 100 year - 24 hour precipitation event. Cross sections of the restored channels are shown in the "Restored Channel Typicals" (Figure IV-10). Design calculations are summarized in the table entitled Restored Channel Designs" (Table IV-6).

Culverts C-1, C-3, C-5, C-7, C-9, C-11, C-13, and C-15 will be replaced by the Main Channel RC-1, and culverts C-2, C-4, C-6, C-8, C-10, C-12, and C-14 will be replaced by the Side Channels entitled RC-2, RC-4,....RC-14, respectively.

The only restored channels with erosive velocities for this area (greater than 4.5 fps) are RC-1, RC-4, and RC-12. Erosion protection is planned for these channels, as shown on the table entitled "Erosion Protection" (Table IV-7). All other restored channels are expected to have non-erosive velocities, and will not require erosion protection.

Loose rock check dams will be placed at the exit of each side drainage prior to entering RC-1. Please see Figure IV-9, for a typical section of the Loose Rock Check Dams.

Hydrologic Balance:

**Sedimentation Ponds**

The sedimentation ponds are shown on Plates 11, 12 and 13. Pond C is constructed as shown on Plate 6 "Support Facilities - As Built". There will be no Pond D. Pond E has been constructed (Plate 13), and is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". The plans and profiles shown on Plate 12 are for Pond C, as constructed. Plate 13 (Pond E) plans and profiles are as built.

All elevations of inflow and discharge are shown on the plates. Also, the embankment slopes are shown not to exceed 5:1 as required. The embankment widths are greater than the required width of height of embankment plus 35 feet divided by 5' as required. (Please note the different horizontal and vertical scales used on the section views of Pond C. Horizontal and vertical scales for Pond E are the same.)

Previous Pond "B" has been redesignated as "Primary Settling Basins" since all the runoff from the basins reports to Sediment Pond "C" (See Plate 11).

**Sediment Pond "C"**

Design specifications for Sediment Pond "C" are shown in this submittal.

**Sediment Pond "E"**

Design specifications for Sediment Pond "E" are covered under this submittal.

**Discharge Structures**

Discharge structures from the sediment ponds have been included.

**Permanent and Temporary Impoundments**

The sedimentation pond E will remain in place after reclamation, until adequate revegetation is established on the reseeded areas. At this time, the pond will be removed and reclaimed.

**Discharge of Water into an Underground Mine**

The Drainage Map, Plate 8, delineates various drainage areas on the site. Based on planimeter areas from this map, the following areas are drained into the respective mines:

| Mine | Disturbed (ac.) | Undisturbed (a.c) |
|---|---|---|
| Pinnacle Mine | 0.81 | 0.13 |
| Apex | 1.23 | 2.06 |
| Old Chidister Mine | 4.53 | 16.21 |

The water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps. Water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps.

Andalex owns the rights to this water.

Hydrologic Balance:

**Water Quality Standards and Limitations.**

**Sediment control for Office Facilities**

The office facilities area is a small paved parking area and runoff from a portion of this area will report to Sediment Pond "E" as shown on Plate 8. The remaining portion is classified as a B.T.C.A. Area (2.19-2).

Natural runoff from above the office area is diverted to the south of the pad, and flows in an open ditch down to the lower (road) level where it enters an 18" culvert going into the 42" culvert carrying undisturbed drainage off site. Straw bales are maintained in the open ditch to minimize sediment in the undisturbed flow.

Most of the office pad and access road are paved. Runoff from a portion of the pad and road flow down a grouted ditch along the north and south sides of the road, through a culvert and then down the east side of the main paved road. From here the runoff flows into Pond E. See Plate 8. Sediment contributions from the office facilities area are negligible (if any) due to the pavement and concrete grouted ditch. Straw bales are also maintained along the main haul road to minimize sediment loading from this area.

**Disturbed Area Drainage not Reporting to Sediment Ponds**

Please refer to Plate 8 in Volume II of the PAP for exempt "Alternate Sediment Control Area" or (ASCA) (areas not reporting to sedimentation ponds). There are 3 areas, 2 of which are shown on Plate 8 as ASCA's and a third in Appendix U as an SAE, with a total area of 1.08 acres or 3.2% of the Disturbed Area:

(1) ASCA #1 - 0.72 acres - near the office, which includes a topsoil storage pile, UD-2, a portion of the main office pad and a portion of the weather station outslope.

(a) Treatment: As a result of a 10 year - 24 hour storm, there would potentially be a discharge of 2,462 cubic feet of runoff from this area. Alternate sediment controls consist of straw dikes, vegetation on the topsoil pile, chemically treated gravel parking areas and paved parking areas.

(2) ASCA #2 - 0.27 acres - Substation area.

(a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 923 cubic feet of runoff from this area. Alternate sediment controls on this site consist of a graveled surface, a straw dike and snow fences.

(3) Small Area Exemption (SAE) #1 - 0.09 acres - Left Fork Fan Powerline area.

(a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 308 cubic feet of runoff from this

area. As these are power poles, there will be no sediment runoff.

These three areas are exempt from the requirement that the drainage report to a sedimentation pond (817.42a) as provided for in 817.42b. The drainage from these areas will meet the effluent standards of 817.42 and State and Federal water quality standards for the receiving waters. In order to assure this, any discharge from these ASCA's will be monitored for suspended solids, total suspended solids and total dissolved solids.

There are three additional undisturbed diversions constructed just inside the disturbed area boundary (UD-1, UD-3 and UD-4). These ditches carry only undisturbed runoff from the areas above, are well vegetated, and discharge directly to the main channel undisturbed drainage without further treatment. Only undisturbed diversion UD-2 is included as a ASCA (#1), due to the fact that it also picks up drainage from a topsoil storage pile and a portion of the office pad as described on the previous page.

**NPDES Permit**

Three point sources are included in Andalex's new UPDES Permit issued in May of 1989. Quarterly reports are submitted to the Utah Department of Health and the EPA.

# TYPICAL

## SCS - TR55 Method of Diversion Calculation

1. Find Drainage Area - Plate 8 or 9

2. Find Runoff from Appropriate Event:
$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$; where: P = Precip. in inches
$S = \frac{1,000}{CN} - 10$

CN = 70 for Undisturbed
CN = 90 for Disturbed

3. Find Hydraulic Length of Watershed - Plate 8 or 9

4. Find Land Slope - Plate 8 or 9

5. Calculate Lag Time; $t_L = \frac{L^{0.8}(S+1)^{0.7}}{1900\ y^{0.5}}$

where: $t_L$ = Lag Time in Hrs.
L = Hydraulic Length in ft.
$S = \frac{(1,000 - 10)}{CN}$
y = Land Slope in %

6. Find Time of Concentration; $t_c = \frac{t_L}{0.6}$

**7. Find Peak Flow (qp) from: $qp = qp^1 AQ$
where qp = Peak Flow in cfs
$qp^1$ = Peak Discharge from Figure 2.40, page 115***.
A = Drainage Area in Square Miles
Q = Runoff (from #2 above)

**8. Find Velocity of Flow from:
$V = \frac{1.49\ R^{0.67} S^{0.5}}{n}$

where: V = Velocity in fps
n = Manning's Number for ditch
R = Hydraulic Radius in ft. = $\frac{\text{Area}}{\text{Wetted Perim.}}$
S = Slope in ft./ft.

**9. Find Required Ditch Area by dividing peak flow by the velocity.
$Q = AV$; $A = Q$

V

**10. Find depth of flow by applying required area to ditch size.

* Where undisturbed and disturbed flows enter the same ditch, a weighted curve number is used, calculated by:

$$\frac{(\text{Area Undisturbed})(70) + (\text{Area Disturbed})(90)}{(\text{Total Area})}$$

** Items 7 through 10 can also be calculated by the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.

*** "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

TABLE IV-3

UNDISTURBED DIVERSION DESIGN

| Structure | UD-1 | UD-2 (PAD) | UD-3 | UD-4 | UD-5 |
|---|---|---|---|---|---|
| Drainage Area (s) | 87.78 | 56.20 | 23.87 | 26.14 | 16.90 |
| Time of Conc. (hours) | 0.24 | 0.21 | 0.22 | 0.06 | 0.14 |
| Runoff Curve Number (CN) | 70 | 70 | 70 | 70 | 70 |
| Manning's Number (n) | 0.038 | 0.038 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.75 | 3.50 | 6.75 | 4.50 | 3.79 |
| Hydraulic Length (ft.) | 2850 | 2800 | 1400 | 600 | 1800 |
| Land Slope (%) | 47.22 | 58.33 | 56.67 | 66.67 | 62.50 |
| 10 yr. 6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Time of Conc. (hrs.) | 0.24 | 0.21 | 0.22 | 0.06 | 0.14 |
| Peak Flow 10/6 (cfs) | 1.35 | 0.99 | 0.11 | 0.47 | 0.29 |
| Required Area 10/6 ($ft^2$) | 0.37 | 0.37 | 0.06 | 0.20 | 0.15 |
| Flow Depth 10/6 (ft) | 0.61 | 0.61 | 0.24 | 0.45 | 0.39 |
| Velocity 10/6 (fps) | 3.65 | 2.64 | 1.88 | 2.32 | 1.93 |
| 10 yr.-24 hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 7.94 | 4.75 | 2.03 | 3.45 | 1.59 |
| Req'd Area 10/24 ($ft^2$) | 1.40 | 1.21 | 0.52 | 0.90 | 0.54 |
| Flow Depth 10/24 ($ft^2$) | 1.18 | 1.10 | 0.72 | 0.95 | 0.73 |
| Velocity 10/24 ($ft^2$) | 5.69 | 3.91 | 3.90 | 3.82 | 2.95 |

Notes:

1- Ditch slopes measured from Plate 8.
2- UD-2 slope measured directly in field.
3- Peak flows by SCS-TR55 Method using "Storm 6.20" computer program.
4- Manning's number based on Table 3.1, p. 159, under Small Drainage Ditches - earth Lined, "Applied Hydrology and Sedimentology Disturbed Areas", Barfield, Warner and Haan, 1983.
5- See Appendix O for computer back-up.
6- All calculations are based on minimum ditch size - "V" shape with 1:1 side slopes. Ditch configurations may vary in field.

TABLE IV-3 (cont'd)

UNDISTURBED DIVERSION DESIGN

| Structure | UD-2 (upper) | UD-2 (lower) | UD-4 (max) | UD-5 (max) |
|---|---|---|---|---|
| Drainage Area (acres) | 56.20 | 56.20 | 26.14 | 16.90 |
| Time of Conc. (hrs.) | 0.21 | 0.21 | 0.06 | 0.14 |
| Runoff Curve Number (CN) | 70 | 70 | 70 | 70 |
| Manning's Number (n) | 0.025 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 12.33 | 42.60 | 20.00 | 17.75 |
| Hydraulic Length (ft.) | 2800 | 2800 | 600 | 1800 |
| Land Slope (%) | 58.33 | 58.33 | 66.67 | 62.50 |
| 10 yr.-6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 0.99 | 0.99 | *10.43 | 0.29 |
| Req'd Area 10/6 ($ft.^2$) | 0.17 | 0.15 | 1.18 | 0.08 |
| Flow Depth 10/6 (ft.) | 0.41 | 0.39 | 1.09 | 0.29 |
| Velocity 10/6 (fps) | 5.80 | 6.49 | 8.81 | 3.44 |
| 10 yr.-24 hr. Event (in) | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow (cfs) | 4.75 | 4.75 | *13.41 | 1.59 |
| Req'd Area ($ft.^2$) | 0.55 | 0.49 | 1.43 | 0.30 |
| Flow Depth 10/24 (ft) | 0.74 | 0.70 | 1.20 | 0.55 |
| Velocity 10/24 (fps) | 8.59 | 9.61 | 9.38 | 5.27 |

* Includes discharge from Pond E Emergency Spillway.

Note: 1. Ditch slopes measured from Plate 8.
2. UD-2 Slopes Measured Directly in Field; UD-2 (Upper) is a lined channel. UD-2 (lower) is rip-rapped.
3. Peak flows by SCS-TR55 Method using "Storm 6.20" computer program.
4. The Manning's number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.
5. See Appendix O for computer back-up.
6. All calculations are based on minimum ditch size-"V" shape with 1:1 side slopes. Ditch Configurations may vary in field.

## TABLE IV-3A

## DISTURBED DIVERSION DESIGN
## (MISCELLANEOUS FLOWS-2YR.-6 HR. DESIGN)

| Structure | DD-1 | *DD-8 | *DD-9 | DD-10 | DD-11 |
|---|---|---|---|---|---|
| Drainage Area (acres) | | | | | |
| Disturbed | 3.31 | - | - | 0.34 | 5.35 |
| Undisturbed | 5.40 | - | - | - | 6.12 |
| Time of Conc. (hrs.) | 0.08 | 0.327 | 0.327 | 0.11 | 0.08 |
| Runoff Curve Number (CN) | | | | | |
| Disturbed | 90 | - | - | 90 | 90 |
| Undisturbed | 70 | - | - | - | 70 |
| Weighted CN | 78 | - | - | 90 | 79 |
| Manning's Number (n) | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.25 | 6.25 | 6.25 | 6.25 | 5.25 |
| Hydraulic Length (ft.) | 200 | 1200 | 1200 | 300 | 800 |
| Land Slope (%) | 6.25 | 6.25 | 6.25 | 6.25 | 56.25 |
| 2 yr.-6 hr. Event (in) | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Peak Flow 2/6 (cfs) | 0.08 | 0.07 | 0.07 | 0.05 | 0.13 |
| Required Area 2/6 ($ft^2$) | 0.05 | 0.04 | 0.04 | 0.03 | 0.07 |
| Flow Depth 2/6 (ft.) | 0.22 | 0.21 | 0.21 | 0.18 | 0.26 |
| Velocity 2/6 (fps) | 1.69 | 1.63 | 1.63 | 1.50 | 1.90 |
| 10 yr.-24 hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 3.49 | 2.88 | 2.88 | 0.31 | 4.75 |

* Based on ½ flow from DD-3, which is 0.13 cfs for 2 yr.-6 hr.event. See Appendix O.

TABLE IV-3A (Continued)

DISTURBED DIVERSION DESIGN
(PRIMARY ROAD DRAINAGE - 10YR.-6HR. DESIGN)

| Structure | DD-2 | DD-3 | DD-4 | DD-6 * | DD-7 |
|---|---|---|---|---|---|
| Drainage Area (acres) | | | | | |
| Disturbed | 4.07 | 7.41 | 12.21 | - | 1.28 |
| Undisturbed | - | 25.49 | 12.20 | - | 6.12 |
| Time of Conc. (hrs.) | 0.04 | 0.327 | 0.289 | 0.289 | 0.08 |
| Runoff Curve Number (CN) | | | | | |
| Disturbed | 90 | 90 | 90 | - | 90 |
| Undisturbed | - | 70 | 70 | - | 70 |
| Weighted CN | 90 | 75 | 80 | - | 74 |
| Manning's Number (n) | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.25 | 6.25 | 6.25 | 5.95 | 5.56 |
| Hydraulic Length (ft.) | 200 | 1200 | 1200 | - | 800 |
| Land Slope (%) | 6.25 | 6.25 | 8.00 | - | 56.25 |
| 10 yr. -6 hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 1.70 | 0.90 | 1.67 | 0.84 | 0.20 |
| Required Area 10/6 ($ft^2$) | 0.47 | 0.30 | 0.40 | 0.28 | 0.10 |
| Flow Depth 10/6 (ft.) | 0.69 | 0.24 | 0.68 | 0.53 | 0.31 |
| Velocity 10/6 (fps) | 3.62 | 2.96 | 3.60 | 2.98 | 2.03 |
| 10yr.-24hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 3.50 | 5.75 | 8.06 | 4.03 | 1.92 |

* Based on ½ flow for DD-4

Notes:

1. Ditch Slopes measured from Plate 8.
2. Peak flows by SCS-TR55 Method using "Storm 6.20" Computer program.
3. The Manning's Number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.
4. See Appendix O for computer back-up.
5. All calculations are based on minimum ditch size- "V" shape with 1:1 side slopes, except DD-3 which has a 1' bottom width. Ditch configurations may vary in field.

## TABLE IV -3B
## DIVERSION DITCH SUMMARY

| DITCH NO. | FLOW (cfs) | REQ'D FLOW DEPTH (ft.) | REQ'D FLOW AREA ($ft^2$) |
|---|---|---|---|
| UD-1 | 1.35 | 0.61 | 0.37 |
| UD-2 (PAD) | 0.99 | 0.61 | 0.37 |
| UD-2 (UPPER) | 0.99 | 0.41 | 0.17 |
| UD-2 (LOWER) | 0.99 | 0.39 | 0.15 |
| UD-3 | 0.11 | 0.24 | 0.06 |
| UD-4 | 0.47 | 0.45 | 0.20 |
| UD-4 (MAX) | 10.43 | 1.09 | 1.18 |
| UD-5 | 0.29 | 0.39 | 0.15 |
| UD-5 (MAX) | 0.29 | 0.29 | 0.08 |
| DD-1 | 0.08 | 0.22 | 0.05 |
| DD-2 | 1.70 | 0.69 | 0.47 |
| DD-3 | 0.90 | 0.24 | 0.30 |
| DD-4 | 1.67 | 0.68 | 0.46 |
| DD-6 | 0.84 | 0.53 | 0.28 |
| DD-7 | 0.20 | 0.31 | 0.10 |
| DD-8 | 0.07 | 0.21 | 0.04 |
| DD-9 | 0.07 | 0.21 | 0.04 |
| DD-10 | 0.05 | 0.18 | 0.03 |
| DD-11 | 0.13 | 0.26 | 0.07 |

Notes: 1- Flows for UD ditches and primary road ditches (D-2 through DD-7) based on 10 yr.-6hr. event (1.25).

2- Flows for Ditches DD-1 and DD-8 through DD-11 based on 2yr.-6hr. event (0.80").

3- All calculations based on minimum ditch size - "V" ditch with 1:1 side slopes, except DD-3, which has a 1' bottom width. Ditch configurations may vary in field.

4- Ditches will be maintained to minimum depth and/or area shown in this table.

# METHOD OF CULVERT CALCULATION
## (TYPICAL)
## See Appendix N for calculation reference

1. Find Drainage Area - Plate 9

2. Find Runoff from Appropriate Event:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$ ; Where: P = Precipitation in Inches.

$$S = \frac{1,000}{CN} - 10$$

or CN = 70

3. Find Hydraulic Length of Watershed - Plate 9.

4. Find Land Slope - Plate 9

5. Calculate Lag Time; $t_L = \frac{L^{0.8}(S+1)^{0.7}}{1,900\ Y^{0.5}}$

where: $t_L$ = Lag Time in Hrs.
L = Hydraulic Length in Ft.
$S = \frac{1,000}{CN} - 10$
Y = Land Slope in %.

6. Find Time of Concentration; $t_c = \frac{t_L}{0.6}$

**7. Find Peak Flow (qp) from: $qp = qp^1\ AQ$

where: qp = Peak Flow
$qp^1$ = Peak Discharge from Figure 2.40, page 115*.
A = Drainage Area in Square Miles
Q = Runoff (from #2 above)

8. Find Required Culvert Size by Manning's Equation:

$$D = \left( \frac{2.16\ Qn}{\sqrt{s}} \right)^{0.375}$$

where: D = Required Culvert Diameter in Ft.
Q = Peak Flow (qp) from 7.
n = Manning's Number (0.025 for culv.)
s = Slope in ft./ft.

* "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

** Item 7 can also be calculated by using the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.

## TABLE IV-3C

## DISTURBED AREA CULVERT DESIGN
## (Drainage to Old Works)

| Structure | CD-1 | CD-2 | CD-8 |
|---|---|---|---|
| Drainage Area (ac.) | --- | --- | --- |
| Undisturbed | 10.09 | 6.12 | 10.09 |
| Disturbed | 3.25 | 1.28 | 3.25 |
| 10 yr. - 6 hr. event (in.) | 1.25 | 1.25 | 1.25 |
| Time of Conc. (hrs.) | 0.10 | 0.10 | 0.10 |
| Curve Number | --- | --- | --- |
| Undisturbed | 70 | 70 | 70 |
| Disturbed | 90 | 90 | 90 |
| Manning's Number | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 5.56 | 5.56 | 5.56 |
| Peak Flow (cfs) | 1.73 | 0.72 | 1.73 |
| Velocity | 4.41 | 3.49 | 3.08 |
| D Req'd (ft.) | 0.71 | 0.51 | 0.71 |
| D in Place (ft.) | 1.00 | 1.00 | 1.50 |

## TABLE IV-3C (Continued)

## DISTURBED AREA CULVERT DESIGN

| Structure | CD-4 | CD-5 | CD-6 | CD-7 |
|---|---|---|---|---|
| 10 yr. - 6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 1.50 | 1.55 | 2.33 | 4.65 |
| Velocity | 4.26 | 4.29 | 4.75 | 5.65 |
| D Req'd (ft.) | 0.67 | 0.68 | 0.79 | 1.02 |
| D in Place (ft.) | 1.50 | 1.50 | 2.00 | 2.00 |

Note: All culverts have adequate headwater to allow flow.

TABLE IV-3C (Continued)

CULVERT CD-3
(Inlet to Sed. Pond "C")

| | |
|---|---|
| 10-yr.6-hr. Event | 1.25" |
| Mannings Number | 0.025 |
| Culvert Slope | 3.30% |
| Peak Flow | 3.00 cfs |
| Velocity | 4.16 fps |
| D. Required | 0.96 ft. |
| D. In Place | 1.50 ft. |

NOTES: 1. Peak flow is based on entire flow from Diversion DD-3.
2. Details for Diversion DD-3 are on Table IV-3A.
3. Culvert slope is based on actual field measurement.
4. A headwall of 4' exists at the culvert inlet, which is adequate to allow the calculated peak flow of 3.00 cfs.
5. Please refer to Plate 8 for CD-3 location and drainage areas.

TABLE IV-3C (Continued)
DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD-9 | CD-10 | CD-11 | CD-12 | CD-13 |
|---|---|---|---|---|---|
| 10yr.-6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 8.00 | 6.25 | 8.00 | 5.56 | 6.25 |
| Peak Flow 10/6 (cfs) | 0.31* | 0.31* | 0.31** | 0.92** | 1.87*** |
| Velocity 10/6 (fps) | 3.29 | 3.00 | 3.29 | 3.77 | 4.70 |
| Diam. Req'd. (ft.) | 0.35 | 0.36 | 0.35 | 0.56 | 0.71 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 1.00 | 2.00 | 1.50 |

* Based on 1/3 flow form DD-11.

** Based on entire flow from DD-11.
**** Based on entire flow from DD-2.

## TABLE IV-3C (Continued)
## DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD-14 | CD-15 | CD-16 | CD-17 | CD-18 |
|---|---|---|---|---|---|
| 10yr.-6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.0025 |
| Culvert Slope (%) | 3.50 | 3.50 | 6.25 | 5.56 | 57.74 |
| Peak Flow 10/6 (cfs) | 1.35* | 2.84** | 4.65*** | 4.65*** | 0.29 |
| Velocity 10/6 (fps) | 3.51 | 4.20 | 5.90 | 5.65 | 6.79 |
| Diam. Req'd. (ft.) | 0.70 | 0.93 | 1.00 | 1.02 | 0.23 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 2.00 | 2.00 | 1.50 |

* Based on entire flow from DD-1.
** Based on entire flows from DD-2, CD-10 & DD-11
*** Based on entire flow from DD-4.

## TABLE IV-4

## MAIN CHANNEL CULVERT DESIGN

| Structure | (optional) C-1a |
|---|---|
| Drainage Area | 469.51 |
| 10 yr. - 24 hr. Event | 1.82 |
| Time of Conc. (hrs.) | 1.02 |
| Curve number | 70 |
| Manning's Number | 0.025 |
| Ditch Slope (%) | 5.56 |
| Peak Flow | 22.12 |
| Structure Area Used ($ft.^2$) | 7.07 |
| Velocity (fps) | 9.20 |
| Hydraulic Length | 10,200 |
| Land Slope | 19.83 |
| Headwater Req'd (ft.) | 2.22 |
| D Req'd (ft.) | 1.84 |
| D in Place | 3.00 |

Note: See Appendix O for culvert justification.

## TABLE IV-4 (cont'd)

## MAIN CHANNEL CULVERT DESIGN

| Structure | C1 | C3 | C5 | C7 |
|---|---|---|---|---|
| Drainage Area | 506.16 | 529.19 | 606.48 | 633.35 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | - | - | - | - |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 23.12 | 23.62 | 26.02 | 26.72 |
| Structure Area Used ($ft.^2$) | 7.07 | 7.07 | 7.07 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | - | - | - | - |
| Land Slope | - | - | - | - |
| Headwater Req'd (ft.) | N/A | N/A | - | - |
| D Req'd (ft.) | 1.86 | 1.88 | 1.95 | 1.97 |
| D in Place | 3.00 | 3.00 | 3.00 | 3.50 |

Note: See Appendix O for culvert justification.

TABLE IV-4 (cont'd)

MAIN CHANNEL CULVERT DESIGN

| Structure | C9 | C11 | C13 | C15 |
|---|---|---|---|---|
| Drainage Area | 678.60 | 696.73 | 752.04 | 752.04 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | - | - | - | - |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 29.82 | 32.42 | 38.92* | 38.92* |
| Structure Area Used ($ft.^2$) | 9.62 | 9.62 | 9.62 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | - | - | - | - |
| Land Slope | - | - | - | - |
| Headwater Req'd (ft.) | - | - | - | - |
| D Req'd (ft.) | 2.06 | 2.12 | 2.27 | 2.27 |
| D in Place | 3.50 | 3.50 | 3.50 | 3.50 |

Note: See Appendix O for culvert justification.

Note: All culverts are within capacity for open-channel flow.

* If design peak flows for primary spillways from Ponds C and E are included, the peak flows for C-13 and C-15 are 65.6 cfs and 90.9 cfs respectively.

## TABLE IV-5

## SIDE DRAINAGE CULVERT DESIGN

| Structure | C-0 | C-2 | C-4 | C-6 |
|---|---|---|---|---|
| Drainage Area | 36.65 | 23.03 | 77.29 | 26.87 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | 0.12 | 0.08 | 0.24 | 0.22 |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 4.00 | 4.00 | 10.00 | 4.00 |
| Peak Flow | 5.65 | 3.90 | 8.77 | 4.17 |
| Structure Area Used ($ft.^2$) | 1.767 | 1.767 | 1.767 | 1.767 |
| Velocity (fps) | 6.18 | 6.18 | 8.73 | 6.18 |
| Hydraulic Length | 1300 | 850 | 2850 | 1400 |
| Land Slope | 51.43 | 61.54 | 47.22 | 56.67 |
| Headwater Req'd (ft.) | 1.35 | 1.12 | *2.40 | 1.02 |
| D Req'd (ft.) | 1.10 | 0.96 | *1.30 | 0.98 |
| D In Place (ft.) | 1.50 | 1.50 | 1.50 | 1.50 |

* Available headwater at culvert inlet is greater than that required to allow for surge storage and passage of flows.

Headwater = distance from base of culvert to top of headwall.

## SIDE DRAINAGE CULVERT DESIGN

| Structure | C-8 | C-10 | C-12 |
|---|---|---|---|
| Drainage Area | 45.25 | 18.16 | 55.31 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | 0.14 | 0.11 | 0.21 |
| Curve Number | 70 | 70 | 70 |
| Manning's Number | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 4.00 | 4.00 | 10.00 |
| Peak Flow | 7.09 | 2.65 | 6.50 |
| Structure Area Used ($ft.^2$) | 4.91 | 3.14 | 1.767 |
| Velocity (fps) | 6.18 | 4.90 | 9.77 |
| Hydraulic Length | 1600 | 1250 | 2800 |
| Land Slope | 58.62 | 63.16 | 58.33 |
| Headwater Req'd (ft.) | 1.25 | 0.98 | 1.60 |

| | | | |
|---|---|---|---|
| D Req'd (ft.) | 1.20 | 0.83 | 1.16 |
| D In Place (ft.) | 2.50 | 2.00 | 1.5 |

TABLE IV-6

## RESTORED CHANNEL DESIGNS*

| | Main Channel | Side Channel* | | |
|---|---|---|---|---|
| Structure | RC-1 | RC-O | RC-2 | RC-4 |
| Drainage Area | 469.22 | 34.55 | 22.18 | 71.83 |
| 100 yr.- 6 hr. Event | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 3.19 | 0.18 | 0.09 | 0.44 |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's Number | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.60 | 4.00 | 4.00 | 10.00 |
| Peak Flow | 60.31** | 2.64 | 1.93 | 4.12 |
| Min. Structure Area ($ft.^2$) | 27.00 | 8.00 | 8.00 | 8.00 |
| Req'd Area ($ft.^2$) | 7.26 | 0.84 | 0.67 | 0.83 |
| Depth of Flow (ft.) | 1.03 | 0.35 | 0.30 | 0.35 |
| Velocity (fps) | 8.31 | 3.16 | 2.86 | 4.98 |
| Hydraulic Length | 10,200 | 1,300 | 850 | 2,400 |
| Land Slope (%) | 19.80 | 51.40 | 61.50 | 47.00 |
| Erosion Protection (Y/N) | Y | N | N | Y |

* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.

** Includes Reclaimed Area.

Note: Ditch Slopes measured from Plate 17.
Areas from Plate 17-A

TABLE IV-6 (cont'd)

RESTORED CHANNEL DESIGNS*

| Structure | RC-6 | RC-8 | RC-10 | RC-12 | RC-14 |
|---|---|---|---|---|---|
| Drainage Area | | 28.74 | 46.92 | 20.74 | 58.20 | 24.37 |
| 100 yr. - 6 hr. Event | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 0.20 | 0.24 | 0.18 | 0.53 | 0.20 |
| Curve number | | 70 | 70 | 70 | 70 |
| Manning's Number | | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | | 4.00 | 4.00 | 4.00 | 10.00 | 4.00 |
| Peak Flow | | 2.15 | 3.39 | 1.60 | 3.12 | 1.82 |
| Min. Structure Area ($ft.^2$) | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| Req'd Area ($ft.^2$) | | 0.73 | 0.99 | 0.60 | 0.69 | 0.65 |
| Depth of Flow (ft.) | | 0.31 | 0.41 | 0.26 | 0.30 | 0.29 |
| Velocity (fps) | | 2.96 | 3.43 | 2.68 | 4.55 | 2.80 |
| Hydraulic Length | | 1,400 | 1,600 | 1,250 | 2,800 | 1,300 |
| Land Slope (%) | | 57.00 | 58.60 | 63.20 | 58.30 | 46.80 |
| Erosion Protection (Y/N) | N | N | N | Y | N |

* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.

Note: Ditch Slopes measured from Plate 17.

TABLE IV-6 (con't)
RESTORED CHANNEL DESIGNS
(Sub-Areas)*

| Structure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Drainage Area (ac.) | 4.72 | 1.09 | 8.73 | 24.37 | 4.37 | 24.00 | 12.74 |
| 100 yr.-6 hr. event (in.) | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 0.08 | 0.07 | 0.13 | 0.22 | 0.09 | 0.20 | 0.17 |
| Curve Number | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Peak Flow (cfs) | 0.42 | 0.10 | 0.72 | 1.78 | 0.38 | 1.78 | 0.99 |
| Hydraulic Length (ft.) | 600 | 400 | 800 | 1,500 | 700 | 1,200 | 1,100 |
| Land Slope (%) | 66.67 | 55.17 | 58.33 | 66.67 | 60.00 | 60.87 | 60.00 |

* These areas drain directly to RC-1 by sheet flow, without entering other channels. See Plate 17-A.

TABLE IV-6 (con't)

RESTORED CHANNEL DESIGNS

| Structure | *Reclaimed Area |
|---|---|
| Drainage Area (ac.) | 32.34 |
| 100 yr.-6 hr. event (in.) | 1.91 |
| Time of Conc. (hrs.) | 0.54 |
| Curve Number | 90 |
| Peak Flow (cfs) | 23.17 |
| Hydraulic Length (ft.) | 49.50 |
| Land Slope (%) | 6.60 |

* This area drains directly to RC-1 by sheet flow, without entering other channels. See Plate 17-A.

TABLE IV-6 (con't)

## RESTORED CHANNEL DESIGNS

Peak flow for RC-1 is based on the total of peak flows for RC-1 (Upper) plus channels RC-0 through RC-14, plus sub-areas 1 through 7, plus the reclaimed area. Peak flows for each of these are shown in Appendix P.

### TABLE IV-7

### EROSION PROTECTION

| Restored Side Channel Structure | *Main Channel C-15 | Restored Main Channel RC-1 | Restored Main Channel RC-4 | Restored Side Channel RC-12 |
|---|---|---|---|---|
| Flow (cfs) | - | - | 4.12 | 3.12 |
| Slope (%) | 5.56 | 6.60 | 10.00 | 10.00 |
| Velocity (fps) | 9.20 | 8.31 | 4.98 | 4.55 |
| Rip-rap Size ($D_{50}$) | 15" | 12" | 6" | 6" |
| Bedding (-3/4" gravel) | 25" | 20" | 10" | 10" |
| Length of Protection (ft.) | 20' | All | All | All |
| Width of Protection (ft.) | 10' | 12' | 6' | 6' |
| Rip-Rap Depth | 18" | 15" | 8" | 8" |

=

| | UD-1 | UD-4 (Max.) | UD-5 (Max.) | DD-3 | DD-4 (Max.) |
|---|---|---|---|---|---|
| Flow (cfs) | 20.57 | 14.82 | 4.75 | 15.18 | 14.55 |
| Slope (%) | 6.75 | 20.00 | 17.75 | 6.25 | 8.00 |

| | | | | | |
|---|---|---|---|---|---|
| Velocity (fps) | 7.25 | 9.67 | 6.98 | 6.28 | 6.82 |
| Rip-rap Size (D50) | 9" | 15" | 9" | 9" | 9" |
| Bedding (-3/4" gravel) | 15" | 25" | 15" | 15" | 15" |
| Length of Protection (ft.) | All | 150' | 150' | All | All |
| Width of Protection (ft.) | 5' | 5' | 5' | 4' | 4' |
| Rip-Rap Depth | 12" | 18" | 12" | 12" | 12" |

* For Reference Only. Natural Rip-rap is more than adequate for erosion protection.

Note: Rip-Rap shall be graded according to the following:
$D_{15}$ = 0.42D; $D_{50}$ = 1D; $D_{85}$ = 1.6D.
For Median Diameter of 12", $D_{15}$ = 5", $D_{50}$ = 12", $D_{85}$ = 19.25".
For Median Diameter of 21", $D_{15}$ = 9", $D_{50}$ = 21", $D_{85}$ = 34.00".

| | | UD-2 (upper) | UD-2 (lower) |
|---|---|---|---|
| Flow (cfs) | 13.87 | 13.87 | |
| Slope (%) | | 12.33 | 42.60 |
| Velocity (fps) | 10.63 | 11.90 | |
| Rip-Rap Size (D50) | N/A** | 12" | |
| Bedding (-3/4" gravel) | N/A** | 20" | |
| Length of Protection (ft.) | | 150' | 100' |
| Width of Protection (ft.) | | 5' | 5' |
| Rip-Rap Depth | N/A** | 15" | |

** UD-2 (upper) is protected by a channel liner.

During the earthwork portion of the reclamation suitable rip-rap will be segregated and stored on site for later use in the stream channel restorations it will not be necessary to haul rip-rap in from an outside source. Also native material will be used for the filter blanket under the rip-rap. This material can be used because of its sandy nature it will not be necessary to haul gravel in.

TABLE IV-8

VALUES FOR MANNING'S N AND MAXIMUM PERMISSIBLE VELOCITY OF FLOW IN OPEN CHANNELS

| Ditch lining | | | Manning's n | $V_{max}$ fps[1] |
|---|---|---|---|---|
| 1. Natural earth | | | | |
| a. Without vegetation | | | | |
| (1) Rock | | | | |
| (a) Smooth and uniform ..... | | | 0.035-0.040 | 20 |
| (b) Jagged & Irregular ..... | | | 0.040-0.045 | 15-18 |
| (2) Soils | | | | |
| Coarse grained | | | | |
| Gravel and gravelly soils | | | | |
| **Unified** | **USDA** | | | |
| GW | Gravel | | 0.022-0.024 | 6-7 |
| GP | Gravel | | 0.023-0.026 | 7-8 |
| GM | Loamy Gravel | d | 0.023-0.025 | 3-5 |
| | | u | 0.022-0.020 | 2-4 |
| | Gravelly Loam | | | |
| GC | Gravelly Clay | | 0.024-0.026 | 5-7 |
| Coarse grained | | | | |
| Sand and sandy soils | | | | |
| SW | Sand | | 0.020-0.024 | 1-2 |
| SP | Sand | | 0.022-0.024 | 1-2 |
| SM | Loamy Sand | d | 0.020-0.023 | 2-3 |
| | | u | 0.021-0.023 | 2-3 |
| SC | Sandy Loam | | 0.023-0.025 | 3-4 |
| Fine grained | | | | |
| Silts and clays | | | | |
| | Clay Loam | | | |
| 50 CL | Sandy Clay Loam | | 0.022-0.024 | 2-3 |
| | Silty Clay | | | |
| | Silt Loam | | | |
| LL ML | Very Fine Sand | | 0.023-0.024 | 3-4 |
| | Silt | | | |
| 50 OL | Mucky Loam | | 0.022-0.024 | 2-3 |
| CH | Clay | | 0.022-0.023 | 2-3 |
| MH | Silty Clay | | 0.023-0.024 | 3-5 |
| LL OH | Mucky Clay | | 0.022-0.024 | 2-3 |
| Highly Organic | | | | |

| | | | |
|---|---|---|---|
| PT | Peat | 0.022-0.025 | 2-3 |

[1]Maximum recommended velocities

# Table IV-9
# Sediment Yield
# for
# Disturbed Area

Using the Universal Soil Loss Equation:

A = RKLSCP; Where:

R = 16.53 from $R = 27P^{2.2}$; $P_{2,6}$ = 0.8 inches

$2,6$

K = 0.50 from Table 5.5 (Ref. Below)

LS = 2.5 Length/Slope factors from Fig. 5-15 (Ref. Below)

Average Length = 1200'

Average Slope = 6.25%

CP = 1.0 from Table 5.A.1 (Ref. Below)

Based on combination of compacted surface and pavement with grouted ditches.

*A = 16.53 x 0.50 x 2.5 x 1.0 = 20.6625 tons/acre/year

Sediment Yield = A = 0.010 ac./ft./acre/yr.

Notes: (1) Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

(2) Sediment Yield based on a weight of 100 lbs./cu. ft.

* Included for reference only. A more conservative figure of 0.05 ac. ft./acre has been used for Pond C, and 0.1 ac. ft./acre has been used for Pond E sizing.

# Table IV-10
# Sediment Yield
# for
# Undisturbed Areas

Using the Universal Soil Loss Equation:

$A = RKLSCP$; Where:

$R = 16.53$ from $R = 27P_{2,6}^{2.2}$; $P_{2,6} = 0.8$ inches

$K = 0.37$ from Table 5.5 (Ref. Below)

LS = Average Length/Slope Factor from Equation = 56.04

$$LS = \left(\frac{L}{72.6}\right)^{0.5}\left(\frac{430X^2 + 30X + 0.43}{6.613}\right)$$

L = Avg. Slope Length = 1,000'

X = Sin 0; 0 = Avg. Slope Angle = 26.57° (50%)

C = 0.1 from Table 5.A.3 (Ref. Below)

25% Canopy Cover; 40% Ground Cover

P = 1 (No. Control Practice)

$A = 16.53 \times 0.37 \times 56.04 \times 0.1 = 34.275$ tons/acre/yr.

$$\text{Sed. Yield} = \frac{34.275 \times 2{,}000}{100 \times 43{,}560} = 0.016 \text{ ac. ft./acre/yr.}$$

Notes: (1)

Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

(2) Sediment yield based on a weight of 100 lbs./cu. ft.

Table IV-11
Minesite Drainage Area Summary

| Drainage No. | Area (ac.) | Type | Drains To: |
|---|---|---|---|
| 1 | 4.23 | Undisturbed | Pond E |
| 2 | 5.40 | " | Pond C |
| 3 | 3.00 | " | Old Works (Chidister Mine) |
| 4 | 3.12 | " | " " " |
| 5 | 11.97 | " | Pond C |
| 6 | 2.06 | " | Apex Mine |
| 7 | 1.12 | " | Old Works (Chidister Mine) |
| 8 | 0.55 | " | " " " |
| 9 | 1.01 | " | " " " |
| 10 | 7.41 | " | " " " |
| 11 | 0.13 | " | Pinnacle Mine |
| 12 | 13.52 | " | Pond C |
| 13 | 6.20 | " | Pond E |
| 14 | 1.77 | " | " " |
| 15 | 12.21 | Disturbed | " " |
| 16 | 6.04 | " | Pond C |
| 17 | 4.07 | " | Catch Basin B |
| 18 | 1.28 | " | Old Works (Chidister Mine) |
| 19 | 0.81 | " | Pinnacle Mine |
| 20 | 4.68 | " | Pond C |
| 21 | 3.25 | " | Old Works (Chidister Mine) |
| 22 | 1.23 | " | Apex Mine |
| Total = | 95.06; | | |

Disturbed = 33.57 Acres;
Undisturbed = 61.49 Acres

Notes: (1) Areas disturbed from Plate 8 (and Plate 9 as necessary).

(2) Does not include diverted undisturbed drainage.

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Typical Diversion Ditch
Figure IV-3

INSERT ORIGINAL DRAWING

Typical Section for Trapezoidal Ditch
Figure IV-3A

INSERT ORIGINAL DRAWING

Undisturbed Diversion Typical
Figure IV-4

INSERT ORIGINAL DRAWING

Typical Section of Emergency Spillway
Figure IV-6

INSERT ORIGINAL DRAWING

Loose Rock Check Dam
(Restored Main Drainage Channel)
Figure IV-8

INSERT ORIGINAL DRAWING

Loose Rock Check Dam
(Restored Side Drainage Channel)
Figure IV-9Restored Channel Typicals
Figure IV-09

INSERT ORIGINAL DRAWING

Restored Channel Typicals
Figure IV-10

INSERT ORIGINAL DRAWING

Figure IV-12

INSERT ORIGINAL DRAWING

Figure IV-13
Sampling Access Ramp

INSERT ORIGINAL DRAWING

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Figure IV-14
Floating Decant Typical

INSERT ORIGINAL DRAWING

**R645-301-733.100. GENERAL PLANS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.110. CERTIFICATION**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.120. MAPS AND CROSS SECTIONS**

See ~~R645-301-512.240~~R645-301-733., also R645-301-510.

**R645-301-733.130. NARRATIVE**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.140. SURVEY RESULTS**

Appendix L

**R645-301-733.150. HYDROLOGIC IMPACT**

Appendix L

**R645-301-733.160. DESIGN PLANS AND CONSTRUCTION SCHEDULE**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.200. PERMANENT AND TEMPORARY IMPOUNDMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.210. REQUIREMENTS**

N/A

**R645-301-733.220. DEMONSTRATION FOR PERMANENT IMPOUNDMENTS**

N/A

**R645-301-733.221. ADEQUACY FOR INTENDED USE**

N/A

**R645-301-733.222. WATER QUALITY AND EFFLUENT LIMITATIONS**

N/A

**R645-301-733.223. WATER LEVEL**

N/A

**R645-301-733.224. FINAL GRADING**

N/A

**R645-301-733.225. DIMINUTION OF QUALITY AND QUANTITY OF WATER UTILIZED BY OTHERS**

N/A

**R645-301-733.226. SUITABILITY FOR POSTMINING LAND USE**

N/A

**R645-301-733.230. TEMPORARY IMPOUNDMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-733.240. HAZARD NOTIFICATIONS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-734. DISCHARGE STRUCTURES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-735. DISPOSAL OF EXCESS SPOIL**

See R645-301-513.300.

**R645-301-736. COAL MINE WASTE**

See R645-301-513.300.

**R645-301-737. NON-COAL MINE WASTE**

See R645-301-513.300.

**R645-301-738. TEMPORARY CASING AND SEALING OF WELLS**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

**R645-301-740. DESIGN CRITERIA AND PLANS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-741. GENERAL REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742. SEDIMENT CONTROL MEASURES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.100. GENERAL REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.110. DESIGN**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.111. PREVENTION**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.112. EFFLUENT LIMITATIONS**

Appendix J

**R645-301-742.113. EROSION PROTECTION**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.120. MEASURES AND METHODS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.121. RETAINING SEDIMENT WITHIN DISTURBED AREAS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.122. DIVERTING RUNOFF AWAY FROM DISTURBED AREAS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.123. DIVERTING RUNOFF USING PROTECTED CHANNELS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-724.124. PHYSICAL TREATMENT TO REDUCE FLOW OR TRAP SEDIMENT**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.125. CHEMICAL TREATMENT**

N/A

**R645-301-742.126. IN-MINE TREATMENT**

N/A

**R645-301-742.200. SILTATION STRUCTURES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.210. GENERAL REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.211. DESIGN**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.212. REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.213. SILTATION STRUCTURES WHICH IMPOUND WATER**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.214. POINT SOURCE DISCHARGES**

See R645-301-711.300.

**R645-301-742.220. SEDIMENTATION PONDS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.221. USE**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.221.1 INDIVIDUALLY OR IN SERIES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.221.2 LOCATION**

See ~~R645-301-512.240~~R645-301-733., Plate 6

## R645-301-742.221.3 DESIGN, CONSTRUCTION AND MAINTENANCE

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.31 SEDIMENT STORAGE VOLUME

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.32 DETENTION TIME

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.33 DESIGN EVENT

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.34 DEWATERING DEVICE

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.35 SHORT CIRCUITING

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.36 SEDIMENT REMOVAL

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.37 EXCESSIVE SETTLEMENT

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.38 EMBANKMENT MATERIAL

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.221.39 COMPACTION

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.222. MSHA SEDIMENTATION PONDS**

N/A

**R645-301-742.223. OTHER SEDIMENTATION PONDS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-745.223.1 OPEN CHANNEL SPILLWAY**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.223.2 LINING**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.230. OTHER TREATMENT FACILITIES**

N/A

**R645-301-742.231. DESIGN EVENT**

N/A

**R645-301-742.232. REQUIREMENTS**

N/A

**R645-301-742.240. EXEMPTIONS**

N/A

**R645-301-742.300. DIVERSIONS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.310. GENERAL REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.311. REQUIREMENTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.312. DESIGN

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.312.1 STABILITY

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.312.2 FLOOD PROTECTION

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.312.3 SUSPENDED SOLIDS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.312.4 COMPLY WITH OTHER REGULATIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.313. TEMPORARY AND PERMANENT DIVERSIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.314. ADDITIONAL DESIGN CRITERIA

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.320. DIVERSION OF PERENNIAL AND INTERMITTENT STREAMS

N/A

## R645-301-742.321. BUFFER ZONE REQUIREMENTS

N/A

## R645-301-742.322. DESIGN CAPACITY

N/A

## R645-301-742.323. DESIGN EVENT

N/A

## R645-301-742.324. CERTIFICATION

N/A

## R645-301-742.330. DIVERSION OF MISCELLANEOUS FLOWS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.331. REQUIREMENTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.332. DESIGN

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.333. DESIGN EVENT

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.400. ROAD DRAINAGE

See ~~R645-301-512.240~~R645-301-733., .250.

## R645-301-742.410. ALL ROADS

See ~~R645-301-512.240~~R645-301-733., .250.

## R645-301-742.411. PROTECTION AND SAFETY

See ~~R645-301-512.240~~R645-301-733., .250.

## R645-301-742.412. INTERMITTENT OR PERENNIAL STREAM RESTRICTION

N/A

## R645-301-742.413. DOWNSTREAM SEDIMENTATION AND FLOODING

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.420. PRIMARY ROADS

See ~~R645-301-512.240~~R645-301-733., .250.

## R645-301-742.421. EROSION PROTECTION

See ~~R645-301-512.240~~R645-301-733., .250.

## R645-301-742.422. STREAM FORDS

N/A

## R645-301-742.423. DRAINAGE CONTROL

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.423.1 PRIMARY ROAD DESIGN CRITERIA

See R645-301-512.250.

## R645-301-742.423.2 DRAINAGE PIPES AND CULVERTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.423.3 DRAINAGE DITCHES

See ~~R645-301-512.240~~R645-301-733.

## R645-301-742.423.4 NATURAL STREAM CHANNELS

See ~~R645-301-512.240~~R645-301-733.

**R645-301-742.423.5 REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743. IMPOUNDMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743.100. GENERAL REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743.110. MSHA IMPOUNDMENTS**

N/A

**R645-301-743.120. CERTIFICATION AND FREEBOARD REQUIREMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743.130. SPILLWAYS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743.140. INSPECTIONS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-743.200. SPILLWAY DESIGN EVENT FOR PERMANENT IMPOUNDMENTS**

N/A

**R645-301-743.300. SPILLWAY DESIGN EVENT FOR TEMPORARY IMPOUNDMENTS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-744. DISCHARGE STRUCTURES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-744.100. EROSION CONTROL**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-744.200. DESIGN**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-745. DISPOSAL OF EXCESS SPOIL**

See R645-301-513.300.

**R645-301-745.100. GENERAL REQUIREMENTS**

See R645-301-513.300.

**R645-301-745.110. DISPOSAL AREA**

See R645-301-513.300.

**R645-301-745.111. EFFECTS ON SURFACE AND GROUND WATER**

See R645-301-513.300.

**R645-301-745.112. IMPOUNDMENTS ON FILL**

N/A

**R645-301-745.113. COVER**

See R645-301-513.300.

**R645-301-745.120. DRAINAGE CONTROL**

N/A

**R645-301-745.121. DIVERSIONS**

monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-750. PERFORMANCE STANDARDS

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

## R645-301-751. WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS

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

## R645-301-752. SEDIMENT CONTROL MEASURES

Sediment control measures must be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760.

## R645-301-752.100. SILTATION STRUCTURES AND DIVERSIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-752.200. ROAD DRAINAGE

See R645-301-512.250.

## R645-301-752.210. CONTROL OF EROSION AND POLLUTION

See ~~R645-301-512.240~~R645-301-733.

**R645-301-752.220. CONTROL OF SUSPENDED SOLIDS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-752.230. COMPLIANCE WITH EFFLUENT STANDARDS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-752.240. MINIMIZE DIMINUTION OF DEGRADATION OF WATER QUALITY**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-752.250. ALTERATION OF STREAM FLOW OR CHANNELS**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-753. IMPOUNDMENTS AND DISCHARGE STRUCTURES**

See ~~R645-301-512.240~~R645-301-733.

**R645-301-754. DISPOSAL OF EXCESS SPOIL, COAL MINE WASTE AND NON-COAL MINE WASTE**

See R645-301-513.300.

**R645-301-755. CASING AND SEALING OF WELLS**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

**R645-301-760. RECLAMATION**

## R645-301-762.200. REGRADING

See R645-301-532.200.

## R645-301-763. SILTATION STRUCTURES

See ~~R645-301-512.240~~R645-301-733.

## R645-301-763.100. RESTRICTIONS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-763.200. REQUIREMENTS

See ~~R645-301-512.240~~R645-301-733.

## R645-301-764. STRUCTURE REMOVAL

See R645-301-240.

## R645-301-765. PERMANENT CASING AND SEALING OF WELLS

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 7

## Hydrology

**C/007/019**

(Revised)
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## R645-301-700. HYDROLOGY

The Kenilworth Lease boundary change will not encroach into any new hydrologic basins which are not addressed in the existing MRP (see plate 29). Seeps located within this boundary change have been addressed in the new Kenilworth Lease PHC. (see PHC for the entire lease area).

SEE ALSO APPENDICES L, N, AND O

## R645-301-710. INTRODUCTION

## R645-301-711. GENERAL REQUIREMENTS

Hydrologic Protection Facilities

**Sewage System**

The nature of the overburden in the area offers excellent drainage. As a result, a septic system with drain fields conforming to the state codes has been established to handle the waste water disposal from the bathhouse and office facilities. The drain fields are located in native material (valley fill) cast of the bath houses in the parking area. Enclosed as Appendix G are the two septic system plans as designed by a Utah Registered Professional Engineer and approved by the State of Utah Department of Health.

**Water Treatment**

Based on the State of Utah, Department of Health review of the septic systems, water treatment is not needed. (Personal communication, Mr. Gerald Story, Utah Department of Health, Price, Utah).

**Drainage Control - Diversions, etc.**

See R645-301-733.

**Sediment Control**

See R645-301-733.

## R645-301-711.100. EXISTING HYDROLOGIC RESOURCES

Appendix L

## R645-301-711.200. POTENTIAL IMPACTS TO THE HYDROLOGIC BALANCE

Appendix L - Potential Hydrologic Consequences

## R645-301-711.300. COMPLIANCE WITH HYDROLOGIC DESIGN CRITERIA

**Protection of Hydrologic Balance and Compliance with Water Quality Laws**

Andalex will follow its approved "Sedimentation and Drainage Control Plan" and comply with the U.P.D.E.S. Permit UT0025674 (see Appendix J). Currently, this permit authorizes four discharge points; two from sedimentation ponds (001, 003) and two from the underground mine (002 and 004). See IV-11

Andalex has approval from the State Engineer, Division of Water Rights, to collect runoff water from the disturbed area for use as a dust suppressant in the underground mining operation. This runoff is a result of direct precipitation with the runoff area.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

Surface and Groundwater Monitoring

This monitoring plan is an up-to-date, comprehensive plan that describes all current water monitoring requirements. It supersedes all other versions of monitoring plans that have been previously developed for the Centennial Mine and that may be contained in various appendices to this MRP. In the past, as the mining area expanded, changes were made to the permit boundary, and new monitoring sites were added. As a result, several different monitoring plans have been developed for the Centennial Mine. These were described to varying extents in separate Probable Hydrologic Consequences (PHC) determinations that are appended to MRP.

The plan written here draws from the various monitoring plans that have previously been written and approved. It is also based upon an assessment of monitoring data collected to date, and accounts for the status of the mine as inoperable. It meets the requirements of R645-301-731.211 and R645-301-731.221, i.e., to document the suitability of water for current and approved postmining land uses and for protecting the hydrologic balance.

Should operations be reinitiated, this monitoring plan will be reexamined for adequacy, and dropped monitoring sites may be picked back up and/or new sites may be added. Any such changes to the monitoring will be reflected in revisions to this section.

Removal of Monitoring Points

As allowed by R645-301-731.214 and R645-301-731.224, several sites that have been monitored for many years have been omitted from this plan. Sites in Hoffman Canyon (S25-1 and 25-2), Straight Canyon (8-1 and 17-2), and Star Point Fork (17-1 and 18-2) will no longer be monitored. All of these sites are located within or near the eastern portion of the MRP boundary, and were never undermined. The closest mining was completed in 1993 and was about half a mile away from the sites, as shown on Figure 7-1. Further, site 12-1, located in Alrad Canyon in the southwest corner of the permit area, has been omitted from this plan.

In addition, there are numerous sites to the north and west of the permit area which have been omitted from this plan. As shown on Figure 7-1, stream site B263 is located more than a mile away from the nearest underground mining, and stream sites AC-1 and SC-1 are three-quarters of a mile from the closest mine works. Four spring or seep sites (B351, B352, B261, and B362) are similarly located well away from any recent mining. It should also be noted that at these sites the overburden is 3000' deep or greater. All mining in the Aberdeen Mine (Tower Mine) was discontinued in mid-2007, the mine has been shut down and sealed up, and there are not immediate plans to ever reopen the mine in the foreseeable future. Therefore, there is no continued need for monitoring.

Last, one other stream site and one stock pond site within the permit area is also being omitted from the monitoring plan. Ephemeral wash site 7-1 is located upstream of the main surface facilities and is typically dry. Because site 18-4 monitors the same stream further downstream and because operations have ceased, 18-4 is sufficient for tracking potential impacts in this drainage. Site 7-1 was never undermined, and the nearest second-mining (nearly one-half mile away) was completed in 1998. The stock pond site 31-1 is located over a inter-panel barrier pillar and was never undermined. The nearest second mining was done in 2004. Overburden cover at this location is 2500' and subsidence survey show that the area has not been subject to subsidence Further justification for discontinuing monitoring at all of the above-mentioned sites is provided below.

As mentioned above, ANDALEX has long-completed mining under Hoffman Canyon; there were no surface facilities associated with mining in that area and there has been no subsidence reported

during annual surveys. Because the spring (S25-1) flows only intermittently and the stream (25-2) flows only ephemerally, few samples have been collected. However, based upon the available data, there has not been any material damage to the hydrologic balance, and postmining land uses have not been compromised. Nor would there be any potential for this to occur in the future from these completed activities.

Similarly, ANDALEX completed mining under Straight Canyon (8-1) in 1995. Site 17-2 was never undermined, and the last mining in the area (nearly half mile away) was done in 1995. The situation is similar for sites in Starpoint Fork (17-1 and 18-2). These sites were originally designated for monitoring to indicate effects of proposed surface facilities in those canyons (Vaughn Hansen Associates 1981); these facilities were never constructed and are no longer proposed. Further, annual subsidence surveys have not indicated subsidence. Though there have been few opportunities to collect water quality samples from these ephemeral channels, available data has not indicated any material damage to the hydrologic balance, and postmining land uses have not been compromised. Nor would there be any potential for this to occur in the future from these completed activities. In addition, the same can be said for site 7-1 in Deadman Canyon above the surface facilities and the continuation of monitoring at site 18-4 ensures that water quality in this watershed is being tracked.

Site 12-1 is located in an ephemeral channel that drains Alrad Canyon. This site was added to the monitoring plan a number of years ago as part of a permit amendment; its purpose was to ensure that any surface runoff effects due to mining could be documented. The site has served its purpose and no effects have been noted during the many years of quaterly monitoring. Located in the southwest corner of the permit area, Alrad Canyon was never undermined, and the closest second-mining (a half-mile away) was completed in 2000.

The Deep Canyon site (B-263) is on an intermittently flowing stream that is more than 7500 feet north of the second-mined area. It was added to the Centennial monitoring plan in 2005, but has been monitored by others as part of the Willow Creek MRP for many years. The Atone Creek site (AC-1) is also an intermittently flowing stream that was added to the monitoring plan in 2005; it is approximately 4500 feet north of the nearest second-mined area. The perennially flowing SC-1 is located below forks of Summit Creek, and is approximately 3800 feet north of the mined area. It has been monitored by ANDALEX since 2004. Although portions of the watersheds of these three streams have been undermined, surface effects from subsidence have not been noted, in part due to the

fact that cover ranges from 2,500 to 3,000 feet in these areas.

Regarding the four above-mentioned spring or seep sites, similar rationale is used to justify their removal from the monitoring plan. In Mathis Canyon, B351 is a small perennially flowing spring which has been monitored by ANDALEX since 2002 and was previously monitored as part of the Willow Creek MRP. The closest that mining came to that water source was 3500 feet, and that occurred in mid-2007. B352 has a similar monitoring history, though this small seep is almost always dry; while somewhat closer to the mined area, there is no mining-related mechanism by which future impacts to its hydrologic balance could occur. A small seep (B261), which may at times support runoff flows stored in Pace Pond, is also a former Willow Creek MRP monitoring site, which was taken over by ANDALEX in 2005; it has been dry in recent years. It is located outside of the permit area and 5500 feet north of second-mined areas. Another seep, which has also been dry essentially throughout its monitoring history (beginning in 2005 for ANDALEX and previously by Willow Creek), is known as B362. It is located on the edge of the permit area, at 3000 feet cover, and has not been undermined.

Last, the stock pond 31-1 was monitored to track any subsidence-related damages. It collects surface runoff and during quarterly monitoring a qualitative record is simply made of whether inflow or outflow is occurring, and the approximately percentage of storage which is currently being used. The nearest mining was in 2004, and at a cover of 2500 feet, no effects from subsidence have been noted.

In sum, none of the above mentioned sites are needed any longer to ensure protection of the hydrologic balance. Further, there is no mechanism by which future mining-related impacts to these water sources could occur, given the current conditions. Should mining be planned for the future, all of these sites have a record with which background conditions could be demonstrated, and any or all of them could be placed back in the plan to collect more data in the future if need be.

The following describes the monitoring plan currently in place, including designation of the sites remaining in the plan, as well as the monitoring methodology, parameter lists, and frequency.

Location of Monitoring Points

**Groundwater**

Groundwater monitoring includes two types of sites: underground

water intercepted by a well; and springs representing surface expressions of natural groundwater discharge. Locations of these sites are depicted on Figure IV-11 (and also Figure 7-1), and they are briefly described below in Table a.

**Table a Groundwater Monitoring Sites**

| Site ID | UTM location | Description |
|---|---|---|
| Well No. 1 | 523236.53 N 4395172.22 E | Well in Deadman Canyon, completed in Aberdeen Sandstone (first aquifer below coal seam) |
| S18-1 | 522923.25 N 4393720.43 E | Spring in Deadman Canyon below confluence with Left and Right Forks Deadman Canyon; stratigraphically below coal seam |

**Surface Water**

All surface water monitoring locations are shown on Figure IV-11. These monitoring sites are listed and briefly described below in Table b. Further, four storm water or mine water discharge outfalls at the Centennial Mine are monitored as required under a UPDES Permit, administered by the Utah Division of Water Quality. They are also shown on Figure IV-11.

**Table b Surface Water Monitoring Site**s

| Site ID | UTM location | Description |
|---|---|---|
| 18-3 | 522832.11 N 4394057.30 E | Left Fork Deadman Canyon above confluence with Right Fork Deadman Canyon, ephemeral stream |
| 18-4 | 522995.07 N 4394031.23 E | Right Fork Deadman Canyon below main surface facilities, ephemeral stream |

**Methodology and Parameters to be Monitored**

Flow rate will be measured at all spring and stream sites using equipment and methods that are appropriate for the amount of flow. Streams will typically be measured with a current meter using the velocity/area approach, a submerged float/area method, or

with a portable, calibrated flume. Springs will typically be measured volumetrically with piping, a known-volume container, and a stopwatch. Notes on flow extent will be made if appropriate. If flow rate is so reduced that it is not possible to measure (i.e. at a seasonal spring where saturated areas are present but no flow is visible), or if no flow is occurring (i.e. at an ephemeral stream site), notes will be made describing the site condition (saturation, ponding, dry but recent flows apparent, etc.) Static water level will be recorded at the monitoring well using a well sounder, and purged before samples are taken. Stock pond sites will be observed for incoming flow, outgoing flow, and approximate percentage of storage; these are reported qualitatively with no quantitative measurements made and no samples collected.

Water temperature, pH, and conductivity will be measured in the field using equipment that has been properly maintained and calibrated. Dissolved oxygen will also be measured in the field at all flowing stream sites. These field parameters will be measured at locations appropriate to the site: for streams, in mid-stream, non-stagnant water, with temperature measurements occurring in shaded areas where possible; and for springs, as near to the source as possible. The monitoring well will be purged prior to measuring field parameters.

Samples for chemical analysis follow requirements of UAC R645-301-723. The parameter list for surface waters (except stock ponds as described above) is shown in Table c, and the list for groundwater is shown in Table d. Any samples collected at the four UPDES outfalls will analyzed for the parameters required by the UPDES permit.

When feasible, field filtering is done prior to filling a bottle for dissolved metals analysis. Samples are stored in iced coolers and submitted to a contract lab using proper chain-of-custody procedures. The lab will be certified for all parameters that it analyzes.

**Table c Surface Water Parameter List**

| Field Parameters | |
|---|---|
| pH | Water temperature |
| Conductivity | Dissolved oxygen |
| Flow rate | |
| **Laboratory Parameters** | |
| Bicarbonate | Alkalinity |
| Carbonate | TDS |
| Calcium (dissolved) | Hardness |
| Chloride | Iron (total and dissolved) |
| Magnesium (dissolved) | Manganese (total and dissolved) |
| Potassium (dissolved) | Oil & Grease |
| Sodium (dissolved) | TSS |
| Sulfate | Cation/anion balance |

**Table d Groundwater Parameter List**

| Field Parameters | |
|---|---|
| pH | Water Temperature |
| Conductivity | Static water level or flow rate |
| **Laboratory Parameters** | |
| Bicarbonate | Sulfate |
| Carbonate | Alkalinity |
| Calcium (dissolved) | TDS |
| Chloride | Hardness |
| Magnesium (dissolved) | Iron (total and dissolved) |
| Potassium (dissolved) | Manganese (total and dissolved) |
| Sodium (dissolved) | Cation/anion balance |

**Frequency**

Surface water and groundwater monitoring sites will be visited quarterly, when accessible. When flowing, field measurements will be made and samples are collected for lab analysis. When not flowing, condition will be documented and subsequently reported.

UPDES outfall sites will be on a monthly monitoring schedule, as required by the UPDES permit.

Quarterly monitoring results will be reported electronically to UDOGM's on-line database.

**Post-Mining Monitoring**

During the reclamation period, Andalex Resources will establish an additional monitoring station at the entrance to the sedimentation pond (Pond E-PM). This station will be monitored on the same frequency and for the same parameters as the NPDES point to be maintained at the pond outlet. All other water monitoring sites will be maintained and monitored during the reclamation period. The sites will be monitored bi-annually for the parameters listed in the Division guidelines (1986), and reported to the Division bi-annually.

There are no acid or toxic-forming materials brought to the surface. No mine development waste is brought to the surface.

## R645-301-711.400. APPLICABLE HYDROLOGIC PERFORMANCE STANDARDS

All applicable hydrologic performance standards will be met.

## R645-301-711.500. RECLAMATION ACTIVITIES

**Post Mining Hydrology**

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side

drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

It should be noted that the main road going through the minesite and continuing on will be left intact as part of the post-mining use.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

Surface water monitoring will continue during this time as described. Please see Figure IV-11.

Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-712. CERTIFICATION

**Construction Specifications for Sedimentation Ponds**

All construction of sedimentation ponds have been performed under the direction of a qualified registered professional engineer.

Dams are constructed with primary overflows at least 2 ft. from the top, and emergency overflows at least 1.5 ft. from the top.

The areas of the pond construction had been examined for topsoil, and if present in removable quantities such soil was removed separately and stored in an approved topsoil storage location.

In areas where fill was to be placed, natural ground was removed for at least 12" below the base of the structure.

Figure IV-11
Location of Ground Water &
Surface Water Monitoring Station

INSERT ORIGINAL MAP

Native materials were used where practical. Fill was placed in lifts not exceeding 15" and compacted prior to placement of the next lift. Compaction of all fill materials is at least 95%.

Grouted rip-rap or culverts have been placed at all inlets and outlets to prevent scouring.

Each pond is fitted with an inverted inlet to the primary overflow, to prevent the passage of oil into the discharge.

Slopes of the dams are not steeper than 2.0:1, inside and outside, with a total of the inslope and outslope not less than 5:1. The inside slope of Pond E exceeded the steepness of 2:1. In part these slopes are incised and in part are constructed in from fill. Because of the steepness of these side slopes an investigation of stability was performed by Palmer Wilding Engineers. The conclusion was that the stability analysis is adequate and a stable section with respect to shear under static loading conditions is indicated. Please Appendix K.

Tops and external slopes of the dams were planted with an approved seed mix to prevent erosion and promote stability. Compaction of the slopes were at least 95%.

Top width of dams are not less than (H + 35)/5.

## R645-301-713. INSPECTION

Sedimentation Pond Specifications

**Location**

The ponds are located over the main drainage of the Right Fork of Deadman Canyon. The main canyon drainage is routed through a 36-42" culvert located under the ponds. The sites are located downslope of the disturbed areas to simplify collection of runoff water (please see Plate 8).

**Design**

The ponds are designed to fully contain the expected runoff and sediment load from a 10-year 24-hour precipitation event in this area. Pond "C" has additionally been shown to fully contain the runoff from a 100-year 6-hour storm. The design has been certified by a registered professional engineer. A certification statement for the ponds can be found at the end of Appendix N.

**Construction**

The construction of the ponds have been completed as per the specifications set forth in the Construction Specifications sheet (part 2.3).

**Capacity**

Each pond is designed to contain the runoff and sediment load from a 10-year 24-hour precipitation event in the area of drainage. In addition, each pond has an overflow capacity in excess of that required for a 25-year 24-hour event. Pond "C" has been designed to contain and pass the runoff from a 100-year 6-hour event.

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on-site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing. (Pond C)

**Monitoring**

Water monitoring stations will be established at the outlet of the ponds. Sample parameters and frequencies shall be as per specification of the NPDES permit.

**Maintenance**

The ponds shall be inspected after each storm and the sediment cleaned as necessary. In no event shall sediment be allowed to build beyond 60% of sediment design capacity.

**Seeding**

An approved seed mix will be applied to all feasible disturbed areas in an effort to minimize erosion and sediment loading to the ponds. The proper seed mixture for this area has been obtained through the local BLM.

**Culverts**

All culverts are shown on Plate 9. Calculations for sizing are also included. It should be noted that all culvert sizes were arrived at and approved through consultation with the DOGM hydrologic engineer.

**Calculations**

The following reflects the calculations for sizing and details of each separate pond. Plates 6 through 13 show pond locations and volumes as well as watershed areas.

See R645-301-512-240, Construction Specifications for Sedimentation Ponds

## R645-301-720. ENVIRONMENTAL DESCRIPTION

Appendix L

## R645-301-721. GENERAL REQUIREMENTS

Appendix L

## R645-301-722. CROSS SECTIONS AND MAPS

See R645-301-510.

## R645-301-722.100. LOCATION AND EXTENT OF SUBSURFACE WATER

Appendix L

## R645-301-722.200. LOCATION OF SURFACE WATER BODIES

Appendix L

## R645-301-722.300 MONITORING STATIONS

**Protection of Hydrologic Balance and Compliance with Water Quality Laws**

Andalex will follow its approved "Sedimentation and Drainage Control Plan" (please see R645-301-733.) and comply with the N.P.D.E.S. Permit No. UTG-040007 issued July, 1989 (see Appendix J). Please note this permit authorizes three discharge points; two from sedimentation ponds (001, 003) and one from the underground mine (002). See IV-11 and R645-301-711.300.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

## R645-301-722.400. WATER WELLS

See R645-301-711.300.

## R645-301-722.500. EXISTING LAND SURFACE CONFIGURATION

Plate 6

## R645-301-723. SAMPLING AND ANALYSIS

Appendix L

## R645-301-724. BASELINE INFORMATION

Appendix L

## R645-301-724.100. GROUND WATER INFORMATION

Appendix L

## R645-301-724.200. SURFACE WATER INFORMATION

Appendix L

## R645-301-724.300. GEOLOGIC INFORMATION

Appendix L

## R645-301-724.310. PROBABLE HYDROLOGIC CONSEQUENCES

Appendix L

## R645-301-724.320. RECLAIMABILITY

**Post Mining Hydrology**

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases including the left hand fork fan installation:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

   All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-724.400. CLIMATOLOGICAL INFORMATION

**Introduction**

The permit area, which is part of the Book Cliffs coal field, is located in a mid-latitude steppe climate with the land below the cliffs approaching desert conditions. The nearest weather recording station is located approximately 10 miles southwest of the Zion's fee in Price, Utah.

Temperatures at the site are 3 to 5° F cooler than at Price, 10 miles south and 1,200 feet lower. Average monthly temperatures at Price range from 25° F in January to 70-75° in July and August. Extreme temperatures of record are -31° and 108° F. Due to the elevation, and a predominance of clear skies and dry air, daily temperature ranges are rather large, averaging 26 degrees in winter and 33 degrees in summer. Average annual precipitation is 12 inches at the portal and may be as much as 16 inches at the higher parts of the lease area. The 100-year 6-hour precipitation is about 2 inches. Snowfall is generally light, averaging less than 33 inches annually, at Price. Potential evaporation is about 36 inches per year. The area is almost completely surrounded by mountains which act as a barrier to storms approaching from every direction except south.

**Source of Data**

National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

Department of the Interior, 1979, Final Environmental Statement, Development of Coal Resources in Central Utah.

Climatological Factors

**Precipitation**

The precipitation in the area, which is largely controlled by elevation, varies from five inches to 20 inches.

The principal rainfall is in late summer when the area is occasionally subjected to thunderstorm activity associated with moisture-laden air masses moving in from the Gulf of Mexico.

Snowfall is generally light, averaging less than 33 inches annually; however, as much as 95 inches have been reported in a single winter season.

The greatest and least monthly precipitation totals for the period of record are shown on Table III-4 following this page.

TABLE III-4

Maximum and Minimum Monthly Precipitation

| Month | Medium | Greatest | Year | Least | Year |
|---|---|---|---|---|---|
| January | 0.60 | 2.50 | 1969 | 0 | 1948 |
| February | 0.61 | 2.44 | 1919 | 0 | 1967 |
| March | 0.83 | 2.58 | 1912 | 0 | 1934 |
| April | 0.47 | 2.22 | 1941 | 0 | 1948 |
| May | 0.46 | 2.19 | 1964 | 0 | 1927 |
| June | 0.54 | 3.69 | 1927 | 0 | 1950 |
| July | 0.73 | 3.84 | 1914 | 0.05 | 1963 |
| August | 1.05 | 4.32 | 1921 | 0 | 1911 |
| September | 0.60 | 5.91 | 1927 | 0 | 1934 |
| October | 0.90 | 4.34 | 1972 | 0 | 1952 |
| November | 0.38 | 2.84 | 1957 | 0 | 1932 |
| December | 0.60 | 2.86 | 1966 | 0 | 1930 |
| Annual | 9.47 | 19.55 | 1927 | 4.47 | 1942 |

The first column contains median precipitation values by month for the 30 year period from 1936-1965.

Extremes of precipitation occurring prior to 1936 are as follows:

| Amount | Date |
|---|---|
| 0.83 | January, 1921 |
| 0.98 | March, 1929 |
| 2.00 | August, 1921 |
| 1.65 | October, 1925 |

PAGE 7-17 OF DOCUMENT

Figure III-4
Price Climatological Summary
Monthly Average 1936-1965

INSERT ORIGINAL GRAPH

TABLE III-5

ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)

Station: Price Elevation: 5680
Latitude: 39° 37' Longitude: 110° 50'

DURATION

| Years | 5 Min | 10 Min | 15 Min | 30 Min | 1 Hr | 2 Hr | 3 Hr | 6 Hr | 12 Hr | 24 Hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .08 | .13 | .17 | .23 | .29 | .37 | .44 | .62 | .78 | .95 |
| 2 | .12 | .18 | .23 | .32 | .40 | .49 | .58 | .80 | 1.00 | 1.20 |
| 5 | .16 | .25 | .32 | .44 | .56 | .68 | .79 | 1.07 | 1.32 | 1.58 |
| 10 | .20 | .31 | .39 | .54 | .68 | .81 | .94 | 1.25 | 1.53 | 1.82 |
| 25 | .24 | .37 | .47 | .65 | .82 | .98 | 1.13 | 1.50 | 1.83 | 2.18 |
| 50 | .28 | .43 | .54 | .75 | .95 | 1.12 | 1.29 | 1.71 | 2.08 | 2.47 |
| 100 | .31 | .49 | .62 | .85 | 1.08 | 1.27 | 1.45 | 1.91 | 2.32 | 2.74 |

Table III-6 shows the average monthly precipitation for the period 1936-1976.

INSERT ORIGINAL TABLE

Table III-6 Continued
Page Two

INSERT PAGE TWO OF ORIGINAL TABLE

The climatology summary by month for period 1936-1965 is given in Table III-7.

INSERT ORIGINAL TABLE

**Temperature**

The average annual maximum temperature for the period 1936-1976 was 64.2 degrees. The annual mean temperature was 49.4 degrees and the annual minimum temperature was 34.7 degrees. See Figure III-4.

Summers are characterized by hot days and cool nights. However, the high temperatures are not oppressive since the relative humidity is low. The hottest month is July with the maximum temperature on most days nears 90 degrees and the lows in the upper 50's. The maximum temperature record was in July, 1925 at 108 degrees. Recorded summer lows have been 28 degrees in June, 1973 and 31 degrees in July, 1924.

The winters are cold and uncomfortable, but usually not severe, due in part to the protecting influence of the mountain ranges to the north and east which prevent cold arctic air masses from moving into the area. The coldest temperature on record is minus 31 degrees in December, 1924.

Temperatures of 100 degrees or higher during summer or 15 degrees below zero or colder during winter are likely to occur once every three years.

The freeze-free period, or growing season, averages about five months in length, from early May to early October.

Average dates of occurrence of various temperature values are given on Table III-8.

TABLE III-8

Occurrence of Various Temperatures

| Temperature Equal to or Lower Than | Average Dates of Occurrence | |
|---|---|---|
| | Last in Spring | First in Fall |
| 32° | May 3 | October 3 |
| 28° | April 27 | October 15 |
| 24° | April 11 | October 15 |
| 20° | March 29 | November 7 |
| 16° | March 17 | November 16 |

Table III-9 gives the average monthly temperature for the area from 1936 - 1976.

INSERT ORIGINAL TABLE

Table III-9 continued
Page Two

INSERT PAGE TWO OF ORIGINAL TABLE

**Winds**

Winds are light to moderate, although strong winds may occur. The average velocity of the prevailing southwest winds is below 20 mph with peak wind velocities occurring in June and July.

## R645-301-724.410. CLIMATOLOGICAL FACTORS

See R645-301-724.400.

## R645-301-724.411. AVERAGE SEASONAL PRECIPITATION

See R645-301-724.400.

## R645-301-724.412. PREVAILING WINDS

See R645-301-724.400.

## R645-301-724.413. SEASONAL TEMPERATURE RANGES

See R645-301-724.400.

## R645-301-724.420. OTHER INFORMATION

N/A

## R645-301-724.500. SUPPLEMENTAL INFORMATION

N/A

## R645-301-724.600. SURVEY OF RENEWABLE RESOURCE LANDS

There are no structures present other than those constructed for mining operations, on the permit area. The land is presently used for grazing and wildlife habitat which constitutes a renewable resource area. It should be noted that geographic areas above Andalex's five-year mine plan do not include any area suitable for grazing, nor do they contribute significantly to the long-range productivity of water, food or fiber products. Andalex commits to mitigate all subsidence related damage to renewable resources including, but not limited to water, grazing, and wildlife habitat including raptor nests.

## R645-301-724.700. STREAMS

Appendix L

## R645-301-725. BASELINE CUMULATIVE IMPACT AREA INFORMATION

Appendix L

**R645-301-725.100. INFORMATION FROM FEDERAL OR STATE AGENCIES**

Appendix L

**R645-301-725.200. INFORMATION FROM APPLICANT**

Appendix L

**R645-301-725.300. RESTRICTIONS ON PERMIT**

N/A

**R645-301-726. MODELING**

N/A

**R645-301-727. ALTERNATIVE WATER SOURCE INFORMATION**

Appendix L

**R645-301-728. PROBABLE HYDROLOGIC CONSEQUENCES (PHC) DETERMINATION**

Appendix L

**R645-301-728.100. DETERMINATION OF PHC**

Appendix L

**R645-301-728.200. BASIS OF DETERMINATION**

Appendix L

**R645-301-728.300. PHC DETERMINATION FINDINGS**

Appendix L

**R645-301-728.310. ADVERSE IMPACTS TO HYDROLOGIC BALANCE**

Appendix L

**R645-301-728.320. ACID FORMING OR TOXIC FORMING MATERIALS**

Appendix L

**R645-301-728.331. SEDIMENT YIELD FROM DISTURBED AREA**

R645-301-733.

**R645-301-728.332. WATER QUALITY PARAMETERS**

R645-301-733.

**R645-301-728.333. FLOODING OR STREAM-FLOW ALTERATION**

N/A

**R645-301-728.334. GROUND WATER AND SURFACE WATER AVAILABILITY**

Appendix L

**R645-301-728.335. OTHER CHARACTERISTICS**

Appendix L

**R645-301-728.340. IMPACT ON SURFACE OR GROUND WATER**

Appendix L

**R645-301-728.400. PERMIT REVISIONS**

Appendix L

**R645-301-729. CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)**

(BY DIVISION)

**R645-301-729.100. DIVISION ASSESSMENT**

(BY DIVISION)

**R645-301-729.200. PERMIT REVISIONS**

N/A

**R645-301-730. OPERATION PLAN**

See R645-301-511.100.

**R645-301-731. GENERAL REQUIREMENTS**

See R645-301-511.100.

**R645-301-731.100. HYDROLOGIC BALANCE PROTECTION**

See R645-301-711-300.

**R645-301-731.110. GROUND WATER PROTECTION**

Appendix L, See Appendix Y

**R645-301-731.111. GROUND WATER QUALITY**

Appendix L

**R645-301-731.112. SURFACE MINING OPERATIONS**

N/A

**R645-301-731.120. SURFACE WATER PROTECTIONS**

Appendix L

**R645-301-731.121. SURFACE WATER QUALITY**

Appendix L

**R645-301-731.122. SURFACE WATER QUANTITY PLAN**

Appendix L

**R645-301-731.200. WATER MONITORING**

See R645-301-711.300.

**R645-301-731.210. GROUND WATER MONITORING**

See R645-301-711.300.

**R645-301-731.211. GROUND WATER MONITORING PLAN**

See R645-301-711.300.

**R645-301-731.212. SAMPLING AND REPORTING DATA**

See R645-301-711.300.

**R645-301-731.213. NON-ESSENTIAL AQUIFERS**

N/A

**R645-301-731.214. DURATION**

See R645-301-711.300.

**R645-301-731.214.1 SUITABILITY**

See R645-301-711.300.

**R645-301-731.214.2 COMPLIANCE**

See R645-301-711.300.

**R645-301-731.215. EQUIPMENT, STRUCTURES AND OTHER DEVICES USED IN CONJUNCTION WITH MONITORING**

Appendix L

**R645-301-731.220. SURFACE WATER MONITORING**

See R645-301-711.300.

**R645-301-731.221. SURFACE WATER MONITORING PLAN**

See R645-301-711.300.

**R645-301-731.222 DESCRIPTION**

See R645-301-711.300.

**R645-301-731.222.1 PARAMETERS**

See R645-301-711.300.

**R645-301-731.222.2 POINT SOURCE DISCHARGES**

See R645-301-711.300.

**R645-301-731.223. SAMPLING AND REPORTING DATA**

See R645-301-711.300.

**R645-301-731.224. DURATION**

See R645-301-711.300.

**R645-301-731.224.1 SUITABILITY**

See R645-301-711.300.

## R645-301-731.224.2 COMPLIANCE

See R645-301-711.300.

## R645-301-731.225. EQUIPMENT, STRUCTURES AND OTHER DEVICES USED IN CONJUNCTION WITH MONITORING

Appendix L

## R645-301-731.300. ACID AND TOXIC FORMING MATERIALS

See R645-301-711.300.

## R645-301-731.310. DRAINAGE INTO SURFACE AND GROUND WATER

**Post Mining Hydrology**

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan). All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-731.311. MATERIAL ADVERSELY AFFECTING WATER QUALITY

See R645-301-731.310.

## R645-301-731.312. STORING MATERIALS

See R645-301-731.310.

## R645-301-731.320. DISPOSAL PROVISIONS

See R645-301-731.310.

## R645-301-731.400. TRANSFER OF WELLS

No transfer of wells has taken place, nor is any transfer anticipated.

## R645-301-731.500. DISCHARGES

See R645-301-711.300.

## R645-301-731.510. DISCHARGES INTO AN UNDERGROUND MINE

Andalex has approval from the State Engineer, Division of Water Rights, to collect the surface runoff from the disturbed area and discharge into the mine. This water is used for dust suppression underground. Water collected is a direct result of precipitation within the disturbed area. Although MSHA has verbally acknowledged the fact that some precipitation drains into the mine, they have not specifically required any type of approval for this occurrence.

## R645-301-731.511. DEMONSTRATION

N/A

## R645-301-731.511.1 PREVENTION OF DAMAGE

N/A

## R645-301-731.511.2 VIOLATION OF WATER QUALITY STANDARDS OR EFFLUENT LIMITATIONS

N/A

## R645-301-531.511.3 COMPLIANCE REQUIREMENTS

N/A

## R645-301-731.511.4 MEET WITH THE APPROVAL OF MSHA

N/A

**R645-301-731.512. DISCHARGE LIMITATIONS**

N/A

**R645-301-731.512.1 WATER**

N/A

**R645-301-731.512.2 COAL PROCESSING WASTE**

N/A

**R645-301-731.512.3 FLY ASH**

N/A

**R645-301-731.512.4 SLUDGE FROM ACID MINE DRAINAGE TREATMENT**

N/A

**R645-301-731.512.5 FLUE-GAS DESULFURIZATION SLUDGE**

N/A

**R645-301-731.512.6 INERT MATERIALS USED FOR STABILIZING UNDERGROUND MINES**

N/A

**R645-301-731.512.7 UNDERGROUND MINE DEVELOPMENT WASTE**

N/A

**R645-301-731.513. DIVERTING MINE WATER INTO UNDERGROUND WORKINGS**

N/A

**R645-301-731.520. GRAVITY DISCHARGES FROM MINE WORKINGS**

If a discharge is found to occur after sealing, the water will be sampled quarterly for compliance with effluent standards of 817.42 and treated (if necessary) during the liability period. See Figures IV-1 and IV-2 for portal sealing details.

**R645-301-731.521. DISCHARGE CONTROL**

See R645-301-731.520.

## R645-301-731.522. PREVENTION OF DISCHARGE

N/A

## R645-301-731.600. STREAM BUFFER ZONES

## R645-301-731.610. BUFFER ZONE LOCATIONS

The fan installation in the left hand fork of Deadman Canyon will require that the intermittent drainage is crossed. A 42-inch culvert will divert the natural runoff underneath the pad where the fan will be located. Since this activity is within 100 feet of an intermittent stream, the Division may authorize this activity by virtue of compliance with all R645-301-731.600 regulations. It should be emphasized that the stream buffer zones will not be adversely affected due to the installation of the culvert and the alternate sediment control measures. Also, travel on the access road and at the pad area will be restricted to times of no flow.

It should be noted (R645-301-542.600) that the access road to the fan installation is already in existence; Andalex intends only to upgrade the road as needed and as described. This road will be reclaimed following cessation of mining to be consistent with the desires of the surface owners and management agencies.

The culvert will be removed upon cessation of mining. Sediment control measures downstream from this activity will be provided in the form of silt fences or straw dikes located in the drainage channel during the removal of the culvert. As there are no permanent water treatment facilities constructed for this fan installation, none need be removed. Typical designs for berms and diversions are shown on the Design Drawings. This includes the berm surrounding the topsoil pile. (See Plate "Aberdeen Mine Left Hand Fork Fan Installation, Sedimentation/Drainage Control".) These typical designs will adequately convey a two-year, ten-hour storm event. Sediment control during construction and reclamation will consist of straw bales or silt fences located downstream from the construction activity.

The same restrictions will also apply to the 48-inch culvert at the lower road / stream crossing and in places where the road will be improved within the stream buffer zone. That is, activities will be allowed only during periods of no flow. Also, and by the same token, the lower culvert will be removed upon final reclamation if is deemed appropriate by the surface land-owner or management agency.

Andalex will reclaim this road entirely if it is determined through communications with the surface owners and land management agencies that this is the appropriate action. Andalex has obtained

official comments on the status of the road for post-mining landuse from the State of Utah, Gladys Artman and the Bureau of Land Management; all parties with the exception of Gladys Artman request that the road be abandoned and reclaimed. Mrs. Artman requested that the road remain status quo upon cessation of mining.

## R645-301-731.611. VIOLATION OF WATER QUALITY STANDARDS OR EFFLUENT LIMITATIONS

Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water quality standards and will not adversely affect the water quantity and quality of other environmental resources of the stream.

## R645-301-731.612. STREAM DIVERSIONS

See R645-301-733, Culvert Design

This diversion will comply with all the requirements of R645-301-742.300 (diversion structures). Also, please refer to culvert sizing calculations in Appendix O.

## R645-301-731.620. BUFFER ZONE SIGNS AND MARKERS

This buffer zone will be marked as specified in R645-301-521.260. Signs will be clearly marked to prevent additional disturbance by operations.

## R645-301-731.700. CROSS SECTIONS AND MAPS

Plate 6.

## R645-301-731.710. WATER SUPPLY INTAKES

N/A

## R645-301-731.720. WATER HANDLING AND STORAGE FACILITIES

Water is trucked from Price for culinary use and is stored in one of four 12,000-gallon tanks on the property. Each mine is equipped with a 12,000-gallon surface tank. All other mine water storage is underground.

## R645-301-731.730. MONITORING LOCATIONS

Figure IV-11

## R645-301-731.740. MAPS

See Volume II, R645-301-510.

## R645-301-731.750. CROSS SECTIONS

See Volume II, R645-301-510.

## R645-301-731.760. OTHER RELEVANT DRAWINGS

Figure IV-2 through IV-12

## R645-301-731.800. WATER RIGHTS AND REPLACEMENT

Appendix L

## R645-301-732. SEDIMENT CONTROL MEASURES

See R645-301-733.

## R645-301-732.100. SILTATION STRUCTURES

See R645-301-733.

## R645-301-732.200. SEDIMENTATION PONDS

See R645-301-733.

## R645-301-732.210. COMPLIANCE REQUIREMENTS

See R645-301-733.

## R645-301-732.220. MSHA REQUIREMENTS

N/A

## R645-301-732.300. DIVERSIONS

See R645-301-733.

## R645-301-732.400. ROAD DRAINAGE

See R645-301-733., also R645-301-512.250.

## R645-301-732.410. ALTERATION OR RELOCATION OF A NATURAL DRAINAGEWAY

See R645-301-733.

## R645-301-732.420. INLET PROTECTIONS

See R645-301-733.

## R645-301-733. IMPOUNDMENTS

See R645-301-733.

Three sedimentation ponds have been constructed so far as shown on Plate 6. Pond A, as its capacity was not required, is now being used for snow storage and topsoil storage. The sedimentation and drainage control plan has been designed according to OSM regulations and the design and construction certified by a Utah Registered Professional Engineer. No other embankments, or other impoundments have been built nor are any proposed.

**General Description**

The Andalex Deadman Canyon Project is comprised of three mines located closely together in Deadman Canyon. The Pinnacle Mine, Apex Mine, and the Aberdeen Mine are all presently in operation mining the Gilson and Lower Sunnyside Seams and the A Seam. The Centennial Seam is mined via rock tunnels from the existing Pinnacle Mine. Surface runoff from the Pinnacle Mine and Apex Mine is controlled by Settling Basin B and Pond C. Engineering Design for these ponds have been presented to the Division of Oil, Gas, and Mining on 4-3-80 and 8-21-81. Surface runoff from the Aberdeen Mine is controlled by Pond E. Designs for these basins and ponds are shown on Plates 11, 12, and 13 included herein.

The mines are located in the Right Fork of Deadman Canyon. This is an ephemeral drainage flowing only from direct runoff and eventually reaches the Price River some 12 miles to the south. The major drainages in the minesite area will be routed under the site through large culverts. The existing minesite has a disturbed area of 34.2 acres. Please note that a certain percentage of the disturbed area does not report to sedimentation ponds. Please refer to Plates 7 and 8 for these areas. Actual disturbed area reporting to basins and ponds is approximately 26 acres. Sediment pond designs include undisturbed areas reporting to ponds. In order to minimize additional sediment loading to the main drainage, these ponds and basins will collect runoff from these approximately 27 acres. Berms will be placed on the lower edge of all disturbed areas to prevent runoff from reaching natural drainages before it has passed through the sedimentation ponds except in small area exemptions. Ponds are designed for maximum runoff including the chidister water. Areas draining to Pinnacle and Apex portals are to be included.

Sedimentation Pond Specifications

**Location**

The ponds are located over the main drainage of the Right Fork of Deadman Canyon. The main canyon drainage is routed through a 36-42" culvert located under the ponds. The sites are located downslope of the disturbed areas to simplify collection of runoff water (please see Plate 8).

**Design**

The ponds are designed to fully contain the expected runoff and sediment load from a 10-year 24-hour precipitation event in this area. Pond "C" has additionally been shown to fully contain the runoff from a 100-year 6-hour storm. The design has been certified by a registered professional engineer. A certification statement for the ponds can be found at the end of Appendix N.

**Construction**

The construction of the ponds have been completed as per the specifications set forth in the Construction Specifications sheet (part 2.3).

**Capacity**

Each pond is designed to contain the runoff and sediment load from a 10-year 24-hour precipitation event in the area of drainage. In addition, each pond has an overflow capacity in excess of that required for a 25-year 6-hour event. Pond "C" has been designed to contain and pass the runoff from a 100-year 6-hour event.

**Safety Precautions**

The ponds were built as per specifications and under supervision of a qualified, registered professional engineer. The ponds are inspected quarterly for safety and compliance. Inspection reports are maintained on-site, and submitted to the Division on an annual basis. Ponds will be cleaned at minimum when sediment reaches 60% of designed sediment volume. Measuring devices will be installed in the ponds to show when the ponds have filled with sediment to the clean-out level (please see plates 11, 12, and 13). Drainage directly into the Pinnacle and Apex Portals is not part of the calculation for sediment pond sizing. (Pond C)

**Monitoring**

Water monitoring stations will be established at the outlet of the ponds. Sample parameters and frequencies shall be as per specification of the NPDES permit.

**Maintenance**

The ponds shall be inspected after each storm and the sediment cleaned as necessary. In no event shall sediment be allowed to build beyond 60% of sediment design capacity.

**Seeding**

An approved seed mix will be applied to all feasible disturbed areas in an effort to minimize erosion and sediment loading to the ponds. The proper seed mixture for this area has been obtained through the local BLM.

**Culverts**

All culverts are shown on Plate 9. Calculations for sizing are also included. It should be noted that all culvert sizes were arrived at and approved through consultation with the DOGM hydrologic engineer.

**Calculations**

The following reflects the calculations for sizing and details of each separate pond. Plates 6 through 13 show pond locations and volumes as well as watershed areas.

**Construction Specifications for Sedimentation Ponds**

All construction of sedimentation ponds have been performed under the direction of a qualified registered professional engineer.

Dams are constructed with primary overflows at least 2 ft. from the top, and emergency overflows at least 1.5 ft. from the top. The areas of the pond construction had been examined for topsoil, and if present in removable quantities such soil was removed separately and stored in an approved topsoil storage location.

In areas where fill was to be placed, natural ground was removed for at least 12" below the base of the structure.

Native materials were used where practical. Fill was placed in lifts not exceeding 15" and compacted prior to placement of the next lift. Compaction of all fill materials is at least 95%.

Grouted rip-rap or culverts have been placed at all inlets and outlets to prevent scouring. Each pond is fitted with an inverted inlet to the primary overflow, to prevent the passage of oil into the discharge.

Slopes of the dams are not steeper than 2.0:1, inside and outside, with a total of the inslope and outslope not less than 5:1. The inside slope of Pond E exceeded the steepness of 2:1. In part these slopes are incised and in part are constructed in from fill. Because of the steepness of these side slopes an investigation of stability was performed by Palmer Wilding Engineers. The conclusion was that the stability analysis is adequate and a stable section with respect to shear under static loading conditions is indicated. Please Appendix K.

Tops and external slopes of the dams were planted with an approved seed mix to prevent erosion and promote stability. Compaction of the slopes were at least 95%. Top width of dams are not less than (H + 35)/5.

Primary Settling Basins (Formerly Pond B)

**General Notes**

The primary settling basins (formerly Pond B) are located above Pond "C". A disturbed area of 9.42 acres drain into the settling basins as shown on Plate 8. These basins collect sediment and runoff from this area; however, since they are a series of cells, any overflow from the basins will be cleaned and go into Pond "C".

It is proposed that 18" culverts be added between cells B-1 and B-2, and between B-2 and B-3. An 18" culvert already exists between cells B-3 and B-4. These culverts will prevent breaching of the dikes between cells during major runoff events. The inflow to the basins is from culverts CD-12 and CD-13, which is a total of 2.79 cfs, as shown on Table IV-3C. Based on the Manning's Equation for culverts (p.169-C), the required diameter to carry a flow of 2.79 cfs is only 0.95 feet; therefore, the 18" culvert overflows are more than adequate to pass the design flow. The placement of the culverts will not affect the maximum water levels or sediment storage capacity of the basins.

The basins are cleaned when sediment accumulations reach 50% of the original volume. The original volume was 0.540 acre feet,

and the sediment cleanout level (0.270 acre feet) is at the culvert inlet level between cells B-2 and B-1 as shown on certified Plate 11.

Pond C

1. Use 1.82" for 10 year - 24 hour event
   Use 1.91" for 100 year - 6 hour event

*2. Disturbed Watershed - 14.79 acres

3. Runoff Curve No. = CN = 90

4. Area Runoff = Q (in.) = $(P-0.2S)^2/(P+0.8S)$; Where:

   S = (1,000/CN) - 10

   $Q_{10/24}$ = 0.942 in./12 = 0.0785 ft.

   $Q_{100/6}$ = 1.018 in./12 = 0.0848 ft.

   Disturbed Volume $_{10/24}$ = 14.79 ac. x 0.0785 ft. = 1.161 ac. ft.

   Disturbed Volume $_{100/6}$ = 14.79 ac. x 0.0848 ft. = 1.254 ac. ft.

5. Undisturbed Watershed - 30.89 acres

6. Runoff Curve No. = CN = 70

7. Area Runoff:

   $Q_{10/24}$ = 0.180 in./12 = 0.0150 ft.

   $Q_{100/6}$ = 0.208 in./12 = 0.0173 ft.

   Undisturbed Volume $_{10/24}$ = 30.89 ac. x 0.0150 ft. = 0.463 ac. ft.

   Undisturbed Volume $_{100/6}$ = 30.89 ac. x 0.0173 ft. = 0.534 ac. ft.

8. Sediment Storage:

   **Disturbed Area 14.79 ac. x 0.05 ac. ft./ac. = 0.740 ac. ft.

   ***Undisturbed Area 30.89 ac. x 0.016 ac. ft./ac. = 0.494 ac. ft.

   Total Sediment Storage Volume Required = 1.234 ac. ft.

60% Cleaning Point = 0.740 ac. ft.

9. Direct Precipitation into Pond

Area of Ponds = 0.39 acres

Volume $_{10/24}$ = 0.39 ac. x 1.82 in./12 in./ft. = 0.059 ac. ft.

Volume $_{100/6}$ = 0.39 ac. x 1.91 in./12 in./ft. = 0.062 ac. ft.
ft.

10. Total Required Pond Volume

Volume $_{10/24}$ = 1.161 + 0.463 + 1.234 + 0.059 = 2.917 ac. ft.

Volume $_{100/6}$ = 1.254 + 0.534 + 1.234 + 0.062 = 3.084 ac. ft.

11. Pond Volume at Outlet

18" cmp oil skimmer = 3.321 ac. ft.

36" cmp overflow = 4.264 ac. ft.

12. Conclusions:

A. Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event.

B. Pond size is also adequate to contain the runoff and sediment load from a 100 year - 6 hour precipitation event.

* Includes runoff to "Primary Settling Basins" (Formerly Pond B)

** Does not include sediment to "Primary Settling Basins". The sediment factor of 0.05 acre-ft./acre is considered conservative due to the extensive paving (roads and loadout area), and the grouted or paved ditches to the pond.

The USLE calculation for Disturbed Areas (Table IV-9) shows the actual expected sediment yield to be much lower than the 0.05 figure used.

*** Sediment yield taken from the USLE calculations on Table IV-10, "Sediment Yield for Undisturbed Areas".

POND C
1STAGE - VOLUME DATA

| Stage | Elevation | Volume (Ac. Ft.) | Acc. Vol. (Ac. Ft.) |
|---|---|---|---|
| Bottom | 7040.0 | - | - |
| | 7042.0 | 0.082 | 0.082 |
| | 7044.0 | 0.162 | 0.244 |
| | 7046.0 | 0.293 | 0.537 |
| 60% Sed. Cleanout | 7046.9 | 0.203 | 0.740 |
| | 7048.0 | 0.266 | 1.006 |
| Max. Sed. Level | 7048.7 | 0.228 | 1.234 |
| Decant Level | 7049.7 | 0.330 | 1.564 |
| | 7050.0 | 0.099 | 1.663 |
| | 7052.0 | 0.862 | 2.525 |
| 10 yr.-24 hr. Volume | 7052.7 | 0.392 | 2.917 |
| 100 yr.-6 hr. Volume | 7053.1 | 0.167 | 3.084 |
| 18" Oil Skimmer | 7053.5 | 0.237 | 3.321 |
| | 7054.0 | 0.297 | 3.618 |
| 36" CMP Overflow | 7055.0 | 0.646 | 4.264 |
| Crest of Embankment | 7056.5 | 0.969 | 5.233 |

INSERT P.E. STAMPED ORIGINAL

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Pond C
Stage - Volume Curve

INSERT ACTUAL DRAWING, P.E. STAMPED ORIGINAL

**Pond "C" - General Notes**

The sizing of Pond C is based on the drainage areas delineated on Plate 8 - "Drainage Map". As can be seen from this Plate, a portion of the minesite drainage goes into the Pinnacle Mine, the old Chidister Portal, and the Apex Mine. The actual disturbed area draining directly to Pond "C" was planimetered from this Plate and determined to be 10.72 acres. The disturbed area flowing to the "Primary Settling Basins" was measured to be 4.07 acres. This flow drains to Pond "C" and is therefore considered in the sizing; however, the projected sediment load to the Primary Settling Basins is not considered in sizing Pond "C", since the basins could be completely full of sediment before it could impact Pond "C". As stated earlier, the Primary Settling Basins will be cleaned when sediment accumulation reaches one-half of the total basin volume; therefore, sediment from this area will not impact Pond "C".

In addition, a certain amount of undisturbed area does not flow into the undisturbed drainage culverts, and thus drains onto the mine site (see plates 8 and 9). The portion of this drainage that flows to Pond "C" was measured at 30.89 acres, and is included in the Pond "C" sizing calculations.

Runoff Curve numbers used in the calculations were: 90 for disturbed areas and 70 for undisturbed areas.

An "As-Constructed" plan and profile of Pond "C" is shown on Plate 12. This plate has been certified by a registered, professional engineer. Also shown on this plate is a proposed sediment marker, and maximum and cleaning point depths for sediment. The cleaning point for sediment is at 60% of the maximum design depth for sediment storage. This point will be clearly marked on the sediment marker.

Also shown on Plate 12 is the location of each of the pond inlets. Inlets are either grouted concrete or culvert, and do not require rip-rap or other additional erosion protection.

Pond "C" will be removed during the earthwork portion of reclamation. The culvert will also be removed and the main channel restored throughout the area. All reclaimed area above will then drain into Pond "E" below.

Decanting for Pond C, as needed, will be accomplished with pumps located at the minesite. Decanted water will be pumped into the primary spillway once the 24 hour retention time has been met. An access ramp will be constructed to allow for inspection and sampling at the overflow riser pipe.

Pond E

1. Use 1.82" for 10 year - 24 hour event
2. Disturbed Watershed - 12.21 acres
3. Runoff Curve No. = CN = 90
4. Area Runoff = Q (in.) = $(P-0.2S)^2/(P+0.8S)$; Where:

   S = (1,000/CN) - 10

   P = 1.82"

   Q (in.) = $[1.82-0.2(1.11)]^2/[1.82+0.8(1.11)]$ =

   $\frac{2.553}{2.709}$ = .94 in. = .0785 ft.

   Volume = 12.21 acres x 0.0785 ft. = 0.959 acre-ft.
5. Undisturbed Watershed - 12.20 acres
6. Runoff Curve No. = CN = 70
7. Area Runoff = 12.20 ac. x 0.2 in./12 = 0.203 acre-ft.
8. Sediment Storage Volume

   12.21 acres x 0.1 acre-ft./acre = 1.221 acre-ft. *

   60% Cleaning Point = 0.733 acre-ft.
9. Direct Precipitation into Pond

   Area of Ponds = 0.500 acres

   0.500 acres x 1.82 in. x 1/12 ft./in. = 0.076 acre-ft.
10. Total Required Pond Volume

    0.959 + 0.203 + 1.221 + 0.076 = 2.459 acre-ft.
11. Pond Volume @ Outlet (Principle Spillway)

    Total Pond Volume = 2.569 acre-ft. (As constructed)

12. Conclusion: Pond size is adequate to contain the runoff and sediment load from a 10 year - 24 hour precipitation event in the area of drainage to the pond.

    * Due to the elevation of the decant inlet, the maximum sediment storage volume is .930 ac-ft. However the 60% cleanout level will not be exceeded and the total pond volume takes into account the disturbed area of 12.21 acres.

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Stage-Volume Data
for
Pond "E"

INSERT ORIGINAL P.E. STAMPED  TABLE

Pond "E" - PM

**Post Mining Sediment Control**

1. Use 1.82" for 10 year - 24 hour event.
2. Disturbed (Reclaimed) Watershed - 34.2 acres
    a. Runoff Curve No. = 90
    b. Runoff Volume = 2.740 ac. ft.
3. Undisturbed Watershed = 805.50 acres
    a. Runoff Curve No. = 70
    b. Runoff Volume = 13.425 ac. ft.
    4. Sediment Storage Volume = 0.150 ac. ft. (Upper Cell)
5. Direct Precipitation into Pond
    a. Use 0.5 acres
    b. 0.5 ac. x 1.82 in. x 1/12 = 0.076 ac. ft.
6. Expected Flow (10 yr. - 24 hr. event) = 88.94 cfs
7. Inflow Velocity (from RC-1) = 8.78 fps
8. Pond Configuration

    3 cells: 2 Gravel Filter Dikes and 1 Compacted Earthen Dam
9. Pond Capacity - 1.592 ac. ft.

Note: Pond is designed to clean and discharge runoff. Sediment will be removed by gravel filter dikes, and cleaned from pond when maximum sediment storage level is reached. Ponds will be cleaned when the 0.150 acre feet capacity of the upper cell is reached.

**Pond "E" - General Notes**

Pond "E" is to control runoff from the Aberdeen Mine. The disturbed area to drain to this pond is 12.21 acres. Pond E for the Aberdeen minesite was constructed prior to any other disturbance of the drainage area which report to the ponds.

Plate 13 shows the plan and profile of the pond. Also shown on this plate is a sediment marker and the level of the sediment 60% cleaning point. The constructed height of the dam includes a 5% settling factor. The elevations on Plate 13 are final.

Grouted rip-rap or culvert is used on all pond inlets; therefore, additional rip-rap or energy dissipators are not required.

Twelve 60" x 60" anti-seepage collars were installed on the main culvert beneath the pond. The collars are of concrete or a standard, manufactured design. Collar sizes and numbers are based on the following:

Flow length = 340'
Increase in flow length = 10% or 34'
Use 60" x 60" anti-seep collars
Each collar increases flow length by 2 x 8" or 3'; therefore, use 12 anti-seep collars.

An emergency spillway has been constructed to convey overflow from the pond into undisturbed diversion UD-4 as shown on Plates 8 and 13. This spillway consists of 12" D50 grouted rip-rap as shown on Figure IV-6. The dimensions of this spillway are shown of Figure IV-6.

Pond E was constructed prior to any disturbance of the drainage area to the pond.

As built certified drawings of Sediment Pond E have been submitted.

**Pond "E" - PM - General Notes**

Upon reclamation, Pond "E" will be enlarged and left in place until revegetation standards are met, as shown on Plate 16. The culvert will be removed, and the pond will be reconstructed to clean and discharge the entire runoff from the drainage area above. Pond sizing calculations are shown on the page entitled "Pond E - PM", "Post-Mining Sediment Control". Andalex will commit to the concept of allowing the entire undisturbed and reclaimed area to drain into this one structure if approved.

The rationale for removing all upper ponds and diversions is based on the following:

1. Pond E is the lowermost structure, and can be rebuilt and later removed and reclaimed with minimum damage to the reclaimed site.

2. The upper site can be reclaimed in a more natural and permanent manner, as shown on the post-mining topography map, Plate 17, without leaving temporary structures such as diversions, ponds, etc. Once vegetation is established, it will not have to be re-disturbed.

3. The extensive use of loose-rock check dams in the restored drainages will serve as effective sediment and erosion control, and will promote the establishment of a riparian area along the drainage.

Because of the large size of the undisturbed drainage above (805.5 acres), upon reclamation, it is proposed to construct a series of filtering ponds to clean and discharge the water rather than try to fully contain the runoff. The expected flow from a 10-year 24-hour event for the entire undisturbed and reclaimed area is 88.94 cfs at a velocity of 8.78 fps. The total volume of water would be approximately 16.2 acre-ft. It is proposed to build a 3-celled system with 2 gravel filter dikes and concrete grouted overflows. The upper 2 cells will act as filters for sediment removal, and the lower cell will become a settling basin for final cleaning prior to discharge. The pond discharge will be sampled per NPDES requirements to check for compliance with effluent standards.

It is expected that effluent standards will be met by this structure; similar filtering ponds have cleaned and discharged up to 1,000,000 gallons per day of sediment-laden mine water and remained in compliance.

The rationale for proposing such a filtering discharge system is based on the following:

1. The main purpose of sediment ponds or any other treatment facility is to control and minimize water pollution by causing the water to meet effluent standards; this type of system will accomplish this purpose:

2. Acceptable practices to control and minimize water pollution include:

(i) Stabilizing the disturbed area through land shaping;

(ii) Diverting runoff;

(iii) Achieving vegetation standards;

(iv) Regulating channel velocity of water;

(v) Lining channels with rock or vegetation;

(vi) Mulching;

(vii) Selectively placing and sealing acid-forming and toxic-forming materials;

(viii) Designing mines to prevent gravity drainage of acid waters;

(ix) Sealing;

(x) Controlling subsidence; and

(xi) Preventing acid mine drainage.

The planned reclamation at this site will meet the above criteria;

3. All surface drainage from the disturbed area, including areas that have been graded, seeded, or planted, shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility before leaving the permit area.

The proposed pond will be equipped with a sediment marker, and cleaned as needed. The pond will also be fitted with a combined primary and emergency spillway, sized and protected to handle the 25-year 6-hour event.

When revegetation standards are met on the reclaimed site, the Pond "E -PM" will be removed, the main channel restored, and the area reseeded according to the approved plan.

Pond Discharge Structures

**Principle Spillways**

Pond C has a single spillway consisting of a 36" cmp riser pipe located 1.5' below the top of the dam at elevation 7,055.0. This pipe discharges directly into the main 42" culvert located beneath the pond. An 18" cmp skimmer pipe is located in the side of the 36" riser 1.5' below the riser inlet at an elevation of 7,053.5. This pipe will be the first to discharge, and will act as an oil skimmer since the pipe inlet is inverted with the intake approximately 1' below water level. Pond C will be decanted as needed by the use of a pump. Decanted water will go into the 36"

riser and be discharged into the 42" cmp passing beneath the disturbed area.

The Pond E principle spillway consists of a 30" riser pipe, connected to the 42" culvert beneath the ponds. A decant device is also attached to the riser pipe for de-watering, and is controlled by a hand-operated valve. Both the riser pipe and decant are constructed to minimize oil from entering the discharging water. Please see Plate 13 for details on the spillway structures for Pond E.

**Emergency Spillways**

The emergency spillway for Pond E is the open notch type with a trapezoidal cross section. The spillway is of grouted rip-rap as shown on Figure IV-6. The spillway dimensions are as shown on the Figure IV-6. This is located 12" above the principal spillway and 2' below the top of the dam. This structure is rip-rapped through the point of discharge and into the main channel. This spillway provides an added safety factor to protect the dam in the event of overlad on the culvert discharge.

**Pond E - PM Spillway**

Pond E - PM will be constructed with an open-notch spillway in the lower cell to allow for safe discharge of runoff from the reclaimed area as well as the contributing undisturbed area. The spillway will be of grouted rip-rap and dimension as shown on Figure IV-6. Calculations for the spillway are shown.

The spillway for Pond C consists of an open 36" culvert which empties directly into the main 42" culvert which drains the main canyon. This spillway is open at the top and extends to within 2.5' of the top of the dam. At right angle to this spillway culvert is an 18" culvert to handle pre-design overflow conditions. This 18" pipe has an inverted inlet to skim oil and grease and flotsam from the water. This is considered a single spillway; however, the following discussion will explain how the pond meets the criteria for exemption of combination spillways required by R645-301-742-223.

**Pond C - Exemption from R645-301-742-223**

The following will describe how Pond C meets the criteria for exemption of the combination spillway requirements of R645-301-742.223 as provided in R645-301-742.225.2:

1 - Storage - The pond has been shown to be adequately sized to safely control the 100 year - 6 hour precipitation event. The pond will not only contain the 100 year - 6 hour event (including sediment), but the overflow will safely pass the runoff from such an event if necessary.

2 - Dewatering - Water can be safely removed from the pond in accordance with current, prudent engineering practices. For this pond, water will be removed by the use of a portable pump system. The following is a description of details relating to the dewatering operation:

a - The pump to be used is an electric 220 volt unit. The pump will be powered by a portable generator set. These units will be available on an as-needed basis.

b - The pump will dewater at a rate of approximately 350 gallons per minute. At 1.0' above the maximum sediment elevation, the 10 year - 24 hour volume is 1.683 acre-feet. At the proposed pumping rate, the pond would be dewatered in approximately 26 hours.

c - The decant water will be discharged directly into the 36" cmp overflow. Any discharge will be done in accordance with the UPDES permit conditions. Samples will also be taken as required.

d - The pump inlet line will be equipped with a floating intake and an oil skimming device. A typical drawing is included as Figure IV-13.

e - The 36" outlet pipe will be visibly marked to show the limit of the decant level. This marker will be placed 2' above the maximum sediment level. This allows for the 18" oil skimmer shown on Figure IV-13, plus the required l' shutoff above maximum sediment elevation. The pump will be turned off when the water level is drawn down to this marker.

f - All storm water will be retained in the pond for a minimum of 24 hours, or until effluent limitations will be met prior to decanting.

g - Sedimentation Pond C to this date has never discharged. It is unlikely at any future date that the pond will discharge water. However, if a discharge ever occurs Andalex will construct an access ramp at that time. The access ramp will consist of a walk- way from the bank to the top of the stand-pipe. It will be equipped with hand rails and safety chains.

**Certification Statement**

A certification statement by a qualified, registered professional engineer that the pond will safely control the 100 year - 6 hour precipitation event, is included with this section.

**Location**

The pond is located where failure could be expected to cause loss of life or serious property damage. In accordance with the requirements, the pond is designed and constructed to safely control the runoff from a 100 year - 6 hour precipitation event. (See related table and certification with this section for designs, and Plates 8 and 12 for location and "As-Constructed" details of the pond).

**Calculations:**

The following pond spillway calculations have been shown separately for each sediment pond at this site. Each of the sheets is separately certified by a registered professional engineer, as required. (appendix N)

Pond C - Spillway Calculations

<u>Design Parameters</u>

| | |
|---|---|
| (1) Disturbed Drainage Area (a.c.) | 14.79 |
| (1) Undisturbed Drainage Area (a.c.) | 30.89 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.176 |
| Land Slope (%) | 6.25 |
| Hydraulic Length (ft.) | 1200 |

<u>Overflow</u>

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 27.56 |
| 25 yr. - 6 hr. Event (in.) | 1.50 |

| | | |
|---|---|---|
| | Peak Flow 25/6 (cfs) | 18.06 |
| | 100 yr. - 6 hr. Event (in.) | 1.91 |
| | Peak Flow 100/6 (cfs) | 30.35 |
| (3) | Oil Skimmer Diameter (in.) | 18 |
| | Overflow Diameter (in.) | 36 |
| (4) | Required Head 10/24 (ft.) | 0.98 |
| (4) | Required Head 25/6 (ft.) | 0.74 |
| (4) | Required Head 100/6 (ft.) | 1.05 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV-3A; Total Flows from DD-1, DD-2, & DD-3
(3) Reference Only - Not included in calculations.
(4) Taken from Stage Volume Curve - 36" riser only.

# Pond E - Spillway Calculations

## Design Parameters

| | |
|---|---|
| (1) Disturbed Drainage Area (ac.) | 12.21 |
| (1) Undisturbed Drainage Area (ac.) | 12.20 |
| Runoff Curve No. (Dist.) | 90 |
| Runoff Curve No. (Undist.) | 70 |
| (2) Time of Concentration (hrs.) | 0.289 |
| Land Slope (%) | 8.00 |
| Hydraulic Length (ft.) | 1200 |

## Primary Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 14.55 |
| Riser Diameter (in.) | 30" |
| Required Head (ft.) | 0.73 |

## Emergency Overflow

| | |
|---|---|
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 9.96 |
| Structure Area Used ($ft.^2$) | 18.00 |
| Required Structure Area ($ft.^2$) | 2.40 |
| Depth of Flow (ft.) | 0.41 |
| Slope (%) | 5.00 |
| Velocity (fps) | 4.15 |

Notes: (1) Digitized from Plate 8.
(2) Taken from Table IV-3A; DD-4.

Pond E - PM - Spillway Calculations

Design Parameters:

| | | |
|---|---|---|
| (1) | Disturbed Drainage Area (ac.) | 34.91 |
| (1) | Undisturbed Drainage Area (ac.) | 805.50 |
| | Runoff Curve No. (Dist.) | 90 |
| | Runoff Curve No. (Undist.) | 70 |
| (2) | Time of Concentration (hrs.) | 1.02 |
| | Land Slope (%) | 19.83 |
| | Hydraulic Length (ft.) | 10,200 |

(3) Overflow

| | |
|---|---|
| 10 yr. - 24 hr. Event (in.) | 1.82 |
| Peak Flow 10/24 (cfs) | 88.94 |
| 25 yr. - 6 hr. Event (in.) | 1.50 |
| Peak Flow 25/6 (cfs) | 45.77 |
| Structure Area Used ($ft.^2$) | 18.0 |
| Slope of Spillway (%) | 33.3 |
| Required Structure Area 10/24 ($ft.^2$) | 5.58 |
| Required Structure Area 25/6 ($ft.^2$) | 3.54 |
| Depth of Flow 10/24 (ft.) | 0.84 |
| Depth of Flow 25/6 (ft.) | 0.58 |
| Velocity 10/24 (fps) | 15.94 |
| Velocity 25/6 (fps) | 12.94 |

Notes: (1) From Plates 8 & 9; Includes B.T.C.A. Areas
(2) Taken from Table IV-4
(3) Single, open channel spillway

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Stage-Discharge Data
for
Sediment Pond "C"

INSERT ORIGINAL P.E. STAMPED TABLE

Stage-Discharge
Centennial Pond C

INSERT ORIGINAL P.E. STAMPED GRAPH

# Certification Statement

INSERT ORIGINAL P.E. STAMPED STATEMENT

CHANNEL FLOW CALCULATIONS

FOR: POND "E" - EMERGENCY SPILLWAY

| | | |
|---|---|---|
| Bed Slope = | .05 | |
| Manning's N = | .04 | |
| Bottom Width = | 5 | feet |
| Channel Side Slope = | .5 | |
| Flow Depth = | .6950414 | feet |
| Cross Sectional Area = | 4.441372 | square feet |
| Wetted Perimeter = | 8.10832 | feet |
| Hydraulic Radius = | .547755 | feet |
| Discharge = | 24.74 | cubic feet / sec |
| Velocity = | 5.570351 | feet / sec |

Culverts

**General**

Culverts have been sized as per the designations on Plates 8 and 9, and are placed to drain on a minimum of .0556 (1 ft./18 ft.) slope. Undisturbed drainage culverts (shown on Plate 9) are fitted with trash racks in drainages where introduction of rocks and other debris into the main culvert is foreseen as a problem. The main culvert inlet (C-1a) is fitted with a trash rack. All disturbed area culverts are designated with a CD- number as shown on Plate 8. These culverts handle much smaller flows and are thus not fitted with trash racks in most cases.

The undisturbed area culverts (C-0 through C-13) flow into the main culvert. The main culvert outlets at section C-15, which is protected from erosion as described on Table IV-7. Disturbed area culverts (CD-1 through CD-7) as shown on Plate 8 discharge onto grouted rip-rap surfaces for protection from erosion. Energy dissipators are also employed where necessary to reduce velocities and prevent erosion from culvert discharges (see Plate 8).

**Maintenance**

Culverts shall be inspected regularly, and cleaned as necessary to provide for passage of designed flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

**Size Justification**

The following note on the undisturbed culverts is for reference only, to show the original design criteria. Due to the complicated nature of the undisturbed culvert flows, it was decided that a drainage system analysis would be used to demonstrate the ability of the system to pass the design event. This system analysis is provided in Appendix O and shows the existing system to be more than adequate for the design storm event.

**Undisturbed Area Culvert Size Determination***

Source:

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Peak Flow - SCS-TR-55 Method For Type II Storms:

$qp = qp^1AQ;$

A = Watershed in square miles;

Q = Runoff volume in inches;

$qp^1$= Discharge from Fig. 2.40

qp = Peak Discharge in cfs.

Source:

B.L.M. State Engineer

Manning Equation:

$$D = \frac{2.16Qn}{\sqrt{s}}^{0.375}$$

D = Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = roughness factor (0.02 for steel culvert)

s = slope (0.0556% = 1 foot for 18 feet)

Using the above formulas, minimum culvert sizes were calculated based on 100% runoff from a 10 year - 24 hour storm.

* Reference Only - See Appendix O for justification of culvert sizes.

**Watershed and Culvert Sizing Map (Plate 9)**

TABLE IV-2

| Culvert | Watershed Area (acres) | Culvert Needed (in.) | Culvert Used (in.) |
|---|---|---|---|
| C-0 | 36.65 | 13 | 18 |
| C-1a | 469.51 | 22 | 36 |
| C1 | 506.16 | 22 | 36 |
| C2 | 23.03 | 12 | 18 |
| C3 | 529.19 | 23 | 36 |
| C4 | 77.29 | 16 | 30 |
| C5 | 606.48 | 23 | 36 |
| C6 | 26.87 | 12 | 18 |
| C7 | 633.35 | 24 | 42 |
| C8 | 45.25 | 14 | 30 |
| C9 | 678.60 | 25 | 42 |
| C10 | 18.16 | 10 | 18 |
| C11 | 696.73 | 25 | 42 |
| C12 | 55.31 | 14 | 18 |
| C13 | 752.04 | 27 | 42 |
| C15 | 752.04 | 27 | 42 |

Note: Culvert C14 flow has been routed to diversion UD-4, and C14 has been eliminated.

Diversion Structures

**General**

Diversion ditch locations are shown on the Surface Facilities Map and Drainage Map, Plate 8. The direction of flow is also shown. All diversions are classed as temporary, and will be removed upon final reclamation.

Note: (1) The runoff curve number of 65 was used only for calculation of the undisturbed culvert diversions. All other diversions, culverts, and pond designs are based on a more conservative runoff curve number of 70 for undisturbed drainages.

(2) Brycan is Hydrologic Soil Group B, Datino (stoney) is also Hydrologic Soil Group B; reference "SCS, National Engineering Handbook, Section 4, 1972".

**Specifications**

Diversions along the upslope side of the road will be as per specifications on the haul road design. At a minimum, these, and any other diversions shown, will meet the minimum size specifications on the Diversion Ditch Summary sheet (Table IV-3B). Disturbed divisions DD-1 and DD-8 through DD-11 are sized to carry the runoff from a 2 year - 6 hour precipitation event in the area, per requirements of R645-301-742.330 "Division of Miscellaneous Flow". There are no divisions of intermittent or perennial flows.

Undisturbed diversions and drainage control for primary roads are sized to carry runoff from a 10 year - 6 hour precipitation event in the area.

Calculations for the 10 year - 24 hour runoff are included only for sediment pond sizing purposes.

**Maintenance**

All diversions will be maintained so as to pass the volumes of water for which they were designed. Sloughage will be cleaned out along with regular road maintenance procedures, and any blockage will be removed as soon as practicable after occurrence. Velocities will be controlled as needed to prevent excessive scouring.

**Diversions and Conveyance of Overland Flow**

There are two types of diversions at this property: undisturbed and disturbed. The undisturbed diversions are labeled UD-1, through UD-5, and C-1 through C-15, and carry undisturbed drainage around and under the disturbed area. All undisturbed diversions are in place, and are shown on Plate 8, along with respective drainage areas. Cross sections of the undisturbed diversions are shown on the "Undisturbed Diversion Ditch Typical" (Figure IV-4). Design calculations are shown on the tables entitled "Diversion Design" (Table IV-3), "Diversion Ditch Summary Sheet" (Table IV-3B) "Main Channel Culvert Design" (Table IV-4), and "Side Drainage Culvert Design" (Table IV-5).

The disturbed diversions carry disturbed drainage to the sediment ponds. The existing disturbed diversions are labeled DD-1, through DD-11 and are shown on Plate 6 "Support Facilities - As Constructed" and on Plate 8 "Support Facilities - Surface Area Drainage and Topography". The diversion DD-4 is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". Cross sections of the disturbed diversions are shown on the Division Ditch Typical" (Figure IV-3) Design calculations are shown on the table entitled "Disturbed Diversion Design" (Table IV-3A) and on the "Diversion Ditch Summary" (Table IV-3B).

Peak flows for all diversions were calculated by the SCS-TR55 Method for Type II storms using the computer program: Office of Surface Mining Watershed Model, Version: Storm 6.20, by Gary E. McIntosh.

A runoff curve number of 70 was used for all undisturbed areas, except for the undisturbed culvert diversions, which use a CN of 65. A CN of 90 was used for the disturbed area.

The curve numbers are based on Table 2.20 "Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Land Use" (Antecedent Moisture Condition II), page 82 of "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.

A runoff curve number of 65 was selected for the undisturbed culvert diversion areas, based on the following:

(1) Land Use Description - Wood or Forest Land: thin stand, moderate to poor cover, no mulch.

    (a) The above description was selected from SCS soils and vegetation data in Appendix M, wherein the site is described as not-desirable as rangeland due to the steep slopes and moderately sparse vegetative cover. The predominant vegetation is trees or large shrubs (pine, juniper, oak, sagebrush) with a mixture of grasses (wildrye, bluegrass, etc.). This land form and vegetation type best fits the Wood or Forest Land Category.

(2) Hydrologic Soil Group - B.

    (a) The undisturbed soils of the permit area are predominantly bouldery loam or bouldery fine sandy loam, as described in the SCS report in Appendix M. These soils are further defined as deep and well-drained with moderate permeability and infiltration rates. This description fits the SCS Hydrologic Soil Group B very well.

(3) The runoff curve number of 65 is further supported by an on-site visit and professional judgement of a respected professional engineer/hydrologist from Horrocks, Carollo Engineers. In his opinion, a curve number of 65 best fits the site conditions, based on the site visit, and Richard H. McCuen's, "A Guide to Hydrologic Analysis Using SCS Methods".

(4) Appendix O, which is the calculations performed by Horrocks Engineering reflects a curve number of 65. Tables IV-4 and IV-5 are also included and use a curve number of 70. Both calculations show adequately sized culverts; the curve number of 70 is slightly more conservative.

    The Curve Number of 90 for the disturbed area is based on Hydrologic Soil Group B, Streets and Roads, with a weighted average of 40% paved area and 60% gravel area.

    The outlet of C-15 (Main-Channel Culvert) shows a velocity of 7.28 fps, which could be slightly erosive in this area; however, existing boulders at this outlet range from 12 to 36 inches in diameter and function as an adequate energy dissipator and erosion control device. Based on past history of storms with little or no evidence of erosion, at this point

it is not felt necessary to install additional protection. Erosion protection parameters are shown on the "Erosion Protection" (Table IV-7), for reference only, to show that the existing natural rock is adequate size for erosion control.

The culvert outlet will be visually examined after each major storm to ensure that erosion is not occurring. If erosion does become evident as determined by visual observation, protection will be installed according to the design on the table entitled "Erosion Protection" (Table IV-7).

Velocities on undisturbed diversions UD-1, UD-3 and UD-5 and portions of UD-2 and UD-4 are less than 6.0 fps, and are not considered erosive. Velocities on disturbed diversions DD-1, through DD-11 are also less than 6.0 fps, and are not considered erosive on this site.

Velocities on the upper and lower portion of UD-2 and the lower 150' of UD-4 and are greater than 6.0 fps, and are considered potentially erosive; therefore, rip-rap will be placed at these locations (see Plate 8). Rip-rap or liner is placed as described in Table IV-7, and is sized according to Figure IV-12. Diversion UD-2 has been observed to be non-erosive.

Undisturbed diversion UD-2 was resurveyed in November 1992. Based on this survey, the division can be divided into four separate components, as follows:

Upper Section - This is the extreme upper end of the division near the disturbed area boundary. This is a fairly steep, rocky area, and is quite inaccessible to equipment. The average grade through this section is 12.33%. the ditch is protected by a liner, which appears to have been effective in preventing erosion over the last 10 years. The liner will be maintained throughout this section;

Undisturbed Section - This is an area below the upper (lined) section and the office pad section. The drainage flows through an undisturbed, vegetated area for approximately 100 feet, at an average slope of 12.11%. There is no evidence of erosion through this area;

Office Pad Section - This is an extremely flat portion of the diversion with an average grade of 3.50% for approximately 200 feet. Velocities through this section are non-erosive, and this is the only portion of the diversion which has required periodic maintenance for silt cleaning;

Lower Section - This section is approximately 100 feet in length with an average slope of 41.60%. The ditch is rip-rapped through this section.

Flow calculations are provided in Table IV-3 for the various sections, and erosion protection requirements are provided in Table IV-7. The diversion has been in place for approximately 10 years, and has required only minimal maintenance for silt clean out in that time. It has been designed, located, constructed, maintained, used and will be removed in accordance with requirements of R645-301-742.300.

A loose rock check dam will be placed at the discharge point of UD-4 for energy dissipation. The dam will be constructed as described in Figure IV-9 and located as shown on Plate 8.

All diversion ditches are sized and maintained to at least the minimum requirements of R645-301-742.330 "Diversion of Miscellaneous Flows" and R645-301-742.423 "(Road) Drainage Control". There are no diversions of intermittent or perennial drainages at this minesite. Ditch sizes, including flow depths and minimum size for maintenance are summarized on Table IV-3B, "Division Ditch Summary". Computer backup sheets for all calculations are provided in Appendix O.

**Stream Channel Diversions**

Re-establishment of drainages is shown on Plates 15 and 16 which are reclamation contours and cross sections. The cross sections show cut and fill which has occurred on-site versus the original contours and reclaimed contours.

The reclamation plans for the drainage in the area consist of replacing each of the culverts C-1 through C-15 with restored channels. The undisturbed diversions UD-1 and UD-2 will also be removed and replaced with appropriate sized channels, corresponding to the channels at culverts C-4 and C-12 respectively. The restored channels are all sized to carry the runoff from a 100 year - 24 hour precipitation event. Cross sections of the restored channels are shown in the "Restored Channel Typicals" (Figure IV-10). Design calculations are summarized in the table entitled Restored Channel Designs" (Table IV-6).

Culverts C-1, C-3, C-5, C-7, C-9, C-11, C-13, and C-15 will be replaced by the Main Channel RC-1, and culverts C-2, C-4, C-6, C-8, C-10, C-12, and C-14 will be replaced by the Side Channels entitled RC-2, RC-4,....RC-14, respectively.

The only restored channels with erosive velocities for this area (greater than 4.5 fps) are RC-1, RC-4, and RC-12. Erosion protection is planned for these channels, as shown on the table entitled "Erosion Protection" (Table IV-7). All other restored channels are expected to have non-erosive velocities, and will not require erosion protection.

Loose rock check dams will be placed at the exit of each side drainage prior to entering RC-1. Please see Figure IV-9, for a typical section of the Loose Rock Check Dams.

Hydrologic Balance:

**Sedimentation Ponds**

The sedimentation ponds are shown on Plates 11, 12 and 13. Pond C is constructed as shown on Plate 6 "Support Facilities - As Built". There will be no Pond D. Pond E has been constructed (Plate 13), and is shown on Plate 7 "Aberdeen Mine Surface Facilities - As Constructed". The plans and profiles shown on Plate 12 are for Pond C, as constructed. Plate 13 (Pond E) plans and profiles are as built.

All elevations of inflow and discharge are shown on the plates. Also, the embankment slopes are shown not to exceed 5:1 as required. The embankment widths are greater than the required width of height of embankment plus 35 feet divided by 5' as required. (Please note the different horizontal and vertical scales used on the section views of Pond C. Horizontal and vertical scales for Pond E are the same.)

Previous Pond "B" has been redesignated as "Primary Settling Basins" since all the runoff from the basins reports to Sediment Pond "C" (See Plate 11).

**Sediment Pond "C"**

Design specifications for Sediment Pond "C" are shown in this submittal.

**Sediment Pond "E"**

Design specifications for Sediment Pond "E" are covered under this submittal.

**Discharge Structures**

Discharge structures from the sediment ponds have been included.

**Permanent and Temporary Impoundments**

The sedimentation pond E will remain in place after reclamation, until adequate revegetation is established on the reseeded areas. At this time, the pond will be removed and reclaimed.

**Discharge of Water into an Underground Mine**

The Drainage Map, Plate 8, delineates various drainage areas on the site. Based on planimeter areas from this map, the following areas are drained into the respective mines:

| Mine | Disturbed (ac.) | Undisturbed (a.c) |
|---|---|---|
| Pinnacle Mine | 0.81 | 0.13 |
| Apex | 1.23 | 2.06 |
| Old Chidister Mine | 4.53 | 16.21 |

The water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps. Water flowing into the mines is strictly from surface runoff, and the quantity is thus highly variable. Because this is such a dry canyon, it is necessary to capture as much water as possible to allow for underground mining operations. The water is directed into storage sumps in the mine, where it is settled and used for dust suppression. Any water going into the mine is used in sprays or remains in the sumps.

Andalex owns the rights to this water.

Hydrologic Balance:

**Water Quality Standards and Limitations.**

**Sediment control for Office Facilities**

The office facilities area is a small paved parking area and runoff from a portion of this area will report to Sediment Pond "E" as shown on Plate 8. The remaining portion is classified as a B.T.C.A. Area (2.19-2).

Natural runoff from above the office area is diverted to the south of the pad, and flows in an open ditch down to the lower (road) level where it enters an 18" culvert going into the 42" culvert carrying undisturbed drainage off site. Straw bales are maintained in the open ditch to minimize sediment in the undisturbed flow.

Most of the office pad and access road are paved. Runoff from a portion of the pad and road flow down a grouted ditch along the north and south sides of the road, through a culvert and then down the east side of the main paved road. From here the runoff flows into Pond E. See Plate 8. Sediment contributions from the office facilities area are negligible (if any) due to the pavement and concrete grouted ditch. Straw bales are also maintained along the main haul road to minimize sediment loading from this area.

**Disturbed Area Drainage not Reporting to Sediment Ponds**

Please refer to Plate 8 in Volume II of the PAP for exempt "Alternate Sediment Control Area" or (ASCA) (areas not reporting to sedimentation ponds). There are 3 areas, 2 of which are shown on Plate 8 as ASCA's and a third in Appendix U as an SAE, with a total area of 1.08 acres or 3.2% of the Disturbed Area:

(1) ASCA #1 - 0.72 acres - near the office, which includes a topsoil storage pile, UD-2, a portion of the main office pad and a portion of the weather station outslope.

    (a) Treatment: As a result of a 10 year - 24 hour storm, there would potentially be a discharge of 2,462 cubic feet of runoff from this area. Alternate sediment controls consist of straw dikes, vegetation on the topsoil pile, chemically treated gravel parking areas and paved parking areas.

(2) ASCA #2 - 0.27 acres - Substation area.

    (a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 923 cubic feet of runoff from this area. Alternate sediment controls on this site consist of a graveled surface, a straw dike and snow fences.

(3) Small Area Exemption (SAE) #1 - 0.09 acres - Left Fork Fan Powerline area.

    (a) Treatment: A 10 year - 24 hour storm will potentially have a discharge of 308 cubic feet of runoff from this

area. As these are power poles, there will be no sediment runoff.

These three areas are exempt from the requirement that the drainage report to a sedimentation pond (817.42a) as provided for in 817.42b. The drainage from these areas will meet the effluent standards of 817.42 and State and Federal water quality standards for the receiving waters. In order to assure this, any discharge from these ASCA's will be monitored for suspended solids, total suspended solids and total dissolved solids.

There are three additional undisturbed diversions constructed just inside the disturbed area boundary (UD-1, UD-3 and UD-4). These ditches carry only undisturbed runoff from the areas above, are well vegetated, and discharge directly to the main channel undisturbed drainage without further treatment. Only undisturbed diversion UD-2 is included as a ASCA (#1), due to the fact that it also picks up drainage from a topsoil storage pile and a portion of the office pad as described on the previous page.

**NPDES Permit**

Three point sources are included in Andalex's new UPDES Permit issued in May of 1989. Quarterly reports are submitted to the Utah Department of Health and the EPA.

TYPICAL

SCS - TR55 Method of Diversion Calculation

1. Find Drainage Area - Plate 8 or 9

*2. Find Runoff from Appropriate Event:
$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$; where: P = Precip. in inches
$S = \frac{1{,}000}{CN} - 10$

CN = 70 for Undisturbed
CN = 90 for Disturbed

3. Find Hydraulic Length of Watershed - Plate 8 or 9

4. Find Land Slope - Plate 8 or 9

5. Calculate Lag Time; $t_L = \frac{L^{0.8}(S+1)^{0.7}}{1900\ y^{0.5}}$

where: $t_L$ = Lag Time in Hrs.
L = Hydraulic Length in ft.
$S = (\frac{1{,}000}{CN} - 10)$
y = Land Slope in %

6. Find Time of Concentration; $t_c = \frac{t_L}{0.6}$

**7. Find Peak Flow (qp) from: $qp = qp^1\ AQ$
where qp = Peak Flow in cfs
$qp^1$= Peak Discharge from Figure 2.40, page 115***.
A = Drainage Area in Square Miles
Q = Runoff (from #2 above)

**8. Find Velocity of Flow from:
$V = \frac{1.49}{n} R^{0.67}S^{0.5}$

where: V = Velocity in fps
n = Manning's Number for ditch
R = Hydraulic Radius in ft. = $\frac{\text{Area}}{\text{Wetted Perim.}}$
S = Slope in ft./ft.

**9. Find Required Ditch Area by dividing peak flow by the velocity.

$$Q = AV;\ A = \frac{Q}{V}$$

**10. Find depth of flow by applying required area to ditch size.

* Where undisturbed and disturbed flows enter the same ditch, a weighted curve number is used, calculated by:

$$\frac{(\text{Area Undisturbed})(70) + (\text{Area Disturbed})(90)}{(\text{Total Area})}$$

** Items 7 through 10 can also be calculated by the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.

*** "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

TABLE IV-3

UNDISTURBED DIVERSION DESIGN

| Structure | UD-1 | UD-2 (PAD) | UD-3 | UD-4 | UD-5 |
|---|---|---|---|---|---|
| Drainage Area (s) | 87.78 | 56.20 | 23.87 | 26.14 | 16.90 |
| Time of Conc. (hours) | 0.24 | 0.21 | 0.22 | 0.06 | 0.14 |
| Runoff Curve Number (CN) | 70 | 70 | 70 | 70 | 70 |
| Manning's Number (n) | 0.038 | 0.038 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.75 | 3.50 | 6.75 | 4.50 | 3.79 |
| Hydraulic Length (ft.) | 2850 | 2800 | 1400 | 600 | 1800 |
| Land Slope (%) | 47.22 | 58.33 | 56.67 | 66.67 | 62.50 |
| 10 yr. 6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Time of Conc. (hrs.) | 0.24 | 0.21 | 0.22 | 0.06 | 0.14 |
| Peak Flow 10/6 (cfs) | 1.35 | 0.99 | 0.11 | 0.47 | 0.29 |
| Required Area 10/6 ($ft^2$) | 0.37 | 0.37 | 0.06 | 0.20 | 0.15 |
| Flow Depth 10/6 (ft) | 0.61 | 0.61 | 0.24 | 0.45 | 0.39 |
| Velocity 10/6 (fps) | 3.65 | 2.64 | 1.88 | 2.32 | 1.93 |
| 10 yr.-24 hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 7.94 | 4.75 | 2.03 | 3.45 | 1.59 |
| Req'd Area 10/24 ($ft^2$) | 1.40 | 1.21 | 0.52 | 0.90 | 0.54 |
| Flow Depth 10/24 ($ft^2$) | 1.18 | 1.10 | 0.72 | 0.95 | 0.73 |
| Velocity 10/24 ($ft^2$) | 5.69 | 3.91 | 3.90 | 3.82 | 2.95 |

Notes:
1- Ditch slopes measured from Plate 8.
2- UD-2 slope measured directly in field.
3- Peak flows by SCS-TR55 Method using "Storm 6.20" computer program.
4- Manning's number based on Table 3.1, p. 159, under Small Drainage Ditches - earth Lined, "Applied Hydrology and Sedimentology Disturbed Areas", Barfield, Warner and Haan, 1983.
5- See Appendix O for computer back-up.
6- All calculations are based on minimum ditch size - "V" shape with 1:1 side slopes. Ditch configurations may vary in field.

TABLE IV-3 (cont'd)

UNDISTURBED DIVERSION DESIGN

| Structure | UD-2 (upper) | UD-2 (lower) | UD-4 (max) | UD-5 (max) |
|---|---|---|---|---|
| Drainage Area (acres) | 56.20 | 56.20 | 26.14 | 16.90 |
| Time of Conc. (hrs.) | 0.21 | 0.21 | 0.06 | 0.14 |
| Runoff Curve Number (CN) | 70 | 70 | 70 | 70 |
| Manning's Number (n) | 0.025 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 12.33 | 42.60 | 20.00 | 17.75 |
| Hydraulic Length (ft.) | 2800 | 2800 | 600 | 1800 |
| Land Slope (%) | 58.33 | 58.33 | 66.67 | 62.50 |
| 10 yr.-6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 0.99 | 0.99 | *10.43 | 0.29 |
| Req'd Area 10/6 ($ft.^2$) | 0.17 | 0.15 | 1.18 | 0.08 |
| Flow Depth 10/6 (ft.) | 0.41 | 0.39 | 1.09 | 0.29 |
| Velocity 10/6 (fps) | 5.80 | 6.49 | 8.81 | 3.44 |
| 10 yr.-24 hr. Event (in) | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow (cfs) | 4.75 | 4.75 | *13.41 | 1.59 |
| Req'd Area ($ft.^2$) | 0.55 | 0.49 | 1.43 | 0.30 |
| Flow Depth 10/24 (ft) | 0.74 | 0.70 | 1.20 | 0.55 |
| Velocity 10/24 (fps) | 8.59 | 9.61 | 9.38 | 5.27 |

* Includes discharge from Pond E Emergency Spillway.

Note: 1. Ditch slopes measured from Plate 8.
2. UD-2 Slopes Measured Directly in Field; UD-2 (Upper) is a lined channel. UD-2 (lower) is rip-rapped.
3. Peak flows by SCS-TR55 Method using "Storm 6.20" computer program.
4. The Manning's number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.
5. See Appendix O for computer back-up.
6. All calculations are based on minimum ditch size-"V" shape with 1:1 side slopes. Ditch Configurations may vary in field.

TABLE IV-3A

DISTURBED DIVERSION DESIGN
(MISCELLANEOUS FLOWS-2YR.-6 HR. DESIGN)

| Structure | DD-1 | *DD-8 | *DD-9 | DD-10 | DD-11 |
|---|---|---|---|---|---|
| Drainage Area (acres) | | | | | |
| Disturbed | 3.31 | - | - | 0.34 | 5.35 |
| Undisturbed | 5.40 | - | - | - | 6.12 |
| Time of Conc. (hrs.) | 0.08 | 0.327 | 0.327 | 0.11 | 0.08 |
| Runoff Curve Number (CN) | | | | | |
| Disturbed | 90 | - | - | 90 | 90 |
| Undisturbed | 70 | - | - | - | 70 |
| Weighted CN | 78 | - | - | 90 | 79 |
| Manning's Number (n) | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.25 | 6.25 | 6.25 | 6.25 | 5.25 |
| Hydraulic Length (ft.) | 200 | 1200 | 1200 | 300 | 800 |
| Land Slope (%) | 6.25 | 6.25 | 6.25 | 6.25 | 56.25 |
| 2 yr.-6 hr. Event (in) | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Peak Flow 2/6 (cfs) | 0.08 | 0.07 | 0.07 | 0.05 | 0.13 |
| Required Area 2/6 ($ft^2$) | 0.05 | 0.04 | 0.04 | 0.03 | 0.07 |
| Flow Depth 2/6 (ft.) | 0.22 | 0.21 | 0.21 | 0.18 | 0.26 |
| Velocity 2/6 (fps) | 1.69 | 1.63 | 1.63 | 1.50 | 1.90 |
| 10 yr.-24 hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 3.49 | 2.88 | 2.88 | 0.31 | 4.75 |

* Based on ½ flow from DD-3, which is 0.13 cfs for 2 yr.-6 hr.event. See Appendix O.

TABLE IV-3A (Continued)

DISTURBED DIVERSION DESIGN
(PRIMARY ROAD DRAINAGE - 10YR.-6HR. DESIGN)

| Structure | DD-2 | DD-3 | DD-4 | DD-6 * | DD-7 |
|---|---|---|---|---|---|
| Drainage Area (acres) | | | | | |
| Disturbed | 4.07 | 7.41 | 12.21 | - | 1.28 |
| Undisturbed | - | 25.49 | 12.20 | - | 6.12 |
| Time of Conc. (hrs.) | 0.04 | 0.327 | 0.289 | 0.289 | 0.08 |
| Runoff Curve Number (CN) | | | | | |
| Disturbed | 90 | 90 | 90 | - | 90 |
| Undisturbed | - | 70 | 70 | - | 70 |
| Weighted CN | 90 | 75 | 80 | - | 74 |
| Manning's Number (n) | 0.040 | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.25 | 6.25 | 6.25 | 5.95 | 5.56 |
| Hydraulic Length (ft.) | 200 | 1200 | 1200 | - | 800 |
| Land Slope (%) | 6.25 | 6.25 | 8.00 | - | 56.25 |
| 10 yr. -6 hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Peak Flow 10/6 (cfs) | 1.70 | 0.90 | 1.67 | 0.84 | 0.20 |
| Required Area 10/6 ($ft^2$) | 0.47 | 0.30 | 0.40 | 0.28 | 0.10 |
| Flow Depth 10/6 (ft.) | 0.69 | 0.24 | 0.68 | 0.53 | 0.31 |
| Velocity 10/6 (fps) | 3.62 | 2.96 | 3.60 | 2.98 | 2.03 |
| 10yr.-24hr. Event (in.) | 1.82 | 1.82 | 1.82 | 1.82 | 1.82 |
| Peak Flow 10/24 (cfs) | 3.50 | 5.75 | 8.06 | 4.03 | 1.92 |

* Based on ½ flow for DD-4

Notes:

1. Ditch Slopes measured from Plate 8.
2. Peak flows by SCS-TR55 Method using "Storm 6.20" Computer program.
3. The Manning's Number is based on Table 3.1, page 159, under Small Drainage Ditches - Earth Lined, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner, and Haan, 1983.
4. See Appendix O for computer back-up.
5. All calculations are based on minimum ditch size- "V" shape with 1:1 side slopes, except DD-3 which has a 1' bottom width. Ditch configurations may vary in field.

TABLE IV -3B
DIVERSION DITCH SUMMARY

| DITCH NO. | FLOW (cfs) | REQ'D FLOW DEPTH (ft.) | REQ'D FLOW AREA ($ft^2$) |
|---|---|---|---|
| UD-1 | 1.35 | 0.61 | 0.37 |
| UD-2 (PAD) | 0.99 | 0.61 | 0.37 |
| UD-2 (UPPER) | 0.99 | 0.41 | 0.17 |
| UD-2 (LOWER) | 0.99 | 0.39 | 0.15 |
| UD-3 | 0.11 | 0.24 | 0.06 |
| UD-4 | 0.47 | 0.45 | 0.20 |
| UD-4 (MAX) | 10.43 | 1.09 | 1.18 |
| UD-5 | 0.29 | 0.39 | 0.15 |
| UD-5 (MAX) | 0.29 | 0.29 | 0.08 |
| DD-1 | 0.08 | 0.22 | 0.05 |
| DD-2 | 1.70 | 0.69 | 0.47 |
| DD-3 | 0.90 | 0.24 | 0.30 |
| DD-4 | 1.67 | 0.68 | 0.46 |
| DD-6 | 0.84 | 0.53 | 0.28 |
| DD-7 | 0.20 | 0.31 | 0.10 |
| DD-8 | 0.07 | 0.21 | 0.04 |
| DD-9 | 0.07 | 0.21 | 0.04 |
| DD-10 | 0.05 | 0.18 | 0.03 |
| DD-11 | 0.13 | 0.26 | 0.07 |

Notes: 1- Flows for UD ditches and primary road ditches (D-2 through DD-7) based on 10 yr.-6hr. event (1.25).
2- Flows for Ditches DD-1 and DD-8 through DD-11 based on 2yr.-6hr. event (0.80").
3- All calculations based on minimum ditch size - "V" ditch with 1:1 side slopes, except DD-3, which has a 1' bottom width. Ditch configurations may vary in field.
4- Ditches will be maintained to minimum depth and/or area shown in this table.

# METHOD OF CULVERT CALCULATION
(TYPICAL)
See Appendix N for calculation reference

1. Find Drainage Area - Plate 9

2. Find Runoff from Appropriate Event:
$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$; Where: P = Precipitation in Inches.
$S = \frac{1{,}000}{CN} - 10$
or CN = 70

3. Find Hydraulic Length of Watershed - Plate 9.

4. Find Land Slope - Plate 9

5. Calculate Lag Time; $t_L = \frac{L^{0.8}(S+1)^{0.7}}{1{,}900\ Y^{0.5}}$
where: $t_L$ = Lag Time in Hrs.
L = Hydraulic Length in Ft.
$S = \frac{1{,}000}{CN} - 10$
Y = Land Slope in %.

6. Find Time of Concentration; $t_c = \frac{t_L}{0.6}$

**7. Find Peak Flow (qp) from: $qp = qp^1\ AQ$
where: qp = Peak Flow
$qp^1$= Peak Discharge from Figure 2.40, page 115*.
A = Drainage Area in Square Miles
Q = Runoff (from #2 above)

8. Find Required Culvert Size by Manning's Equation:

$$D = \left( \frac{2.16\ Qn}{\sqrt{s}} \right)^{0.375}$$

where: D = Required Culvert Diameter in Ft.
Q = Peak Flow (qp) from 7.
n = Manning's Number (0.025 for culv.)
s = Slope in ft./ft.

* "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.
** Item 7 can also be calculated by using the computer program "Office of Surface Mining Watershed Model", Version: Storm 6.20, by Gary E. McIntosh.

TABLE IV-3C

DISTURBED AREA CULVERT DESIGN
(Drainage to Old Works)

| Structure | CD-1 | CD-2 | CD-8 |
|---|---|---|---|
| Drainage Area (ac.) | --- | --- | --- |
| Undisturbed | 10.09 | 6.12 | 10.09 |
| Disturbed | 3.25 | 1.28 | 3.25 |
| 10 yr. - 6 hr. event (in.) | 1.25 | 1.25 | 1.25 |
| Time of Conc. (hrs.) | 0.10 | 0.10 | 0.10 |
| Curve Number | --- | --- | --- |
| Undisturbed | 70 | 70 | 70 |
| Disturbed | 90 | 90 | 90 |
| Manning's Number | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 5.56 | 5.56 | 5.56 |
| Peak Flow (cfs) | 1.73 | 0.72 | 1.73 |
| Velocity | 4.41 | 3.49 | 3.08 |
| D Req'd (ft.) | 0.71 | 0.51 | 0.71 |
| D in Place (ft.) | 1.00 | 1.00 | 1.50 |

TABLE IV-3C (Continued)

DISTURBED AREA CULVERT DESIGN

| Structure | CD-4 | CD-5 | CD-6 | CD-7 |
|---|---|---|---|---|
| 10 yr. - 6 hr. Event (in.) | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 1.50 | 1.55 | 2.33 | 4.65 |
| Velocity | 4.26 | 4.29 | 4.75 | 5.65 |
| D Req'd (ft.) | 0.67 | 0.68 | 0.79 | 1.02 |
| D in Place (ft.) | 1.50 | 1.50 | 2.00 | 2.00 |

Note: All culverts have adequate headwater to allow flow.

TABLE IV-3C (Continued)

CULVERT CD-3
(Inlet to Sed. Pond "C")

| | |
|---|---|
| 10-yr.6-hr. Event | 1.25" |
| Mannings Number | 0.025 |
| Culvert Slope | 3.30% |
| Peak Flow | 3.00 cfs |
| Velocity | 4.16 fps |
| D. Required | 0.96 ft. |
| D. In Place | 1.50 ft. |

NOTES:
1. Peak flow is based on entire flow from Diversion DD-3.
2. Details for Diversion DD-3 are on Table IV-3A.
3. Culvert slope is based on actual field measurement.
4. A headwall of 4' exists at the culvert inlet, which is adequate to allow the calculated peak flow of 3.00 cfs.
5. Please refer to Plate 8 for CD-3 location and drainage areas.

TABLE IV-3C (Continued)
DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD-9 | CD-10 | CD-11 | CD-12 | CD-13 |
|---|---|---|---|---|---|
| 10yr.-6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Culvert Slope (%) | 8.00 | 6.25 | 8.00 | 5.56 | 6.25 |
| Peak Flow 10/6 (cfs) | 0.31* | 0.31* | 0.31** | 0.92** | 1.87*** |
| Velocity 10/6 (fps) | 3.29 | 3.00 | 3.29 | 3.77 | 4.70 |
| Diam. Req'd. (ft.) | 0.35 | 0.36 | 0.35 | 0.56 | 0.71 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 1.00 | 2.00 | 1.50 |

* Based on 1/3 flow form DD-11.
** Based on entire flow from DD-11.
**** Based on entire flow from DD-2.

TABLE IV-3C (Continued)
DISTURBED AREA CULVERT DESIGN

| STRUCTURE | CD-14 | CD-15 | CD-16 | CD-17 | CD-18 |
|---|---|---|---|---|---|
| 10yr.-6hr. Event (in) | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Manning's Number (n) | 0.025 | 0.025 | 0.025 | 0.025 | 0.0025 |
| Culvert Slope (%) | 3.50 | 3.50 | 6.25 | 5.56 | 57.74 |
| Peak Flow 10/6 (cfs) | 1.35* | 2.84** | 4.65*** | 4.65*** | 0.29 |
| Velocity 10/6 (fps) | 3.51 | 4.20 | 5.90 | 5.65 | 6.79 |
| Diam. Req'd. (ft.) | 0.70 | 0.93 | 1.00 | 1.02 | 0.23 |
| Diam. In Place (ft.) | 1.50 | 1.50 | 2.00 | 2.00 | 1.50 |

* Based on entire flow from DD-1.
** Based on entire flows from DD-2, CD-10 & DD-11
*** Based on entire flow from DD-4.

TABLE IV-4

MAIN CHANNEL CULVERT DESIGN

| Structure | (optional) C-1a |
|---|---|
| Drainage Area | 469.51 |
| 10 yr. - 24 hr. Event | 1.82 |
| Time of Conc. (hrs.) | 1.02 |
| Curve number | 70 |
| Manning's Number | 0.025 |
| Ditch Slope (%) | 5.56 |
| Peak Flow | 22.12 |
| Structure Area Used ($ft.^2$) | 7.07 |
| Velocity (fps) | 9.20 |
| Hydraulic Length | 10,200 |
| Land Slope | 19.83 |
| Headwater Req'd (ft.) | 2.22 |
| D Req'd (ft.) | 1.84 |
| D in Place | 3.00 |

Note: See Appendix O for culvert justification.

TABLE IV-4 (cont'd)

MAIN CHANNEL CULVERT DESIGN

| Structure | C1 | C3 | C5 | C7 |
|---|---|---|---|---|
| Drainage Area | 506.16 | 529.19 | 606.48 | 633.35 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | - | - | - | - |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 23.12 | 23.62 | 26.02 | 26.72 |
| Structure Area Used ($ft.^2$) | 7.07 | 7.07 | 7.07 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | - | - | - | - |
| Land Slope | - | - | - | - |
| Headwater Req'd (ft.) | N/A | N/A | - | - |
| D Req'd (ft.) | 1.86 | 1.88 | 1.95 | 1.97 |
| D in Place | 3.00 | 3.00 | 3.00 | 3.50 |

Note: See Appendix O for culvert justification.

TABLE IV-4 (cont'd)

MAIN CHANNEL CULVERT DESIGN

| Structure | C9 | C11 | C13 | C15 |
|---|---|---|---|---|
| Drainage Area | 678.60 | 696.73 | 752.04 | 752.04 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | - | - | - | - |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 5.56 | 5.56 | 5.56 | 5.56 |
| Peak Flow | 29.82 | 32.42 | 38.92* | 38.92* |
| Structure Area Used ($ft.^2$) | 9.62 | 9.62 | 9.62 | 9.62 |
| Velocity (fps) | 9.20 | 9.20 | 9.20 | 9.20 |
| Hydraulic Length | - | - | - | - |
| Land Slope | - | - | - | - |
| Headwater Req'd (ft.) | - | - | - | - |
| D Req'd (ft.) | 2.06 | 2.12 | 2.27 | 2.27 |
| D in Place | 3.50 | 3.50 | 3.50 | 3.50 |

Note: See Appendix O for culvert justification.

Note: All culverts are within capacity for open-channel flow.

* If design peak flows for primary spillways from Ponds C and E are included, the peak flows for C-13 and C-15 are 65.6 cfs and 90.9 cfs respectively.

TABLE IV-5

SIDE DRAINAGE CULVERT DESIGN

| Structure | C-0 | C-2 | C-4 | C-6 |
|---|---|---|---|---|
| Drainage Area | 36.65 | 23.03 | 77.29 | 26.87 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | 0.12 | 0.08 | 0.24 | 0.22 |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's number | 0.025 | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 4.00 | 4.00 | 10.00 | 4.00 |
| Peak Flow | 5.65 | 3.90 | 8.77 | 4.17 |
| Structure Area Used ($ft.^2$) | 1.767 | 1.767 | 1.767 | 1.767 |
| Velocity (fps) | 6.18 | 6.18 | 8.73 | 6.18 |
| Hydraulic Length | 1300 | 850 | 2850 | 1400 |
| Land Slope | 51.43 | 61.54 | 47.22 | 56.67 |
| Headwater Req'd (ft.) | 1.35 | 1.12 | *2.40 | 1.02 |
| D Req'd (ft.) | 1.10 | 0.96 | *1.30 | 0.98 |
| D In Place (ft.) | 1.50 | 1.50 | 1.50 | 1.50 |

* Available headwater at culvert inlet is greater than that required to allow for surge storage and passage of flows.

Headwater = distance from base of culvert to top of headwall.

SIDE DRAINAGE CULVERT DESIGN

| Structure | C-8 | C-10 | C-12 |
|---|---|---|---|
| Drainage Area | 45.25 | 18.16 | 55.31 |
| 10 yr. - 24 hr. Event | 1.82 | 1.82 | 1.82 |
| Time of Conc. (hrs.) | 0.14 | 0.11 | 0.21 |
| Curve Number | 70 | 70 | 70 |
| Manning's Number | 0.025 | 0.025 | 0.025 |
| Ditch Slope (%) | 4.00 | 4.00 | 10.00 |
| Peak Flow | 7.09 | 2.65 | 6.50 |
| Structure Area Used ($ft.^2$) | 4.91 | 3.14 | 1.767 |
| Velocity (fps) | 6.18 | 4.90 | 9.77 |
| Hydraulic Length | 1600 | 1250 | 2800 |
| Land Slope | 58.62 | 63.16 | 58.33 |
| Headwater Req'd (ft.) | 1.25 | 0.98 | 1.60 |
| D Req'd (ft.) | 1.20 | 0.83 | 1.16 |
| D In Place (ft.) | 2.50 | 2.00 | 1.5 |

TABLE IV-6

RESTORED CHANNEL DESIGNS*

| Structure | Main Channel RC-1 | Side Channel* RC-O | RC-2 | RC-4 |
|---|---|---|---|---|
| Drainage Area | 469.22 | 34.55 | 22.18 | 71.83 |
| 100 yr.- 6 hr. Event | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 3.19 | 0.18 | 0.09 | 0.44 |
| Curve number | 70 | 70 | 70 | 70 |
| Manning's Number | 0.040 | 0.040 | 0.040 | 0.040 |
| Ditch Slope (%) | 6.60 | 4.00 | 4.00 | 10.00 |
| Peak Flow | 60.31** | 2.64 | 1.93 | 4.12 |
| Min. Structure Area ($ft.^2$) | 27.00 | 8.00 | 8.00 | 8.00 |
| Req'd Area ($ft.^2$) | 7.26 | 0.84 | 0.67 | 0.83 |
| Depth of Flow (ft.) | 1.03 | 0.35 | 0.30 | 0.35 |
| Velocity (fps) | 8.31 | 3.16 | 2.86 | 4.98 |
| Hydraulic Length | 10,200 | 1,300 | 850 | 2,400 |
| Land Slope (%) | 19.80 | 51.40 | 61.50 | 47.00 |
| Erosion Protection (Y/N) | Y | N | N | Y |

* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.

** Includes Reclaimed Area.

Note: Ditch Slopes measured from Plate 17.
Areas from Plate 17-A

TABLE IV-6 (cont'd)

RESTORED CHANNEL DESIGNS*

| Structure | RC-6 | RC-8 | RC-10 | RC-12 | RC-14 |
|---|---|---|---|---|---|
| Drainage Area | | 28.74 | 46.92 | 20.74 | 58.20 24.37 |
| 100 yr. - 6 hr. Event | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 0.20 | 0.24 | 0.18 | 0.53 | 0.20 |
| Curve number | | 70 | 70 | 70 | 70 70 |
| Manning's Number | | 0.040 | 0.040 | 0.040 | 0.040 0.040 |
| Ditch Slope (%) | | 4.00 | 4.00 | 4.00 | 10.00 4.00 |
| Peak Flow | | | 2.15 | 3.39 | 1.60 3.12 1.82 |
| Min. Structure Area ($ft.^2$) | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| Req'd Area ($ft.^2$) | | 0.73 | 0.99 | 0.60 | 0.69 0.65 |
| Depth of Flow (ft.) | | 0.31 | 0.41 | 0.26 | 0.30 0.29 |
| Velocity (fps) | | 2.96 | 3.43 | 2.68 | 4.55 2.80 |
| Hydraulic Length | | 1,400 | 1,600 | 1,250 | 2,800 1,300 |
| Land Slope (%) | | 57.00 | 58.60 | 63.20 | 58.30 46.80 |
| Erosion Protection (Y/N) | N | N | N | Y | N |

* In areas where these side drainages cross the road after final reclamation, road dips at least as substantial as the restored channels shown in Table IV-6 will be put in place. Locations of these are shown on Plate 17.

Note: Ditch Slopes measured from Plate 17.

TABLE IV-6 (con't)
RESTORED CHANNEL DESIGNS
(Sub-Areas)*

| Structure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Drainage Area (ac.) | 4.72 | 1.09 | 8.73 | 24.37 | 4.37 | 24.00 | 12.74 |
| 100 yr.-6 hr. event (in.) | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Time of Conc. (hrs.) | 0.08 | 0.07 | 0.13 | 0.22 | 0.09 | 0.20 | 0.17 |
| Curve Number | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Peak Flow (cfs) | 0.42 | 0.10 | 0.72 | 1.78 | 0.38 | 1.78 | 0.99 |
| Hydraulic Length (ft.) | 600 | 400 | 800 | 1,500 | 700 | 1,200 | 1,100 |
| Land Slope (%) | 66.67 | 55.17 | 58.33 | 66.67 | 60.00 | 60.87 | 60.00 |

* These areas drain directly to RC-1 by sheet flow, without entering other channels. See Plate 17-A.

TABLE IV-6 (con't)

RESTORED CHANNEL DESIGNS

| Structure | *Reclaimed Area |
|---|---|
| Drainage Area (ac.) | 32.34 |
| 100 yr.-6 hr. event (in.) | 1.91 |
| Time of Conc. (hrs.) | 0.54 |
| Curve Number | 90 |
| Peak Flow (cfs) | 23.17 |
| Hydraulic Length (ft.) | 49.50 |
| Land Slope (%) | 6.60 |

* This area drains directly to RC-1 by sheet flow, without entering other channels. See Plate 17-A.

TABLE IV-6 (con't)

RESTORED CHANNEL DESIGNS

Peak flow for RC-1 is based on the total of peak flows for RC-1 (Upper) plus channels RC-O through RC-14, plus sub-areas 1 through 7, plus the reclaimed area. Peak flows for each of these are shown in Appendix P.

TABLE IV-7

EROSION PROTECTION

| Restored Side Channel Structure | *Main Channel C-15 | Restored Main Channel RC-1 | Restored Main Channel RC-4 | Restored Side Channel RC-12 |
|---|---|---|---|---|
| Flow (cfs) | - | - | 4.12 | 3.12 |
| Slope (%) | 5.56 | 6.60 | 10.00 | 10.00 |
| Velocity (fps) | 9.20 | 8.31 | 4.98 | 4.55 |
| Rip-rap Size ($D_{50}$) | 15" | 12" | 6" | 6" |
| Bedding (-3/4" gravel) | 25" | 20" | 10" | 10" |
| Length of Protection (ft.) | 20' | All | All | All |
| Width of Protection (ft.) | 10' | 12' | 6' | 6' |
| Rip-Rap Depth | 18" | 15" | 8" | 8" |

| | UD-1 | UD-4 (Max.) | UD-5 (Max.) | DD-3 | DD-4 (Max.) |
|---|---|---|---|---|---|
| Flow (cfs) | 20.57 | 14.82 | 4.75 | 15.18 | 14.55 |
| Slope (%) | 6.75 | 20.00 | 17.75 | 6.25 | 8.00 |
| Velocity (fps) | 7.25 | 9.67 | 6.98 | 6.28 | 6.82 |
| Rip-rap Size (D50) | 9" | 15" | 9" | 9" | 9" |
| Bedding (-3/4" gravel) | 15" | 25" | 15" | 15" | 15" |
| Length of | All | 150' | 150' | All | All |

| | | | | | |
|---|---|---|---|---|---|
| Protection (ft.) | | | | | |
| Width of Protection (ft.) | 5' | 5' | 5' | 4' | 4' |
| Rip-Rap Depth | 12" | 18" | 12" | 12" | 12" |

* For Reference Only. Natural Rip-rap is more than adequate for erosion protection.

Note: Rip-Rap shall be graded according to the following:
$D_{15}$ = 0.42D; $D_{50}$ = 1D; $D_{85}$ = 1.6D.
For Median Diameter of 12", $D_{15}$ = 5", $D_{50}$ = 12", $D_{85}$ = 19.25".
For Median Diameter of 21", $D_{15}$ = 9", $D_{50}$ = 21", $D_{85}$ = 34.00".

| | | UD-2 (upper) | UD-2 (lower) |
|---|---|---|---|
| Flow (cfs) | 13.87 | 13.87 | |
| Slope (%) | | 12.33 | 42.60 |
| Velocity (fps) | 10.63 | 11.90 | |
| Rip-Rap Size (D50) | N/A** | 12" | |
| Bedding (-3/4" gravel) | N/A** | 20" | |
| Length of Protection (ft.) | | 150' | 100' |
| Width of Protection (ft.) | | 5' | 5' |
| Rip-Rap Depth | N/A** | 15" | |

** UD-2 (upper) is protected by a channel liner.

During the earthwork portion of the reclamation suitable rip-rap will be segregated and stored on site for later use in the stream channel restorations it will not be necessary to haul rip-rap in from an outside source. Also native material will be used for the filter blanket under the rip-rap. This material can be used because of its sandy nature it will not be necessary to haul gravel in.

TABLE IV-8

VALUES FOR MANNING'S N AND MAXIMUM PERMISSIBLE VELOCITY OF FLOW IN OPEN CHANNELS

| Ditch lining | | | | Manning's n | $V_{max}$ fps[1] |
|---|---|---|---|---|---|
| 1. Natural earth | | | | | |
| a. Without vegetation | | | | | |
| (1) Rock | | | | | |
| (a) Smooth and uniform ..... | | | | 0.035-0.040 | 20 |
| (b) Jagged & Irregular ..... | | | | 0.040-0.045 | 15-18 |
| (2) Soils | | | | | |
| Coarse grained | | | | | |
| Gravel and gravelly soils | | | | | |
| **Unified** | **USDA** | | | | |
| GW | Gravel | | | 0.022-0.024 | 6-7 |
| GP | Gravel | | | 0.023-0.026 | 7-8 |
| GM | Loamy | | d | 0.023-0.025 | 3-5 |
| | Gravel | | u | 0.022-0.020 | 2-4 |
| GC | Gravelly Loam<br>Gravelly Clay | | | 0.024-0.026 | 5-7 |
| Coarse grained | | | | | |
| Sand and sandy soils | | | | | |
| SW | Sand | | | 0.020-0.024 | 1-2 |
| SP | Sand | | | 0.022-0.024 | 1-2 |
| SM | Loamy | | d | 0.020-0.023 | 2-3 |
| | Sand | | u | 0.021-0.023 | 2-3 |
| SC | Sandy Loam | | | 0.023-0.025 | 3-4 |
| Fine grained | | | | | |
| Silts and clays | | | | | |
| 50 CL | Clay Loam<br>Sandy Clay Loam<br>Silty Clay | | | 0.022-0.024 | 2-3 |
| LL ML | Silt Loam<br>Very Fine Sand<br>Silt | | | 0.023-0.024 | 3-4 |
| 50 OL | Mucky Loam | | | 0.022-0.024 | 2-3 |
| CH | Clay | | | 0.022-0.023 | 2-3 |
| MH | Silty Clay | | | 0.023-0.024 | 3-5 |
| LL OH | Mucky Clay | | | 0.022-0.024 | 2-3 |
| Highly Organic | | | | | |
| PT | Peat | | | 0.022-0.025 | 2-3 |

[1]Maximum recommended velocities

Table IV-9
Sediment Yield
for
Disturbed Area

Using the Universal Soil Loss Equation:
A = RKLSCP; Where:

R = 16.53 from $R = 27P_{2,6}^{2.2}$; $P_{2,6}$ = 0.8 inches

K = 0.50 from Table 5.5 (Ref. Below)
LS = 2.5 Length/Slope factors from Fig. 5-15 (Ref. Below)

Average Length = 1200'
Average Slope = 6.25%
CP = 1.0 from Table 5.A.1 (Ref. Below)

Based on combination of compacted surface and pavement with grouted ditches.

*A = 16.53 x 0.50 x 2.5 x 1.0 = 20.6625 tons/acre/year
Sediment Yield = A = 0.010 ac./ft./acre/yr.

Notes: (1) Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

(2) Sediment Yield based on a weight of 100 lbs./cu. ft.

* Included for reference only. A more conservative figure of 0.05 ac. ft./acre has been used for Pond C, and 0.1 ac. ft./acre has been used for Pond E sizing.

Table IV-10
Sediment Yield
for
Undisturbed Areas

Using the Universal Soil Loss Equation:
A = RKLSCP; Where:

R = 16.53 from $R = 27P,^{2.2,}$; $P_{2,6}$ = 0.8 inches
2,6

K = 0.37 from Table 5.5 (Ref. Below)
LS = Average Length/Slope Factor from Equation = 56.04

$$LS = \left(\frac{L}{72.6}\right)^{0.5} \left(\frac{430X^2 + 30X + 0.43}{6.613}\right);$$

L = Avg. Slope Length = 1,000'

X = Sin 0; 0 = Avg. Slope Angle = 26.57° (50%)

C = 0.1 from Table 5.A.3 (Ref. Below)
25% Canopy Cover; 40% Ground Cover

P = 1 (No. Control Practice)

A = 16.53 x 0.37 x 56.04 x 0.1 = 34.275 tons/acre/yr.

Sed. Yield = $\frac{34.275 \times 2{,}000}{100 \times 43{,}560}$ = 0.016 ac. ft./acre/yr.

Notes: (1) Reference: "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

(2) Sediment yield based on a weight of 100 lbs./cu. ft.

Table IV-11
Minesite Drainage Area Summary

| Drainage No. | Area (ac.) | Type | Drains To: |
|---|---|---|---|
| 1 | 4.23 | Undisturbed | Pond E |

| | | | |
|---|---|---|---|
| 2 | 5.40 | " | Pond C |
| 3 | 3.00 | " | Old Works (Chidister Mine) |
| 4 | 3.12 | " | " " " |
| 5 | 11.97 | " | Pond C |
| 6 | 2.06 | " | Apex Mine |
| 7 | 1.12 | " | Old Works (Chidister Mine) |
| 8 | 0.55 | " | " " " |
| 9 | 1.01 | " | " " " |
| 10 | 7.41 | " | " " " |
| 11 | 0.13 | " | Pinnacle Mine |
| 12 | 13.52 | " | Pond C |
| 13 | 6.20 | " | Pond E |
| 14 | 1.77 | " | " " |
| 15 | 12.21 | Disturbed | " " |
| 16 | 6.04 | " | Pond C |
| 17 | 4.07 | " | Catch Basin B |
| 18 | 1.28 | " | Old Works (Chidister Mine) |
| 19 | 0.81 | " | Pinnacle Mine |
| 20 | 4.68 | " | Pond C |
| 21 | 3.25 | " | Old Works (Chidister Mine) |
| 22 | 1.23 | " | Apex Mine |
| Total = | 95.06; | | |

Disturbed = 33.57 Acres;
Undisturbed = 61.49 Acres

Notes: (1) Areas disturbed from Plate 8 (and Plate 9 as necessary).

(2) Does not include diverted undisturbed drainage.

Typical Diversion Ditch
Figure IV-3

INSERT ORIGINAL DRAWING

Typical Section for Trapezoidal Ditch
Figure IV-3A

INSERT ORIGINAL DRAWING

Undisturbed Diversion Typical
Figure IV-4

INSERT ORIGINAL DRAWING

Typical Section of Emergency Spillway
Figure IV-6

INSERT ORIGINAL DRAWING

Loose Rock Check Dam
(Restored Main Drainage Channel)
Figure IV-8

INSERT ORIGINAL DRAWING

Loose Rock Check Dam
(Restored Side Drainage Channel)
Figure IV-9Restored Channel Typicals
Figure IV-09

INSERT ORIGINAL DRAWING

Restored Channel Typicals
Figure IV-10

INSERT ORIGINAL DRAWING

Figure IV-12

INSERT ORIGINAL DRAWING

Figure IV-13
Sampling Access Ramp

INSERT ORIGINAL DRAWING

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Figure IV-14
Floating Decant Typical

INSERT ORIGINAL DRAWING

## R645-301-733.100. GENERAL PLANS

See R645-301-733.

## R645-301-733.110. CERTIFICATION

See R645-301-733.

## R645-301-733.120. MAPS AND CROSS SECTIONS

See R645-301-733., also R645-301-510.

## R645-301-733.130. NARRATIVE

See R645-301-733.

## R645-301-733.140. SURVEY RESULTS

Appendix L

## R645-301-733.150. HYDROLOGIC IMPACT

Appendix L

## R645-301-733.160. DESIGN PLANS AND CONSTRUCTION SCHEDULE

See R645-301-733.

## R645-301-733.200. PERMANENT AND TEMPORARY IMPOUNDMENTS

See R645-301-733.

## R645-301-733.210. REQUIREMENTS

N/A

## R645-301-733.220. DEMONSTRATION FOR PERMANENT IMPOUNDMENTS

N/A

## R645-301-733.221. ADEQUACY FOR INTENDED USE

N/A

**R645-301-733.222. WATER QUALITY AND EFFLUENT LIMITATIONS**

N/A

**R645-301-733.223. WATER LEVEL**

N/A

**R645-301-733.224. FINAL GRADING**

N/A

**R645-301-733.225. DIMINUTION OF QUALITY AND QUANTITY OF WATER UTILIZED BY OTHERS**

N/A

**R645-301-733.226. SUITABILITY FOR POSTMINING LAND USE**

N/A

**R645-301-733.230. TEMPORARY IMPOUNDMENTS**

See R645-301-733.

**R645-301-733.240. HAZARD NOTIFICATIONS**

See R645-301-733.

**R645-301-734. DISCHARGE STRUCTURES**

See R645-301-733.

**R645-301-735. DISPOSAL OF EXCESS SPOIL**

See R645-301-513.300.

**R645-301-736. COAL MINE WASTE**

See R645-301-513.300.

**R645-301-737. NON-COAL MINE WASTE**

See R645-301-513.300.

**R645-301-738. TEMPORARY CASING AND SEALING OF WELLS**

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-740. DESIGN CRITERIA AND PLANS

See R645-301-733.

## R645-301-741. GENERAL REQUIREMENTS

See R645-301-733.

## R645-301-742. SEDIMENT CONTROL MEASURES

See R645-301-733.

### R645-301-742.100. GENERAL REQUIREMENTS

See R645-301-733.

### R645-301-742.110. DESIGN

See R645-301-733.

### R645-301-742.111. PREVENTION

See R645-301-733.

### R645-301-742.112. EFFLUENT LIMITATIONS

Appendix J

### R645-301-742.113. EROSION PROTECTION

See R645-301-733.

### R645-301-742.120. MEASURES AND METHODS

See R645-301-733.

### R645-301-742.121. RETAINING SEDIMENT WITHIN DISTURBED AREAS

See R645-301-733.

**R645-301-742.122. DIVERTING RUNOFF AWAY FROM DISTURBED AREAS**

See R645-301-733.

**R645-301-742.123. DIVERTING RUNOFF USING PROTECTED CHANNELS**

See R645-301-733.

**R645-301-724.124. PHYSICAL TREATMENT TO REDUCE FLOW OR TRAP SEDIMENT**

See R645-301-733.

**R645-301-742.125. CHEMICAL TREATMENT**

N/A

**R645-301-742.126. IN-MINE TREATMENT**

N/A

**R645-301-742.200. SILTATION STRUCTURES**

See R645-301-733.

**R645-301-742.210. GENERAL REQUIREMENTS**

See R645-301-733.

**R645-301-742.211. DESIGN**

See R645-301-733.

**R645-301-742.212. REQUIREMENTS**

See R645-301-733.

**R645-301-742.213. SILTATION STRUCTURES WHICH IMPOUND WATER**

See R645-301-733.

**R645-301-742.214. POINT SOURCE DISCHARGES**

See R645-301-711.300.

## R645-301-742.220. SEDIMENTATION PONDS

See R645-301-733.

## R645-301-742.221. USE

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## R645-301-742.221.1 INDIVIDUALLY OR IN SERIES

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## R645-301-742.221.2 LOCATION

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## R645-301-742.221.3 DESIGN, CONSTRUCTION AND MAINTENANCE

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## R645-301-742.221.31 SEDIMENT STORAGE VOLUME

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## R645-301-742.221.32 DETENTION TIME

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## R645-301-742.221.34 DEWATERING DEVICE

See R645-301-733.

## R645-301-742.221.35 SHORT CIRCUITING

See R645-301-733.

## R645-301-742.221.36 SEDIMENT REMOVAL

See R645-301-733.

## R645-301-742.221.37 EXCESSIVE SETTLEMENT

See R645-301-733.

## R645-301-742.221.38 EMBANKMENT MATERIAL

See R645-301-733.

**R645-301-742.221.39 COMPACTION**

See R645-301-733.

**R645-301-742.222. MSHA SEDIMENTATION PONDS**

N/A

**R645-301-742.223. OTHER SEDIMENTATION PONDS**

See R645-301-733.

**R645-301-745.223.1 OPEN CHANNEL SPILLWAY**

See R645-301-733.

**R645-301-742.223.2 LINING**

See R645-301-733.

**R645-301-742.230. OTHER TREATMENT FACILITIES**

N/A

**R645-301-742.231. DESIGN EVENT**

N/A

**R645-301-742.232. REQUIREMENTS**

N/A

**R645-301-742.240. EXEMPTIONS**

N/A

**R645-301-742.300. DIVERSIONS**

See R645-301-733.

**R645-301-742.310. GENERAL REQUIREMENTS**

See R645-301-733.

**R645-301-742.311. REQUIREMENTS**

See R645-301-733.

**R645-301-742.312. DESIGN**

See R645-301-733.

**R645-301-742.312.1 STABILITY**

See R645-301-733.

**R645-301-742.312.2 FLOOD PROTECTION**

See R645-301-733.

**R645-301-742.312.3 SUSPENDED SOLIDS**

See R645-301-733.

**R645-301-742.312.4 COMPLY WITH OTHER REGULATIONS**

See R645-301-733.

**R645-301-742.313. TEMPORARY AND PERMANENT DIVERSIONS**

See R645-301-733.

**R645-301-742.314. ADDITIONAL DESIGN CRITERIA**

See R645-301-733.

**R645-301-742.320. DIVERSION OF PERENNIAL AND INTERMITTENT STREAMS**

N/A

**R645-301-742.321. BUFFER ZONE REQUIREMENTS**

N/A

**R645-301-742.322. DESIGN CAPACITY**

N/A

**R645-301-742.323. DESIGN EVENT**

N/A

**R645-301-742.324. CERTIFICATION**

N/A

## R645-301-742.330. DIVERSION OF MISCELLANEOUS FLOWS

See R645-301-733.

## R645-301-742.331. REQUIREMENTS

See R645-301-733.

## R645-301-742.332. DESIGN

See R645-301-733.

## R645-301-742.333. DESIGN EVENT

See R645-301-733.

## R645-301-742.400. ROAD DRAINAGE

See R645-301-733., .250.

## R645-301-742.410. ALL ROADS

See R645-301-733., .250.

## R645-301-742.411. PROTECTION AND SAFETY

See R645-301-733., .250.

## R645-301-742.412. INTERMITTENT OR PERENNIAL STREAM RESTRICTION

N/A

## R645-301-742.413. DOWNSTREAM SEDIMENTATION AND FLOODING

See R645-301-733.

## R645-301-742.420. PRIMARY ROADS

See R645-301-733., .250.

## R645-301-742.421. EROSION PROTECTION

See R645-301-733., .250.

## R645-301-742.422. STREAM FORDS

N/A

**R645-301-742.423. DRAINAGE CONTROL**

See R645-301-733.

**R645-301-742.423.1 PRIMARY ROAD DESIGN CRITERIA**

See R645-301-512.250.

**R645-301-742.423.2 DRAINAGE PIPES AND CULVERTS**

See R645-301-733.

**R645-301-742.423.3 DRAINAGE DITCHES**

See R645-301-733.

**R645-301-742.423.4 NATURAL STREAM CHANNELS**

See R645-301-733.

**R645-301-742.423.5 REQUIREMENTS**

See R645-301-733.

**R645-301-743. IMPOUNDMENTS**

See R645-301-733.

**R645-301-743.100. GENERAL REQUIREMENTS**

See R645-301-733.

**R645-301-743.110. MSHA IMPOUNDMENTS**

N/A

**R645-301-743.120. CERTIFICATION AND FREEBOARD REQUIREMENTS**

See R645-301-733.

**R645-301-743.130. SPILLWAYS**

See R645-301-733.

**R645-301-743.140. INSPECTIONS**

See R645-301-733.

**R645-301-743.200. SPILLWAY DESIGN EVENT FOR PERMANENT IMPOUNDMENTS**

N/A

**R645-301-743.300. SPILLWAY DESIGN EVENT FOR TEMPORARY IMPOUNDMENTS**

See R645-301-733.

**R645-301-744. DISCHARGE STRUCTURES**

See R645-301-733.

**R645-301-744.100. EROSION CONTROL**

See R645-301-733.

**R645-301-744.200. DESIGN**

See R645-301-733.

**R645-301-745. DISPOSAL OF EXCESS SPOIL**

See R645-301-513.300.

**R645-301-745.100. GENERAL REQUIREMENTS**

See R645-301-513.300.

**R645-301-745.110. DISPOSAL AREA**

See R645-301-513.300.

**R645-301-745.111. EFFECTS ON SURFACE AND GROUND WATER**

See R645-301-513.300.

**R645-301-745.112. IMPOUNDMENTS ON FILL**

N/A

**R645-301-745.113. COVER**

See R645-301-513.300.

**R645-301-745.120. DRAINAGE CONTROL**

N/A

**R645-301-745.121. DIVERSIONS**

N/A

**R645-301-745.122. UNDERDRAINS**

N/A

**R645-301-745.200. VALLEY FILLS AND HEAD-OF-HOLLOW FILLS**

N/A

**R645-301-745.210. REQUIREMENTS**

N/A

**R645-301-745.220. DRAINAGE CONTROL**

N/A

**R645-301-745.221. RESTRICTIONS**

N/A

**R645-301-745.222. RUNOFF CONTROL**

N/A

**R645-301-745.300. DURABLE ROCK FILLS**

N/A

**R645-301-745.310. REQUIREMENTS**

N/A

**R645-301-745.320. UNDERDRAINS**

N/A

**R645-301-745.330. RUNOFF CONTROL**

N/A

**R645-301-745.400. PRE-EXISTING BENCHES**

N/A

**R645-301-746. COAL MINE WASTE**

See R645-301-513.300.

**R645-301-746.100. GENERAL REQUIREMENTS**

See R645-301-513.300.

**R645-301-746.110. PLACEMENT**

See R645-301-513.300.

**R645-301-746.120. EFFECTS ON SURFACE AND GROUND WATER**

See R645-301-513.300.

**R645-301-746.200. REFUSE PILES**

N/A

**R645-301-746.210. REQUIREMENTS**

N/A

**R645-301-746.211. SEEPS AND SPRINGS**

N/A

**R645-301-746.212. UNCONTROLLED SURFACE DRAINAGE**

N/A

**R645-301-746.213. UNDERDRAINS**

N/A

**R645-301-746.220. SURFACE AREA STABILIZATION**

N/A

**R645-301-746.221. SLOPE PROTECTION**

N/A

**R645-301-746.222. IMPOUNDMENT RESTRICTIONS**

N/A

**R645-301-746.300. IMPOUNDING STRUCTURES**

N/A

**R645-301-746.310. COAL MINE WASTE**

See R645-301-513.300.

**R645-301-746.311. REQUIREMENTS**

See R645-301-513.300.

**R645-301-746.312. MSHA IMPOUNDING STRUCTURE**

N/A

**R645-301-746.320. SPILLWAYS AND OUTLET WORK**

N/A

**R645-301-746.330. DRAINAGE CONTROL**

N/A

**R645-301-746.340. WATER STORAGE**

N/A

**R645-301-746.400. RETURN OF COAL PROCESSING WASTE TO ABANDONED UNDERGROUND WORKINGS**

N/A

**R645-301-746.410. HYDROLOGIC IMPACTS**

N/A

**R645-301-746.420. MONITORING WELLS**

N/A

**R645-301-746.430. PNEUMATIC BACKFILLING**

N/A

**R645-301-747. DISPOSAL OF NON-COAL MINE WASTE**

See R645-301-513.300.

## R645-301-747.100. REQUIREMENTS

See R645-301-513.300.

## R645-301-747.200. PLACEMENT AND STORAGE

See R645-301-513.300

## R645-301-747.300. FINAL DISPOSAL

See R645-301-513.300.

## R645-301-748. CASING AND SEALING OF WELLS

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-750. PERFORMANCE STANDARDS

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

## R645-301-751. WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS

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

## R645-301-752. SEDIMENT CONTROL MEASURES

Sediment control measures must be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760.

## R645-301-752.100. SILTATION STRUCTURES AND DIVERSIONS

See R645-301-733.

## R645-301-752.200. ROAD DRAINAGE

See R645-301-512.250.

## R645-301-752.210. CONTROL OF EROSION AND POLLUTION

See R645-301-733.

## R645-301-752.220. CONTROL OF SUSPENDED SOLIDS

See R645-301-733.

## R645-301-752.230. COMPLIANCE WITH EFFLUENT STANDARDS

See R645-301-733.

## R645-301-752.240. MINIMIZE DIMINUTION OF DEGRADATION OF WATER QUALITY

See R645-301-733.

## R645-301-752.250. ALTERATION OF STREAM FLOW OR CHANNELS

See R645-301-733.

## R645-301-753. IMPOUNDMENTS AND DISCHARGE STRUCTURES

See R645-301-733.

## R645-301-754. DISPOSAL OF EXCESS SPOIL, COAL MINE WASTE AND NON-COAL MINE WASTE

See R645-301-513.300.

## R645-301-755. CASING AND SEALING OF WELLS

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be

maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

## R645-301-760. RECLAMATION

See R645-301-240.

## R645-301-761. GENERAL REQUIREMENTS

See R645-301-240.

## R645-301-762. ROADS

See R645-301-512.250.

## R645-301-762.100. RESTORING NATURAL DRAINAGE PATTERS

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

   All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

## R645-301-762.200. REGRADING

See R645-301-532.200.

## R645-301-763. SILTATION STRUCTURES

See R645-301-733.

## R645-301-763.100. RESTRICTIONS

See R645-301-733.

## R645-301-763.200. REQUIREMENTS

See R645-301-733.

## R645-301-764. STRUCTURE REMOVAL

See R645-301-240.

## R645-301-765. PERMANENT CASING AND SEALING OF WELLS

All exploratory drill holes have been sealed with cement and all water wells have been cased with steel casing and will be maintained. After mining is completed, the water wells and monitoring wells will be sealed except in the event the state engineer allows them to remain opened for other purposes.

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 8

## Bonding

## C/007/019

(Revised)
June, 2014

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## R645-301-800. BONDING AND INSURANCE

~~As the Mathis Tract and New Federal Summit Creek Lease boundary change~~ Since the relinquishments and adding Kenilworth do not involve a reduction or an increase in disturbed areas Chapter 8 has not been changed. The depth of Kenilworth lease averages in excess of 2,500 feet of cover, no subsidence or surface disturbance is anticipated. Please refer to the approved MRP for current Chapter 8 information. The Kenilworth Lease is simply an extension of underground mine workings under roughly 2,600 - 3,000 feet of cover there will be absolutely no effect to the surface and therefore has no influence on the reclamation bond already in place. ANDALEX is equipped with the required liability insurance.

## R645-301-810. BONDING DEFINITIONS AND DIVISION RESPONSIBILITIES

N/A -- DIVISION

## R645-301-811. TERMS USED

N/A -- DIVISION

## R645-301-812. DIVISION RESPONSIBILITIES - BONDING

N/A -- DIVISION

## R645-301-812.100. FORMS

N/A -- DIVISION

## R645-301-812.200. REGULATION TERMS AND CONDITIONS FOR PERFORMANCE BONDS AND INSURANCE

N/A -- DIVISION

## R645-301-812.300. BOND AMOUNT

N/A -- DIVISION

## R645-301-812.400. SELF-BOND

## R645-301-820.114. REQUIREMENTS

Introduction

An estimate is provided in the Reclamation Cost Projection. Notably changed from the original bond estimate is the addition of the shop/warehouse complex, the removal of which will have to be added to the reclamation cost. The original estimate has also been revised to reflect current prices and wage estimate has also been revised to reflect current prices and wage schedules. Andalex frequently requires the use of dirt contractors and is therefore current on equipment rental costs, labor costs, and productivity, since we have a great deal of experience with construction projects. Andalex has used its experience in construction and earth moving projects to estimate the amount of time which will be required and the equipment needed for individual reclamation activities. Andalex has also been involved with several ~~rEVEGATATION~~revegetation projects from which it drew estimates. Andalex has provided, as Plate 15, accurate as built versus reclaimed cross sections which show the mass balance for earthwork. The approximate original contours will be achieved using the material cut out to create the fill areas. No material will be hauled in. Maps depicting accurately the surface facilities including topsoil areas, structures and facilities are included in Volume II and also specific topsoil maps and cross sections are included. Andalex expects to return topsoil to a depth of up to 6" around the surface area of ~~34~~47.~~2~~19 acres.

Phase I of the reclamation will include, chronologically, structure removal including culverts, portal sealing, well sealing, regrading, recontouring, distribution of topsoil and ~~rEVEGATATION~~revegetation. Additional sediment control during Phase I such as straw dikes and rock check dams will be implemented as shown on Plate 16. Once Phase I is adequately achieved, Phase II will commence which includes the removal of sediment structure E and ~~rEVEGATATION~~revegetation of this area. This is followed by monitoring, noting that monitoring had begun during Phase I. See 5.8 re Monitoring. This section discusses the extended period of liability as being ten years if necessary. The entire permit area receives less than 26 inches of annual precipitation; therefore, it is generally accepted that Andalex is subject to an extended period of liability. Obviously if ~~rEVEGATATION~~revegetation is deemed successful prior to this ten

## R645-301-820.350. GENERAL

N/A

## R645-301-820.351. BOND LIABILITY

N/A

## R645-301-820.352. IMPLEMENTATION OF ALTERNATIVE POSTMINING LAND USE

N/A

## R645-301-830. DETERMINATION OF BOND AMOUNT

~~Calculations of the estimate are included following this page. Calculations for cuts and fills were made and are summarized following the bond estimate. This summary shows the mass balance for the entire disturbed area including the Aberdeen site, as taken from Plates 14 and 15. Station numbers are referenced on Plate 14 and cross sections are shown on Plates 15-1, 2, and 3. Similarly, topsoil piles have been surveyed for the existing minesite and are summarized following the cut and fill summary. Because of deficits Andalex has committed to testing topsoil substitute areas.~~

~~**Cost of Reclamation**~~

~~Detailed Estimate~~

~~A detailed cost projection follows and includes reclamation of the left hand fork fan installation~~

~~Calculations~~

Calculations

Calculations of the estimate are included ~~following this page. Calculations for cuts and fills were made and are summarized following the bond estimate. This summary shows the mass balance~~

~~for the entire disturbed area including the Aberdeen site, as taken from Plates 14 and 15. Station numbers are referenced on Plate 14 and cross sections are shown on Plates 15 1, 2, and 3. Similarly, topsoil piles have been surveyed for the existing minesite and are summarized following the cut and fill summary. Because of deficits Andalex has committed to testing topsoil substitute areas.~~

in Appendix B.

**Bond or Surety Arrangement**

Andalex currently holds a bond, approved by UDOGM ~~in the amount of $1,080,000.00~~ and it is included in this MRP in Appendix B.

~~Reclamation Plan (before bond estimate)~~

~~The productivity of equipment is somewhat difficult to predict, and therefore, Andalex feels that conservative estimates were in order. There are many variables which contribute to the productivity of a particular machine, including operator skill, type of material, and the condition of the material.~~

~~It is obvious that a front end loader, for example, can move more topsoil from a pile than, for example, a bouldery conglomerate of highly compacted material.~~

~~However, for the purpose of this analysis, it should be assured that based on means cost data the following prices on earthwork can be used:~~

~~Open Dozer grading : $2.25/yd~~
~~Fill Placement : $1.16/yd~~
~~Topsoil Placement: $1.16/yd~~
~~Topsoil Hauling: $4.55/yd~~
~~Compaction: $.21/yd~~

~~The following cost projection reflects hourly rates. An additional earthwork estimate can be found following the mass balance estimates.~~

1989
Reclamation Cost Projection
Centennial Project

Lower Sunnyside Mine

Restoration to pre mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Coal Pile Storage Area | | | |
| a. Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. Fill pad | Loader | 55 | 4,400 |
| c. Contour slope including stream channel | D 7 | 50 | 4,000 |
| d. Compact | Loader | 15 | 1,200 |
| e. Replace topsoil | Loader | 23 | 1,840 |
| f. Grade topsoil | Grader | 15 | 1,050 |
| g. Revegetate | Drill | 7 | 350 |
| h. Stake | Engineer | 14 | 700 |
| Total Coal Pile Area: | | | $14,180 |
| 2. Roads | | | |
| a. Recontour | D 7 | 5 | $ 400 |
| b. Compact | Loader | 3 | 240 |
| c. Replace topsoil | Loader | 2 | 160 |
| d. Grade topsoil | Grader | 2 | 140 |
| e. Revegetate | Drill | 1 | 50 |
| Total Roads: | | | $ 990 |
| 3. Seal Wells (2) | | | |
| a. Fill, cement | | | $ 800 |
| Total Wells: | | | $ 800 |
| 4. Material Storage Area (including topsoil pile) | | | |
| a. Remove all structures | 5 man crew | 120 | $ 9,000 |
| b. Recontour including stream channel | D 7 | 30 | 2,400 |

| | | | |
|---|---|---|---|
| c. Compact | Loader | 4 | 320 |
| d. Replace topsoil | Loader | 8 | 640 |
| e. Grade topsoil | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| g. Stake | Engineer | 14 | 700 |

Total Material Storage: $13,440

Gilson (Pinnacle Mine)

Restoration to the pre-mining land use will require:

| Job Description | Equipment | Hours | Cost |
|---|---|---|---|
| 1. Mine Portal Area | | | |
| a. Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. Fill pad | Loader | 12 | 960 |
| c. Contour slope | D 7 | 8 | 640 |
| d. Compact | Loader | 4 | 320 |
| e. Replace topsoil | Loader | 6 | 480 |
| f. Grade topsoil | Grader | 4 | 280 |
| g. Revegetate | Drill | 2 | 100 |
| h. Stake slope | Engineer | 4 | 200 |
| Total Portal: | | | $ 3,620 |
| 2. Roads (1 mile) | | | |
| a. Recontour | D 7 | 20 | $ 1,600 |
| b. Compact | Loader | 10 | 800 |
| c. Topsoil | Loader | 8 | 640 |
| d. Grade | Grader | 8 | 560 |
| e. Revegetate | Drill | 4 | 200 |
| Total Roads: | | | $ 3,800 |
| 3. Coal Pile Area | | | |
| a. Fill pad | Loader | 16 | $ 1,280 |
| b. Contour slope including stream channel | D 7 | 20 | 1,600 |
| c. Compact | Loader | 4 | 320 |
| d. Topsoil | Loader | 6 | 480 |
| e. Grade | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| g. Stake | Engineer | 4 | 200 |
| Total Stockpile Area: | | | $ 4,260 |
| 4. Seal Wells | | | |
| a. Fill, cement | | 8 | $ 1,000 |
| Total Wells: | | | $ 1,000 |
| 5. Material Storage & Building Areas | | | |
| a. Remove all structures (including shop/ warehouse) | 5 man crew | 240 | $27,000 |

| | | | |
|---|---|---|---|
| b. Recontour including stream channel | D-7 | 30 | 2,400 |
| c. Compact | Loader | 4 | 320 |
| d. Replace topsoil | Loader | 8 | 640 |
| e. Grade | Grader | 4 | 280 |
| f. Revegetate | Drill | 2 | 100 |
| Total Material: | | | $30,740 |

Aberdeen Mine

Restoration to the pre mining land use will require:

| | Job Description | Equipment | Hours | Cost |
|---|---|---|---|---|
| 1. | Mine Portal Area | | | |
| a. | Seal portals, remove conveyor, etc. | Loader | 8 | $ 640 |
| b. | Fill pad | Loader | 24 | 1,920 |
| c. | Contour slope | D 7 | 16 | 1,280 |
| d. | Compact | Loader | 8 | 640 |
| e. | Replace topsoil | Loader | 12 | 960 |
| f. | Grade topsoil | Grader | 8 | 560 |
| g. | Revegetate | Drill | 4 | 200 |
| h. | Stake slope | Engineer | 8 | 400 |
| | Total Portal Area: | | | $ 6,600 |
| 2. | Coal Pile Area (including topsoil storage and sedimentation pond) | | | |
| a. | Fill pad | Loader | 50 | $ 4,000 |
| b. | Contour slope including stream channel | D 7 | 50 | 4,000 |
| c. | Compact | Loader | 15 | 1,200 |
| d. | Replace topsoil | Loader | 22 | 1,760 |
| e. | Grade topsoil | Grader | 15 | 1,050 |
| f. | Revegetate | Drill | 7 | 350 |
| g. | Stake slope | Engineer | 14 | 700 |
| | Total Stockpile Area: | | | $13,060 |
| 3) a. | Seal Portals, fill cut slope | Loader | 8 | $ 640 |
| b. | Remove culvert | Backhoe | 25 | 2,000 |
| c. | Contour stream channel | D 7 | 16 | 1,280 |
| d. | Contour slope | D 7 | 16 | 1,280 |
| e. | Compace | Loader | 8 | 640 |
| f. | Replace topsoil | Loader | 16 | 1,200 |
| g. | REVEGATATION | Drill | 2 | 100 |

| | | | |
|---|---|---|---|
| h. | Stake slope Engineer | 8 | 400 |
| | Total Stockpile Area: | | $ 7,540 |

~~Office Site~~

~~Restoration to pre mining land use will require:~~

| ~~Job Description~~ | ~~Equipment~~ | ~~Hours~~ | ~~Cost~~ |
|---|---|---|---|
| ~~1. Office Site~~ | | | |
| ~~a. Remove structures~~ | ~~5 man crew~~ | ~~50~~ | ~~$ 3,750~~ |
| ~~b. Recontour~~ | ~~D 7~~ | ~~8~~ | ~~640~~ |
| ~~c. Compact~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| ~~d. Replace topsoil~~ | ~~Loader~~ | ~~4~~ | ~~320~~ |
| ~~e. Grade topsoil~~ | ~~Grader~~ | ~~4~~ | ~~280~~ |
| ~~f. Revegetate~~ | ~~Drill~~ | ~~2~~ | ~~100~~ |
| ~~g. Stake slope~~ | ~~Engineer~~ | ~~4~~ | ~~200~~ |
| ~~Total Office Site:~~ | | | ~~$ 5,610~~ |
| ~~2. Seal Well (1)~~ | | | |
| ~~a. Fill, cement~~ | | ~~4~~ | ~~$ 400~~ |
| ~~Total Well:~~ | | | ~~$ 400~~ |
| ~~3. Roads 1/4 Mile~~ | | | |
| ~~a. Recontour~~ | ~~D 7~~ | ~~5~~ | ~~$ 400~~ |
| ~~b. Compact~~ | ~~Loader~~ | ~~3~~ | ~~240~~ |
| ~~c. Replace topsoil~~ | ~~Loader~~ | ~~2~~ | ~~160~~ |
| ~~d. Grade topsoil~~ | ~~Grader~~ | ~~2~~ | ~~140~~ |
| ~~e. Revegetate~~ | ~~Drill~~ | ~~1~~ | ~~50~~ |
| ~~Total Roads:~~ | | | ~~$ 990~~ |

~~Total Projected Reclamation Costs:~~

| | |
|---|---|
| ~~Lower Sunnyside Mine~~ | ~~$ 29,410~~ |
| ~~Gilson (Pinnacle) Mine~~ | ~~43,420~~ |
| ~~Aberdeen Mine~~ | ~~27,200~~ |
| ~~Office Site~~ | ~~7,000~~ |
| ~~Monitoring (5 years)~~ | ~~10,000~~ |
| ~~Total Reclamation, 1987 $~~ | ~~$117,490~~ |
| ~~Contingency 10%~~ | ~~11,750~~ |
| ~~Grand Total*~~ | ~~$129,240~~ |

~~* Please note that as no reclamation is required for the Centennial Seam Mine no costs for reclamation are described above.~~

## MASS BALANCE SUMMARY

| Station | CUT | | FILL | |
|---|---|---|---|---|
| | ft² | yds³ | ft² | yds³ |
| 1 + 00 | 520 | 963 | 160 | 2148 |
| 0 + 00 | 0 | 815 | 1000 | 1889 |
| 1 + 00 | 440 | 1000 | 20 | 407 |
| 2 + 00 | 100 | 1074 | 200 | 1259 |
| 3 + 00 | 480 | 3333 | 480 | 1519 |
| 4 + 00 | 1320 | 2593 | 340 | 2259 |
| 5 + 00 | 80 | 2889 | 880 | 1852 |
| 6 + 00 | 1480 | 6778 | 120 | 2704 |
| 7 + 00 | 2180 | 9037 | 1340 | 4074 |
| 8 + 00 | 2700 | 8259 | 860 | 2556 |
| 9 + 00 | 1760 | 6000 | 520 | 4297 |
| 10 + 00 | 1480 | 6444 | 1800 | 6519 |
| 11 + 00 | 2000 | 6259 | 1720 | 5593 |
| 12 + 00 | 1380 | 9222 | 1300 | 5074 |
| 13 + 00 | 3600 | 7037 | 1440 | 6148 |
| 14 + 00 | 200 | 370 | 1880 | 8852 |
| 15 + 00 | 0 | 370 | 2900 | 5815 |
| 16 + 00 | 200 | 407 | 240 | 2111 |
| 17 + 00 | 20 | 1889 | 900 | 5593 |
| 18 + 00 | 1000 | 2889 | 2120 | 8185 |
| 19 + 00 | 560 | 2000 | 2300 | 5319 |
| 20 + 00 | 520 | 4444 | 572 | 3059 |
| 21 + 00 | 1880 | 8704 | 1080 | 3185 |
| 22 + 00 | 2820 | 8556 | 640 | 3037 |
| 23 + 00 | 1800 | 3741 | 1000 | 3370 |
| 24 + 00 | 220 | 1148 | 820 | 2963 |
| 25 + 00 | 400 | 926 | 780 | 4519 |
| 26 + 00 | 100 | 2630 | 1660 | 10222 |
| 27 + 00 | 1320 | 4444 | 3860 | 7407 |
| 28 + 00 | 1080 | 3111 | 140 | 1741 |
| 29 + 00 | 600 | 2222 | 800 | 2815 |
| 30 + 00 | 600 | 2074 | 720 | 2222 |

| | | | | |
|---|---|---|---|---|
| 31 + 00 | 520 | 1889 | 480 | 1741 |
| 32 + 00 | 500 | 1482 | 460 | 2185 |
| 33 + 00 | 300 | 2037 | 720 | 1815 |
| 34 + 00 | 800 | 3111 | 260 | 852 |
| 35 + 00 | 880 | 3185 | 200 | 1630 |
| 36 + 00 | 840 | 1963 | 680 | 3482 |
| 37 + 00 | 220 | 1741 | 1200 | 5407 |
| 38 + 00 | 720 | 2741 | 1720 | 4037 |
| 39 + 00 | 760 | 3000 | 460 | 6111 |
| 40 + 00 | 860 | 2704 | 2840 | 5593 |
| 41 + 00 | 600 | 1444 | 180 | 1148 |
| 42 + 00 | 180 | 482 | 440 | 963 |
| 43 + 00 | 80 | 148 | 80 | 148 |

* Total Cut = 147,555 $yds^3$; * Total Fill = 163,825 $yds^3$

* Ratio of fill to cut = 1.11:1.00. This allows for an expansion factor of 1.11 or 11% on the cut material.

As Constructed Earthwork Volume (Aberdeen Mine and Left Fork Fan)

Cut 72,406 yds.³
Fill 76,925 yds.³
Topsoil 4,250 yds.³ (Piles H & J)

As Constructed Earthwork Volumes
(including Aberdeen Site)

Cut 117,273 yds.³
Fill 112,969 yds.³
Topsoil 8,500 yds.³

For purposes of reclamation costs for earthwork, the following estimates can be used. Please keep in mind that as built cross sections for the Aberdeen Mine will aid in the final earthwork estimates.

Open Grading (including 10% swell factor)
76,925 + 7693 = 84,618 @ $2.25
112,969 + 11,297 = 124,266 @ $2.25
208,884 @ $2.25 = $469,989

Topsoil Hauling and Placement
22,750 + 2275 = 25,025 @ $5.71 = $142,893

Compaction
158,294 @ $.21 = $33,242

Total Earthwork: $646,124

There is a 8,000 yd.³ topsoil deficit. The topsoil substitutes will make up this deficit.

The test plots previously discussed regarding the topsoil deficit is further discussed here.

Two test plot locations were decided upon based on certain known parameters. The 5,240 yard substitute material area chosen was once designated as substitute topsoil. Now that the shop building is in place, this should not have any impact on the suitability of the material. The second location depicted on Plate 6 near the Apex Truck Loadout is very similar, if not identical material, to the shop pad material (the rEVEGATATION test will ultimately prove this). To prove the materials suitability, Andalex has proposed to test the material using the approved seed mixture on the locations shown on Plate 6. The area of the test plots are both currently heavily vegetated indicating good potential. These test plots will

~~be monitored for two years and evaluated for growth and species success. It is anticipated that these areas will succeed and solve the deficit problem.~~

VERIFICATION STATEMENT

STATE OF UTAH )
SS.
COUNTY OF CARBON )

I, Michael W. Glasson, having been duly sworn, depose and attest that all of the representations contained in the foregoing application and true, accurate and complete to the best of my knowledge; that I am authorized to complete and file this application on behalf of the Applicant and this application has been executed as required by law.

Signed: _____

Taken, subscribed and sworn to me before the undersigned authority in my said county, this _____ day of December, 1998.

Notary Public: _____

My Commission Expires: _____

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CHAPTER 8

## Bonding

**C/007/019**

(Revised)
July, 2014

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## R645-301-800. BONDING AND INSURANCE

Since the relinquishments and adding Kenilworth do not involve a reduction or an increase in disturbed areas Chapter 8 has not been changed. The depth of Kenilworth lease averages in excess of 2,500 feet of cover, no subsidence or surface disturbance is anticipated. Please refer to the approved MRP for current Chapter 8 information. The Kenilworth Lease is simply an extension of underground mine workings under roughly 2,600 - 3,000 feet of cover there will be absolutely no effect to the surface and therefore has no influence on the reclamation bond already in place. ANDALEX is equipped with the required liability insurance.

## R645-301-810. BONDING DEFINITIONS AND DIVISION RESPONSIBILITIES

N/A -- DIVISION

## R645-301-811. TERMS USED

N/A -- DIVISION

## R645-301-812. DIVISION RESPONSIBILITIES - BONDING

N/A -- DIVISION

## R645-301-812.100. FORMS

N/A -- DIVISION

## R645-301-812.200. REGULATION TERMS AND CONDITIONS FOR PERFORMANCE BONDS AND INSURANCE

N/A -- DIVISION

## R645-301-812.300. BOND AMOUNT

N/A -- DIVISION

## R645-301-812.400. SELF-BOND

N/A -- DIVISION

## R645-301-812.500. BOND RELEASE

N/A -- DIVISION

## R645-301-812.600. BOND FORFEITURE

N/A -- DIVISION

## R645-301-812.700. ADEQUATE BOND COVERAGE AT ALL TIMES

N/A -- DIVISION

## R645-301-820. REQUIREMENT TO FILE A BOND

Andalex currently holds a bond, approved by UDOGM in the amount of $1,080,000.00 and it is included in this MRP in Appendix B.

See also Appendix B

## R645-301-820.100. PRIOR TO PERMIT ISSUANCE

Appendix B

## R645-301-820.110. AREAS COVERED BY BONDING

Appendix B

## R645-301-820.111. REQUIREMENTS

Appendix B

## R645-301-820.112. INCREMENTAL BONDING

Appendix B

## R645-301-820.113. BONDING MAP

Plates 5 & 7

## R645-301-820.114. REQUIREMENTS

**Introduction**

An estimate is provided in the Reclamation Cost Projection. Notably changed from the original bond estimate is the addition of the shop/warehouse complex, the removal of which will have to be added to the reclamation cost. The original estimate has also been revised to reflect current prices and wage estimate has also been revised to reflect current prices and wage schedules. Andalex frequently requires the use of dirt contractors and is therefore current on equipment rental costs, labor costs, and productivity, since we have a great deal of experience with construction projects. Andalex has used its experience in construction and earth moving projects to estimate the amount of time which will be required and the equipment needed for individual reclamation activities. Andalex has also been involved with several revegetation projects from which it drew estimates. Andalex has provided, as Plate 15, accurate as built versus reclaimed cross sections which show the mass balance for earthwork. The approximate original contours will be achieved using the material cut out to create the fill areas. No material will be hauled in. Maps depicting accurately the surface facilities including topsoil areas, structures and facilities are included in Volume II and also specific topsoil maps and cross sections are included. Andalex expects to return topsoil to a depth of up to 6" around the surface area of 47.19 acres.

Phase I of the reclamation will include, chronologically, structure removal including culverts, portal sealing, well sealing, regrading, recontouring, distribution of topsoil and revegetation. Additional sediment control during Phase I such as straw dikes and rock check dams will be implemented as shown on Plate 16. Once Phase I is adequately achieved, Phase II will commence which includes the removal of sediment structure E and revegetation of this area. This is followed by monitoring, noting that monitoring had begun during Phase I. See 5.8 re Monitoring. This section discusses the extended period of liability as being ten years if necessary. The entire permit area receives less than 26 inches of annual precipitation; therefore, it is generally accepted that Andalex is subject to an extended period of liability. Obviously if revegetation is deemed successful prior to this ten year period, Andalex will request bond release. Andalex has not proposed any selective husbandry practices.

**R645-301-820.120. ACTIVITY RESTRICTION PRIOR TO BONDING**

See R645-301-820.114.

**R645-301-820.130. BONDING SCHEMES**

See R645-301-820.114.

**R645-301-820.131. PERFORMANCE BOND FOR ENTIRE PERMIT AREA**

N/A

**R645-301-820.132. CUMULATIVE BOND SCHEDULE AND PERFORMANCE BOND**

Appendix B

**R645-301-820.133 INCREMENTAL BOND SCHEDULE AND PERFORMANCE BOND**

N/A

**R645-301-820.200. FORM OF THE PERFORMANCE BOND**

Appendix B

**R645-301-820.210. FORM**

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**R645-301-820.220. ALLOWABLE TYPES OF BONDS**

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**R645-301-820.221. SURETY BOND**

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**R645-301-820.222. COLLATERAL BOND**

N/A

**R645-301-820.223. SELF BOND**

N/A

## R645-301-820.224. COMBINATION OF BOND TYPES

N/A

## R645-301-820.300. PERIOD OF LIABILITY

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## R645-301-820.310. REQUIREMENTS

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## R645-301-820.320. BOND PHASES

See R645-301-820.114.

## R645-301-820.330. RESTRICTIONS

N/A

## R645-301-820.340. INTENSIVE AGRICULTURAL POSTMINING LAND USE

N/A

## R645-301-820.350. GENERAL

N/A

## R645-301-820.351. BOND LIABILITY

N/A

## R645-301-820.352. IMPLEMENTATION OF ALTERNATIVE POSTMINING LAND USE

N/A

## R645-301-830. DETERMINATION OF BOND AMOUNT

**Calculations**

Calculations of the estimate are included in Appendix B.

**Bond or Surety Arrangement**

Andalex currently holds a bond, approved by UDOGM and it is included in this MRP in Appendix B.

## R645-301-830.100. BONDED AREAS

See Plate 6, R645-301-830., Appendix B

## R645-301-830.110. DETERMINATION BY DIVISION

See R645-301-820.114.

## R645-301-830.120. REQUIREMENTS OF APPROVED PERMIT AND RECLAMATION PLAN

See R645-301-820.114.

## R645-301-830.130. DIFFICULTY OF RECLAMATION

See R645-301-820.114.

## R645-301-830.140. DETAILED COST ESTIMATE

See R645-301-240.

## R645-301-830.200. MINIMUM BOND AMOUNT

See R645-301-240.

## R645-301-830.300. INFLATION

See R645-301-240.

## R645-301-830.400. ADJUSTMENT OF AMOUNT

N/A -- DIVISION

## R645-301-830.410. CONDITIONS OF ADJUSTMENT

N/A -- DIVISION

## R645-301-830.420. DIVISION ACTION

N/A -- DIVISION

## R645-301-830.421. NOTIFICATION

N/A -- DIVISION

**R645-301-830.422. INFORMAL CONFERENCE**

N/A -- DIVISION

**R645-301-830.430. REQUEST FOR ADJUSTMENT BY PERMITTEE**

N/A -- DIVISION

**R645-301-830.440. PERMIT REVISIONS**

N/A -- DIVISION

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**R645-301-850.200. LONG-TERM PERIOD OF LIABILITY**

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**R645-301-860.200. COLLATERAL BONDS**

N/A

**R645-301-860.210. CONDITIONS**

N/A

**R645-301-860.211. CUSTODY**

N/A

**R645-301-860.212. MARKET VALUE**

N/A

**R645-301-860.213. ASSIGNMENT**

N/A

**R645-301-860.214. F.D.I.C. LIMITS**

N/A

**R645-301-860.220. LETTERS OF CREDIT**

N/A

**R645-301-860.221. QUALIFICATIONS**

N/A

**R645-301-860.222. IRREVOCABLE AND CONTINUOUS**

N/A

**R645-301-860.223. PAYABLE ON DEMAND**

N/A

**R645-301-860.230. REAL PROPERTY**

N/A

**R645-301-860.231. CONDITIONS**

N/A

**R645-301-860.232. SCHEDULE OF REAL PROPERTY**

N/A

**R645-301-860.232.1 DESCRIPTION**

N/A

**R645-301-860.232.2 FAIR MARKET VALUE**

N/A

**R645-301-860.232.3 PROOF OF POSSESSION AND TITLE**

N/A

**R645-301-860.233. RESTRICTIONS**

N/A

**R645-301-860.240. CASH ACCOUNTS**

N/A

**R645-301-860.241. BOND SUPPLEMENTS**

N/A

**R645-301-860.242. INTEREST**

N/A

**R645-301-860.243. CERTIFICATES OF DEPOSIT**

N/A

**R645-301-860.244. F.D.I.C. LIMITATIONS**

N/A

**R645-301-860.250. BOND VALUE OF COLLATERAL**

N/A

**R645-301-860.251. BOND MARGIN**

N/A

**R645-301-860.252. EVALUATION AND ADJUSTMENTS**

N/A

**R645-301-860.260. NOTIFICATION**

N/A

**R645-301-860.300. SELF-BONDING**

N/A

**R645-301-860.310. DEFINITIONS**

N/A

**R645-301-860.320. CONDITIONS**

N/A

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N/A

**R645-301-860.322. CONTINUOUS OPERATION**

N/A

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N/A

**R645-301-860.322.2 CALCULATION OF BUSINESS DURATION**

N/A

**R645-301-860.323. FINANCIAL INFORMATION**

N/A

**R645-301-860.323.1 BOND RATING**

N/A

**R645-301-860.323.2 TANGIBLE NET WORTH**

N/A

**R645-301-860.323.3 ASSETS AND LIABILITIES**

N/A

**R645-301-860.324. SUBMITTAL**

N/A

**R645-301-860.324.1 AUDITED FINANCIAL STATEMENTS**

N/A

**R645-301-860.324.2 UNAUDITED FINANCIAL STATEMENTS**

N/A

**R645-301-860.324.3 ADDITIONAL UNAUDITED INFORMATION**

N/A

**R645-301-860.324.4 ANNUAL REPORT**

N/A

**R645-301-860.330. SELF BONDING CONDITIONS**

N/A

**R645-301-860.331. LIABILITY**

N/A

**R645-301-860.332. TERMS**

N/A

**R645-301-860.333. CANCELLATION**

N/A

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N/A

**R645-301-860.350. CONDITIONS**

N/A

**R645-301-860.360. INDEMNITY AGREEMENT**

N/A

**R645-301-860.361. EXECUTION**

N/A

**R645-301-860.362. AUTHORIZATION**

N/A

**R645-301-860.363. BINDER**

N/A

**R645-301-860.364. DEFAULT**

N/A

**R645-301-860.365. FORFEITURE**

N/A

**R645-301-860.370. UPDATE INFORMATION**

N/A

**R645-301-860.380. NOTIFICATION REQUIREMENTS**

N/A

**R645-301-870. REPLACEMENT OF BONDS**

N/A

**R645-301-870.100. EQUIVALENT COVERAGE**

N/A

**R645-301-870.220. CONDITIONS**

N/A

**R645-301-880. REQUIREMENT TO RELEASE PERFORMANCE BONDS**

N/A -- UNTIL FINAL RECLAMATION

**R645-301-880.100. BOND RELEASE APPLICATION**

N/A

**R645-301-880.110. TIMING**

N/A

**R645-301-880.120. PUBLICATION**

N/A

**R645-301-880.200. INSPECTION BY THE DIVISION**

N/A

**R645-301-880.210. EVALUATION AND PROCEEDINGS**

N/A

**R645-301-880.220. NOTIFICATION OF BOND RELEASE**

N/A

**R645-301-880.300. PHASED BOND RELEASE**

N/A

**R645-301-880.310. PHASE I**

N/A

**R645-301-880.320. PHASE II**

N/A

**R645-301-880.330. PHASE III**

N/A

**R645-301-880.400. DISAPPROVAL**

N/A

**R645-301-880.500. NOTIFICATION PRIOR TO BOND RELEASE**

N/A

**R645-301-880.600. WRITTEN OBJECTIONS**

N/A

**R645-301-880.700. PUBLIC HEARING**

N/A

**R645-301-880.800. INFORMAL CONFERENCE**

N/A

**R645-301-880.900. FORFEITURE OF BONDS**

N/A

**R645-301-880.910. CONDITIONS**

N/A

**R645-301-880.911. NOTIFICATION**

N/A

**R645-301-880.912. AVOIDANCE**

N/A

**R645-301-880.912.1 COMPLIANCE SCHEDULE**

N/A

**R645-301-880.912.2 RECLAMATION IN LIEU OF BOND FORFEITURE**

N/A

**R645-301-880.920. FORFEITURE**

N/A

**R645-301-880.921. COLLECTION**

N/A

**R645-301-880.922. USE OF FUNDS**

N/A

**R645-301-880.930. EXTENDED LIABILITY**

N/A

**R645-301-880.931. REMAINING LIABILITY**

N/A

**R645-301-880.932. UNUSED FUNDS**

N/A

## R645-301-890. TERMS AND CONDITIONS FOR LIABILITY INSURANCE

N/A

## R645-301-890.100. POLICY REQUIREMENTS

N/A

## R645-301-890.200. LIABILITY PERIOD

N/A

## R645-301-890.300. NOTIFICATION

N/A

## R645-301-890.400. SELF-INSURANCE

N/A

1500' 0 3000' 6000'

SURFACE PERMIT ONLY
(NO MINERALS)

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

SURFACE PERMIT ONLY
(NO MINERALS)

SURFACE
FACILITIES

SOURCE OF SOIL INFORMATION:
"SOIL SURVEY OF CARBON COUNTY AREA, UTAH" AS PUBLISHED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE'S SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE UNITED STATES DEPARTMENT OF THE INTERIOR, THE BUREAU OF LAND MANAGEMENT, AND THE UTAH AGRICULTURAL EXPERMENT STATION

# REGIONAL SOILS MAP

PLATE 18

DATE: JUNE 2014
SHEET NUMBER: 2

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED #152606 R. Jay Marshall PROFESSIONAL ENGINEER

## SOIL TYPES

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | BADLAND | 35 | GERST–BADLAND–STORMITT COMPLEX | 75 | PERMA FAMILY – 15 TO 40 PERCENT SLOPES | 101 | SENCHERT LOAM – 30 TO 50 PERCENT SLOPES |
| 7 | BEJE–TRAG COMPLEX | 36 | GERST–STRYCH–BADLAND COMPLEX – 3% TO 50% SLOPES | 76 | PERMA FAMILY – DATINO COMPLEX | 104 | SENCHERT FAMILY – 3 TO 15 PERCENT SLOPES |
| 11 | CABA FAMILY – 40 TO 70 PERCENT SLOPES | 37 | GERST–STRYCH–BADLAND COMPLEX – 50% TO 70% SLOPES | 85 | RABBITEX SILT LOAM – 15 TO 50 PERCENT SLOPES | 105 | SENCHERT FAMILY–SENCHERT COMPLEX |
| 13 | CABBA FAMILY – GUBEN–ROCK OUTCROP COMPLEX | 47 | GUBEN–ROCK OUTCROP COMLPEX | 86 | RABBITEX–DONEY FAMILY – MIDFORK FAMILY COMLPEX | 107 | SUPERT–WINETTI COMPLEX |
| 20 | COMODORE–DATINO VARIANT COMLPEX | 62 | MIDFORK FAMILY – COMODORE COMPLEX | 88 | RABBITEX FAMILY – DATINO VARIANT COMPLEX | 113 | STRYCH VERY STONY LOAM – 3 TO 15 PERCENT SLOPES |
| 21 | CROYDON LOAM – 8 TO 30 PERCENT SLOPES | 63 | MIDFORK FAMILY – PODO ASSOCIATION | 95 | ROCK OUTCROP | 114 | STRYCH VERY STONY LOAM – DRY – 3 TO 30 PERCENT SLOPES |
| 25 | DONEY FAMILY – 3 TO 15 PERCENT SLOPES | 71 | PATHEAD EXTREMELY BOULDERY FINE SANDY LOAM – 40 TO 70 PERCENT SLOPES | 96 | ROCK OUTCROP–RUBBLELAND–TRAVESSILLA COMPLEX | 117 | TRAG–BEJE–SENCHERT COMPLEX |
| 26 | DONEY FAMILY – 50 TO 70 PERCENT SLOPES | | | 97 | ROTTULEE FAMILY – TRAG COMPLEX | 121 | TRAVESILLA–ROCK OUTCROP–GERST COMPLEX |
| 27 | DONEY FAMILY – PODO COMPLEX | 72 | PATHEAD–CURECANTI FAMILY ASSOCIATION | 100 | SENCHERT LOAM – 3 TO 15 PERCENT SLOPES | 124 | UINTA FAMILY–PODO ASSOCIATION |

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

# SEEP / SPRING SURVEY MAP

FIGURE 7-2

JUNE 2014

2

1500' 0 3000' 6000'

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

B21
B262
B263
B32
B33
B261
SC-S1
B271
B331A
B331
B321
B342
B353
B362
B341
B351
B352
36-1
B361
31-1
32-1
SURFACE PERMIT ONLY (NO MINERALS)
OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)
B121
SURFACE PERMIT ONLY (NO MINERALS)
SURFACE FACILITIES
S25-1
S18-1
B51
B71
B41
B161

SPRING MONITORING STATION
MONITORING WELL STATION
STREAM MONITORING STATION
STOCK WATERING POND

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

# OPERATIONAL WATER MONITORING LOCATIONS

FIGURE 7-1

DATE: JUNE 2014

SHEET NUMBER: 2

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

1750' 0 3500' 7000'

N

B211 B32 B262 B263 B33 B261 BN301 B271 B321 B331A B331 B342 B353 B341 B362 AC-1 SC-1 B-2 B311 B351 B352 B361 B-3 31-1 B51 B41 B71 B121 7-1 8-1 12-1 25-1 S-25-1 17-2 18-3 18-4 S18-1 18-2 B161

SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

SURFACE PERMIT ONLY (NO MINERALS)

SURFACE FACILITIES

## LEGEND

**FORMER TOWER WATER MONITORING SITES**

- SPRING MONITORING STATION
- STREAM MONITORING STATION

**CURRENT TOWER WATER MONITORING STATIONS**

- WELL MONITORING STATION
- SPRING MONITORING STATION
- STOCK POND MONITORING STATION
- STREAM MONITORING STATION

**FORMER RAG MONITORING STATIONS**

- WELL MONITORING STATION
- SPRING MONITORING STATION
- STREAM MONITORING STATION

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

# REGIONAL WATER RIGHTS MAP

FIGURE 5

DATE: JUNE 2014

SCALE: 1:24000

SHEET 2

1500' 0 3000' 6000'

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

91-3375
91-2529
91-3597
91-564
91-3595
91-3593
91-3598
91-3592
91-1855
91-1856
91-1650
91-4645
91-4644
91-4643
91-3624
91-3661
91-3662
91-1248
91-1247
91-1857
91-1224
91-1255
91-1223
91-1254
91-1249
91-1222
91-1253
91-1250
91-1252
91-1251
91-3725
91-848
91-1226
91-882
91-854
91-1228
91-1229
91-1227
91-1231
91-1567
91-1232
91-1237
91-1236
91-1233
91-1234
91-1235
91-859
91-887
91-857
91-886
91-856
91-884
91-858
91-885
91-3663
91-860
91-888
91-861
91-889
91-1204
91-1202
91-1203
91-4800
91-1206
91-1187
91-351
91-4803
91-855
91-883
91-4805
91-845
91-846
91-847
91-4379
91-4655
91-4719
91-4173
91-2572
a11509

SURFACE PERMIT ONLY (NO MINERALS)

OS GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

SURFACE PERMIT ONLY (NO MINERALS)

SURFACE FACILITIES

## LEGEND

- UNDERGROUND WATER RIGHT
- SPRING WATER RIGHT
- STOCKWATER RESERVOIR WATER RIGHT
- POINT–TO–POINT WATER RIGHT

WATER RIGHTS INFORMATION OBTAINED FROM THE UTAH DIVISION OF WATER RIGHTS ON–LINE MAPS AND FILES.

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

GVH 16A
GVH 15A
GVH 14A
GVH 13A
GVH 12A
GVH 11A
PANEL 10
GVH 17 (PAD ONLY)
GVH 16 (PAD ONLY)
GVH 15 (PAD ONLY)
GVH 14
GVH 13
GVH 12
GVH 11
GVH 10 (ELIMINATED)
SURFACE ONLY - NO MINERALS
REMONUMENTED SECTION CORNER (BLM)
OSO COMPRESSOR STATION
PANEL 7
GVH 9
GVH 8A
GVH 8
GVH 7
GVH 7A
GVH 6
GVH 5A
GVH 5 (RECLAIMED)
Aspen/Grass Reference Area
PANEL 6
GVH 4
GVH 3
Sagebrush/Grass Reference Area
SURFACE ONLY - NO MINERALS
1.13 ACRES (125' RADIUS AROUND GVH HOLE)
GVH1 (RECLAIMED)
OSO GAS WELL PAD AND PIPELINE (11.92 ACRES - NOT IN PERMIT AREA)
PANEL 5
PANEL 4
PANEL 3

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER
#152606
R. Jay Marshall

**LEGEND**

- CURRENT GVH LOCATIONS
- PROPOSED GVH LOCATIONS (Primary)
- PROPOSED GVH LOCATIONS (Alternate)
- OSO PIPELINE CORRIDOR (APPROXIMATE LOCATION)
- EXISTING ROADS
- NEWLY CONSTRUCTED ROADS
- SURFACE OWNERSHIP BOUNDARY
- ANDALEX PERMIT BOUNDARY
- VEGETATION REFERENCE AREAS

# GVH LOCATIONS MAP

## CENTENNIAL PROJECT

ANDALEX RESOURCES, INC.
6750 AIRPORT ROAD
PRICE, UTAH 84501

MSHA MINE ID #42-02028

| | |
|---|---|
| DRAWN BY: PJ | SCALE: 1" = 1000' |
| APPROVED BY: DH | DATE: JUNE 2014 |

FIGURE 1-1

1250 0 2500 5000 FEET

R 10 E
R 11 E

NEW COAL LEASE BOUNDARY

UNLEASED AREA

MATHIS FEE LEASE
(640 Acres)

UTU-81893
(1760.00 Acres)

UTU-79975
(Surface Only -
167.53 Acres)

UTU-66060
(Surface Only -
285.68 Acres)

UTU-66060
(161.41 Acres)

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

T 12 S
T 13 S

NEW COAL LEASE BOUNDARY

PREVIOUS PERMIT
BOUNDARY (C/007/019)

T 12 S
T 13 S

UTU-010581
(Surface Only -
40.00 Acres)

UTU-69600
(497.18 Acres)

ZION FEE
LEASE
(205.98 Acres)

UTU-010581
(40.00 Acres)

UTSL-27304
(Surface Only -
40.00 Acres)

NEW COAL LEASE BOUNDARY

UTSL-27304
(155.96 Acres)

BLM ROW UTU-64158
(Left Fork Fan
and Access Road)
(1.45 Acres)

SL-63058
(40.00 Acres)

BLM ROW U-62045
(10 Acres)

CAVE PRIVATE
EASEMENT
(1.5 Acres)

R 10 E
R 11 E

UTAH REGISTERED
#6449561
David W. Hibbs
PROFESSIONAL ENGINEER

N

## PERMIT AREA TABULATION

| | |
|---|---|
| FEDERAL COAL LEASES (MINERALS): | 2,654.55 ACRES |
| FEE COAL LEASES: | 845.98 ACRES |
| BLM SURFACE R.O.W.: | 11.45 ACRES |
| PRIVATE EASEMENT: | 1.50 ACRES |
| FEDERAL COAL LEASES (SURFACE ONLY): | 533.21 ACRES |
| PERMIT AREA SUBTOTAL: | 4,046.69 ACRES |
| LESS OSO GASWELL AREA | (11.92) ACRES |
| TOTAL PERMIT AREA: | 4,034.77 ACRES |

ANDALEX RESOURCES, INC.
Tower Division

# Centennial Leases/Permit Area

| | |
|---|---|
| DATE | JUNE 2014 |
| SCALE | 1" = 2500' |
| REVISION NUMBER | 106 |
| PLATE | FIGURE 1-2 |

1250 0 2500 5000 FEET

R 10 E
R 11 E

NEW COAL LEASE BOUNDARY

UNLEASED AREA

GOB GAS
VENT HOLE PADS
(15 EACH)

SURFACE PERMIT ONLY
(NO MINERALS)

T 12 S
T 13 S

NEW COAL LEASE BOUNDARY

OSO GAS WELL
PAD AND PIPELINE
(11.92± ACRES -
NOT IN PERMIT AREA)

PREVIOUS PERMIT BOUNDARY
(C/007/019)

T 12 S
T 13 S

MINESITE SURFACE
FACILITY AREA

SURFACE PERMIT ONLY
(NO MINERALS)

NEW COAL LEASE BOUNDARY

LEFT FORK
VENTILATION FAN
AND ACCESS ROAD

R 10 E
R 11 E

N

UTAH REGISTERED
#6449561
David W. Hibbs
PROFESSIONAL ENGINEER

ANDALEX
RESOURCES, INC.
Tower Division

Centennial
Disturbed Areas

DATE JUNE 2014
SCALE 1" = 2500'
REVISION NUMBER 106
PLATE FIGURE 1-2(A)

# REGIONAL LAND USE MAP

FIGURE 4-1

JUNE 2014

2

KYUNE II GRAZING ALLOTMENT

WILLOW CREEK GRAZING ALLOTMENT

DOWNARD CABIN

PACE POND

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

SURFACE FACILITIES

DEADMAN GRAZING ALLOTMENT

CORNER GRAZING ALLOTMENT

COAL CREEK GRAZING ALLOTMENT

WOOD HILL GRAZING ALLOTMENT

KENILWORTH MINE

ROCK TUNNEL/ KENILWORTH MINE

ROCK TUNNEL/ KENILWORTH MINE

ABERDEEN MINE

ARRONCO MINE

MILBURN MINE

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

1500' 0 3000' 6000'

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

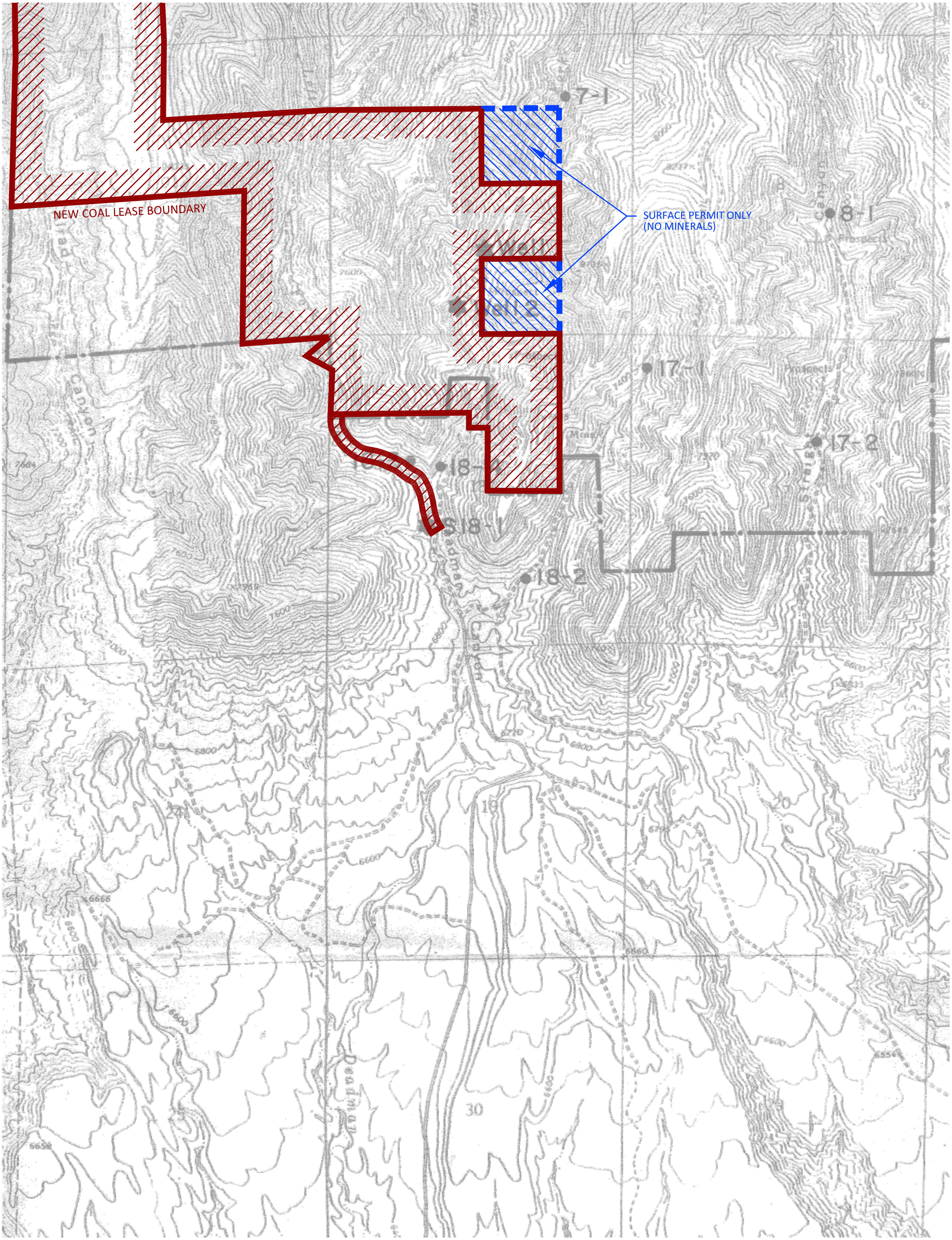
UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

## LEGEND

- BLM LANDS – WILDLIFE HABITAT, GRAZING, AND INCIDENTAL RECREATION – MINING & COALBED METHANE EXTRACTION PERMITTED AREAS ONLY
- INCORPORATED AREA – RESIDENTIAL, COMMERCIAL, INDUSTRIAL
- GRAZING ALLOTMENTS – PER NAME
- EXISTING FACILITIES / STRUCTURES

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT


NEW COAL LEASE BOUNDARY
SURFACE PERMIT ONLY
(NO MINERALS)
7-1
8-1
17-1
17-2
18-2
S18-1
Canyon
Deadman

# CENTENNIAL PROJECT
## GENERAL LOCATION MAP

PLATE 1

DATE: JUNE 2014
REVISION NUMBER: 7

R. 9 E.
R. 10 E.
R. 10 E.
R. 11 E.

T. 12 S.
T. 13 S.

UNLEASED

PERMIT AREA

SURFACE PERMIT ONLY
(NO MINERALS)

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

T. 12 S.
T. 13 S.

SURFACE PERMIT ONLY
(NO MINERALS)

SURFACE FACILITIES

ANCILLARY ROAD
RIGHT-OF-WAY

HELPER CITY

KENILWORTH

COUNTY ROAD

I CERTIFY THIS MAP TO BE TRUE AND CORRECT
TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED
#152606
R. Jay Marshall
PROFESSIONAL ENGINEER

T. 13 S.
T. 14 S.

R. 9 E.
R. 10 E.
R. 10 E.
R. 11 E.

PRICE CITY

COUNTY
AIRPORT

1/2 0 1 2 MILES
SCALE: 1" = 1 MILE

NOTES

1. SEE PLATE 4 FOR LEASE AND RIGHT-OF-WAY DETAILS.

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

SURFACE FACILITIES

TYPICAL SURFACE PERMIT
ONLY (NO MINERALS)

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

KENILWORTH

SCALE: 1" = 2,500 FEET

1250 0 2500 5000 FEET

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER
#152606
R. Jay Marshall

**ANDALEX RESOURCES, INC.**
TOWER DIVISION
PRICE, UTAH

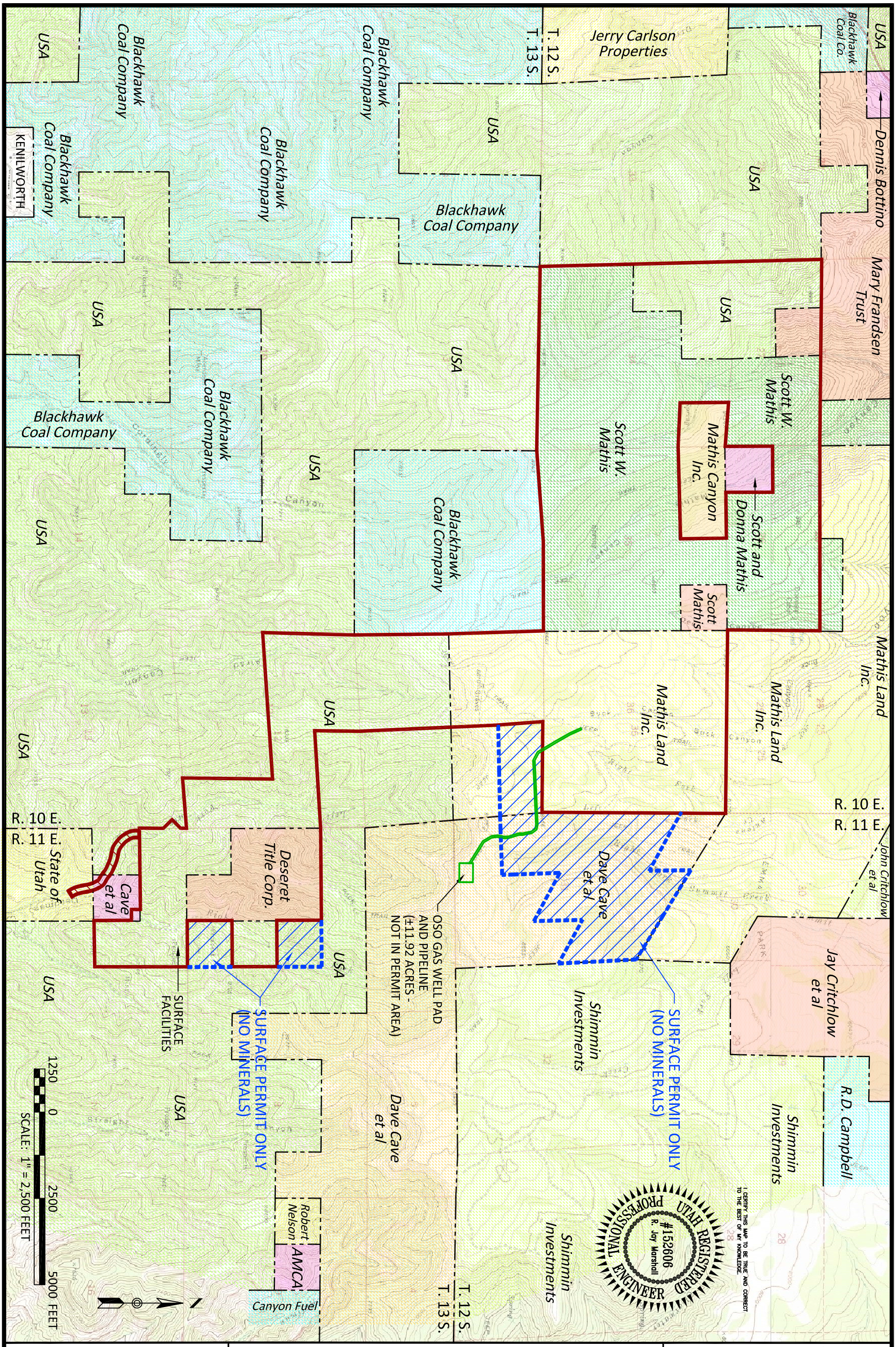
| | | | |
|---|---|---|---|
| | PERMIT LINE | | |
| | PERMIT LINE (SURFACE ONLY) | | VEGETATION TYPE BOUNDARY |
| CO | CONIFER | PJ | PINYON–JUNIPER |
| GS | GRASSLAND – SAGEBRUSH | DE | DECIDUOUS |
| MB | MIXED BRUSH | OB | OAKBRUSH |

# CENTENNIAL PROJECT

## VEGETATION MAP

DATE: JUNE 2014
REVISION NUMBER: 2

PLATE 19




ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

LEGEND

PROPERTY LINES

PERMIT LINE

PERMIT LINE (SURFACE ONLY)

# CENTENNIAL PROJECT
## SURFACE OWNERSHIP MAP

DATE: JUNE 2014
REVISION NUMBER: 3

PLATE 2

# CENTENNIAL PROJECT
## SURFACE GEOLOGY MAP

PLATE 21

DATE: JUNE 2014
REVISION NUMBER: 3

1500 0 3000 6000 FEET
SCALE: 1" = 3,000 FEET

R. 10 E.
R. 11 E.

T. 12 S.
T. 13 S.

SURFACE PERMIT ONLY
(NO MINERALS)

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

SURFACE FACILITIES

KENILWORTH

Kpr
Kc
TKfn
Kbh
Kmbg
QTpm

## LEGEND

| | |
|---|---|
| TKfn | FLAGSTAFF LIMESTONE (PALEOCENE) AND NORTH HORN FORMATION (PALEOCENE AND UPPER CRETACEOUS) |
| Kpr | PRICE RIVER FORMATION (UPPER CRETACEOUS) |
| Kc | CASTLE GATE SANDSTONE (UPPER CRETACEOUS) |
| Kbh | BLACKHAWK FORMATION (UPPER CRETACEOUS) |
| Kmbg | MAIN BODY OF THE BLUE GATE MEMBER |
| QTpm | PEDIMENT MANTLE (HOLOCENE TO MIOCENE?) |

NOTE:
MAP DATA TRACED FROM THE "GEOLOGIC MAP OF THE PRICE 30' X 60' QUADRANGLE, CARBON, DUCHESNE, UINTAH, AND WASATCH COUNTIES, UTAH" BY MALCOLM P. WEISS, IRVING J. WITKIND, AND WILLIAM B. CASHION, 1990.

LEGEND
PROPERTY LINES
PERMIT LINE
PERMIT LINE (SURFACE ONLY)

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED
#152606
R. Jay Marshall
PROFESSIONAL ENGINEER

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

# CENTENNIAL PROJECT
## GEOLOGIC CROSS SECTION and DRILL HOLE REFERENCE

PLATE 22

DATE: JUNE 2014
REVISION NUMBER: 3

1250 0 2500 5000 FEET
SCALE: 1" = 2,500 FEET

R. 10 E.
R. 11 E.

T. 12 S.
T. 13 S.

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

A'

B'

DH-6

DH PG&E

DH-5

DH-1

MC-191

77-3-CP

DH-2

89-1-APEX

DH-7 NACC

77-2-CP

DH-2A

77-1-CP

MC-193

77-4-CP

77-5-CP

77-6-CP

77-7-CP

SURFACE FACILITIES

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED
#152606
R. Jay Marshall
PROFESSIONAL ENGINEER

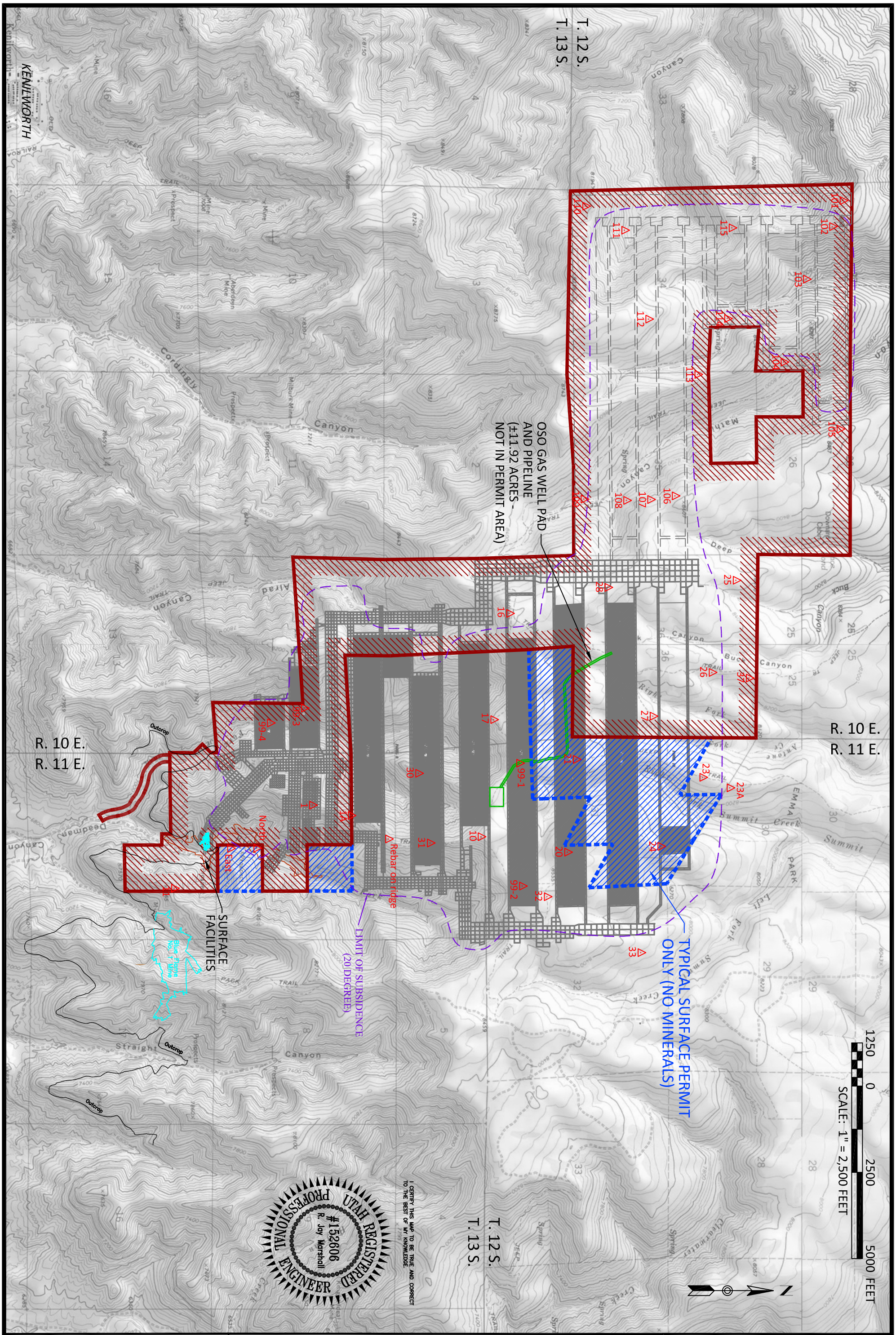
N

LEGEND
PROPERTY LINES
PERMIT LINE
PERMIT LINE (SURFACE ONLY)

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

NOTE:
SEE PLATES 23 & 24 FOR GEOLOGIC CROSS SECTION DETAILS.

KENILWORTH




ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

LEGEND

- SUBSIDENCE MONITORING STATION
- PERMIT LINE
- PERMIT LINE (SURFACE ONLY)

# CENTENNIAL PROJECT
## SUBSIDENCE MONITORING

DATE: JUNE 2014
REVISION NUMBER: 3

PLATE 25

# CENTENNIAL PROJECT
# LOWER SUNNYSIDE SEAM
# PRODUCTION AREAS

## PLATE 26

DATE: JUNE 2014
REVISION NUMBER: 3

1250 0 2500 5000 FEET

SCALE: 1" = 2,500 FEET

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER
#152606
R. Jay Marshall

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

DH-6
DH PG&E
DH-5
MC-191
77-3-CP
DH-2
89-1-APEX
DH-7 NACC
77-2-CP
DH-2A
77-1-CP
DH-1
MC-193
77-5-CP
77-4-CP
77-6-CP
77-7-CP
SURFACE FACILITIES

Probable Rock Split

APEX MINE
LOWER SUNNYSIDE SEAM

NOTE:
THE APEX MINE IS NOW INACTIVE, CLOSED AND SEALED.

LEGEND
PERMIT LINE
PERMIT LINE (SURFACE ONLY)

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

KENILWORTH

# TOWER DIVISION
# ABERDEEN SEAM

NOTE:
ADDITIONAL LEASES SHALL BE ACQUIRED PRIOR TO MINING IN ANY CURRENTLY UNLEASED AREAS.

NEW COAL LEASE BOUNDARY

UNLEASED AREA

NEW COAL LEASE BOUNDARY

PROPOSED WORKINGS - DEPENDENT UPON LEASE ACQUISITION AND CONDITIONS

SURFACE PERMIT ONLY (NO MINERALS)

EXISTING WORKINGS

OSO GAS WELL PAD AND PIPELINE (11.92± ACRES - NOT IN PERMIT AREA)

SURFACE PERMIT ONLY (NO MINERALS)

SURFACE PERMIT ONLY (NO MINERALS)

NEW COAL LEASE BOUNDARY

Blue Flame No. 1 Mine

Outcrop

Outcrop

Outcrop

Dip N 25° E 11°
Strike N83°04'E Aberdeen Seam

Note:
The Aberdeen Mine in now inactive, closed and sealed.

LEGEND:

Mined Areas

N

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED #152606 R. Jay Marshall PROFESSIONAL ENGINEER

ANDALEX RESOURCES, INC.
Tower Division

SCALE: 500' 0' 1000' 2000'

ACAD REF: Plate 29 - Aberdeen Seam
REVISION DATE: JUNE 2014

Aberdeen Mine
P.O. Box 910
East Carbon, Utah 84520

*PLATE 29*

Isopachs
Current Mining

Cover
Drillhole Location

# CENTENNIAL PROJECT
## MINERAL OWNERSHIP MAP

PLATE 3

DATE: JUNE 2014
REVISION NUMBER: 3

1250 0 2500 5000 FEET
SCALE: 1" = 2,500 FEET

R. 10 E.
R. 11 E.

USA-BLM
Carbon County
State of Utah
T. 12 S.
T. 13 S.
Fee Coal
Carbon County Sublease
AEP Fee Coal
Edwards
Blackhawk Coal Company
KENILWORTH
State of Utah
MATHIS FEE (UNLEASED)
FEDERAL LEASE UTU-81893
MATHIS FEE
FEDERAL LEASE UTU-66060
FEDERAL LEASE UTU-69600
ZION FEE
SURFACE FACILITIES
Whitmore Fee Lease
SURFACE PERMIT ONLY (NO MINERALS)
OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)
Andalex Fee
Sunedco Fee Lease

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER
#152606
R. Jay Marshall

## LEGEND

- PERMIT BOUNDARY
- SURFACE PERMIT BOUNDARY
- LEASE BOUNDARY
- ① FEDERAL LEASE UTU–010581
- ② FEDERAL LEASE UTSL–27304
- ③ FEDERAL LEASE UTSL–63058

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

# LEGEND

- DENOTES DEER SUMMER RANGE
- DENOTES DEER WINTER RANGE
- DENOTES DEER YEAR–LONG RANGE
- DENOTES OTHER DEER RANGE

MAP INFORMATION OBTAINED FROM THE UTAH DIVISION OF WILDLIFE RESOURCES CONSERVATION DATA CENTER.

# WILDLIFE MAP - MULE DEER RANGE

PLATE 34B

DATE: JUNE 2014

REVISION NUMBER: 3

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED #152606 R. Jay Marshall PROFESSIONAL ENGINEER

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

NEW COAL LEASE BOUNDARY

SURFACE PERMIT ONLY (NO MINERALS)

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

KENILWORTH

1500' 0 3000' 6000'

N

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

# LEGEND

DENOTES ELK SUMMER RANGE

DENOTES ELK WINTER RANGE

MAP INFORMATION OBTAINED FROM THE UTAH DIVISION OF WILDLIFE RESOURCES CONSERVATION DATA CENTER.

# WILDLIFE MAP - ELK RANGE

PLATE 34C

DATE: JUNE 2014

DRAWING NUMBER: 3

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

NEW COAL LEASE BOUNDARY

SURFACE PERMIT ONLY (NO MINERALS)

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

KENILWORTH

1500' 0 3000' 6000'

ANDALEX RESOURCES, INC.

CENTENNIAL PROJECT

# LEGEND

DENOTES SAGE GROUSE RANGE

MAP INFORMATION OBTAINED FROM THE UTAH DIVISION OF WILDLIFE RESOURCES CONSERVATION DATA CENTER.

# WILDLIFE MAP - SAGE GROUSE RANGE

PLATE 34D

DATE: JUNE 2014

DRAWING NUMBER: 3

I CERTIFY THIS MAP TO BE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 R. Jay Marshall

NEW COAL LEASE BOUNDARY

TYPICAL SURFACE PERMIT ONLY (NO MINERALS)

OSO GAS WELL PAD AND PIPELINE (±11.92 ACRES - NOT IN PERMIT AREA)

SURFACE PERMIT ONLY (NO MINERALS)

T. 12 S.
T. 13 S.

R. 10 E.
R. 11 E.

KENILWORTH

1500′ 0 3000′ 6000′

ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT

# CENTENNIAL PROJECT
## LEASES

PLATE 4

DATE: JUNE 2014
REVISION NUMBER: 3

R. 10 E.
R. 11 E.

MATHIS FEE
(UNLEASED)

FEDERAL LEASE
UTU-81893

MATHIS FEE

FEDERAL
LEASE
UTU-66060

SURFACE PERMIT ONLY
(NO MINERALS)

OSO GAS WELL PAD
AND PIPELINE
(±11.92 ACRES -
NOT IN PERMIT AREA)

T. 12 S.
T. 13 S.

I CERTIFY THIS MAP TO BE TRUE AND CORRECT
TO THE BEST OF MY KNOWLEDGE.

UTAH REGISTERED
#152606
R. Jay Marshall
PROFESSIONAL ENGINEER

T. 12 S.
T. 13 S.

FEDERAL LEASE
UTU-69600

ZION
FEE

SURFACE PERMIT ONLY
(NO MINERALS)

SURFACE
FACILITIES

R. 10 E.
R. 11 E.

1250 0 2500 5000 FEET
SCALE: 1" = 2,500 FEET

## LEGEND

- PERMIT BOUNDARY
- SURFACE PERMIT BOUNDARY
- LEASE BOUNDARY
- (1) FEDERAL LEASE UTU-010581
- (2) FEDERAL LEASE UTSL-27304
- (3) BLM R.O.W. UTU-64158
- (4) BLM R.O.W. UTU-062045
- (5) CAVE PRIVATE EASEMENT
- (6) FEDERAL LEASE UTSL-63058

ANDALEX RESOURCES, INC.
TOWER DIVISION
PRICE, UTAH

# APPENDIX 1 (PART 1)

# OWNERSHIP AND CONTROL

# REVISED 9/17/2012

**Section 1**

Insert
Family Tree

**Section 2**

**MURRAY ENERGY HOLDINGS CO.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | President & CEO | 06/30/03 | |
| Michael D. Loiacono | Treasurer | 01/10/05 | |
| | | 06/30/03 | |
| Michael O. McKown | Secretary | 06/30/03 | |
| Robert D. Moore | Chief Financial Officer | 04/23/07 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Delaware;<br>Charter No. 3676958 |
| Date of Incorporation | June 27, 2003 |
| ID # | 20-0100463 |

| | | | |
|---|---|---|---|
| Shareholders: | Robert E. Murray, Trustee (Class A stock 100%, Class B stock 20%, originally acquired by Mr. Murray on 06/30/03 and transferred into Trust on 05/10/2010) | 05/10/2010 | |
| | Robert Edward Murray, (20% Class B stock) | 06/30/03 | |
| | Jonathan Robert Murray, (20% Class B stock) | 06/30/03 | |
| | Ryan Michael Murray, (20% Class B stock) | 06/30/03 | |
| | Fifth Third Bank of Northeast Ohio, Trustee, (20% Class B stock) | 06/30/03 | |
| Directors: | Robert E. Murray | 06/30/03 | |
| | Michael D. Loiacono | 06/30/03 | 04/23/07 |
| | Michael O. McKown | 06/30/03 | |
| | Robert D. Moore | 04/23/07 | |

**Section 3**

**MURRAY ENERGY CORPORATION**
46226 National Road
St. Clairsville, Ohio 43950

Appointment of Officers

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | Chairman, President & | 02/23/01 | |
| | Chief Executive Officer | 02/23/01 | |
| John R. Forrelli | Vice President, Engineering & Planning | 09/11/07 | 11/01/10 |
| | Senior Vice Prsident | 11/01/10 | |
| Robert D. Moore | Executive Vice President & | 08/01/08 | |
| | Chief Financial Officer | 08/01/08 | |
| Robert Edward Murray | Vice President | 09/11/07 | |
| Ryan M. Murray | Vice President | 09/11/07 | |
| Roy A. Heidelbach | Asst. Vice President | 09/11/07 | |
| P. Bruce Hill | Vice President - Human Resources | 12/18/03 | 11/05/09 |
| B.J. Cornelius | Vice President | 08/01/08 | |
| Michael D. Loiacono | Treasurer | 02/23/01 | |
| Michael D. Loiacono | Chief Financial Officer | 12/20/05 | 04/23/07 |
| Michael O. McKown | Secretary | 02/24/01 | |
| | Senior Vice President, | | |
| | General Counsel & Secretary | 08/01/08 | |
| | Senior VP, HR & Legal | 03/23/10 | 04/08/11 |
| G. Christopher Van Bever | Asst. Secretary | 10/22/07 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Ohio; Charter No. 1211519 |
| Date of Incorporation | February 23, 2001 |
| ID# | 34-1956752 |

Shareholder:

| | Begin | End |
|---|---|---|
| Murray Energy Holdings Co. (100%) | 06/27/03 | |
| Robert E. Murray | 02/23/01 | 10/21/03 |

Directors:

| | | |
|---|---|---|
| Robert E. Murray | 02/23/01 | |
| Michael D. Loiacono | 12/20/05 | 04/23/07 |
| Henry W. Fayne | 01/28/05 | |
| Richard L. Lawson | 01/28/05 | |
| Andrew D. Weissman | 10/23/03 | 08/27/09 |
| Robert D. Moore | 04/23/07 | |

**Section 4**

**UTAHAMERICAN ENERGY, INC.**
P.O. Box 910
East Carbon, Utah 84520

Officers:

| | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| P. Bruce Hill | Chief Executive Officer | 08/18/06 | 11/05/09 |
| P. Bruce Hill | President | 12/16/06 | 11/05/09 |
| Douglas H. Smith | President | 08/18/06 | 12/16/06 |
| Clyde I. Borrell | President | 07/31/98 | 05/19/06 |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |
| Marsha Baker Kocinski | Secretary | 07/31/98 | 06/25/02 |
| Barbara Boyce | Secretary | 07/31/98 | 11/01/99 |
| Jay Marshall | Manager | 07/31/98 | 08/18/06 |
| B. J. Cornelius | Senior Vice President | 09/12/06 | |

Directors:

| | | |
|---|---|---|
| Robert E. Murray | 07/31/98 | |
| P. Bruce Hill | 08/18/06 | 11/05/09 |
| David W. Hibbs | 11/05/09 | |

Owner:
Murray Energy Corp.

**Section 5**

**ANDALEX RESOURCES, INC.**
P.O. Box 910
East Carbon, Utah 84520

Officers:

| | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| P. Bruce Hill | President and Chief Executive Officer | 12/16/06 | 11/05/09 |
| Douglas H. Smith | President | 03/07/94 | 12/16/06 |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |

Former Officers/Directors:

| | | | |
|---|---|---|---|
| Peter B. Green | Director | 01/05/98 | 08/18/06 |
| Peter B. Green | CB | 05/11/90 | 08/18/06 |
| Peter B. Green | CEO | 05/11/90 | 08/18/06 |
| Ronald C. Beedie | Director | 01/05/88 | 08/18/06 |
| John Bradshaw | Secretary | 02/05/90 | 08/18/06 |
| John Bradshaw | Vice-President | 02/05/90 | 08/18/06 |
| Douglas H. Smith | Director | 03/07/94 | 08/18/06 |
| Samuel C. Quigley | Vice-President | 02/24/95 | 08/18/06 |
| Andalex Hungary Ltd. | Shareholder | 12/28/20 | 08/18/06 |
| Alexander Harold Samuel Green | Director | 01/11/02 | 08/18/06 |

Directors:

| | | | |
|---|---|---|---|
| Robert E. Murray | | 08/18/06 | |
| P. Bruce Hill | | 08/18/06 | 11/05/09 |
| David W. Hibbs | | 12/11/09 | |

Owner:

| | | | |
|---|---|---|---|
| UtahAmerican Energy, Inc. | 100% | 08/18/06 | |

MSHA Numbers

| | |
|---|---|
| Apex Mine | 42-01750 |
| Pinnacle Mine | 42-01474 |
| Aberdeen Mine | 42-02028 |
| Wildcat Loadout | 42-01864 |

**Section 6**

**AMCA COAL LEASING, INC.**
P.O. Box 910
East Carbon, Utah 84520

Appointment of Officers:

| | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| P. Bruce Hill | President and Chief Executive Officer | 12/16/06 | 11/05/09 |
| Douglas H. Smith | President | 08/18/06 | 12/16/06 |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |

Directors:

| | | |
|---|---|---|
| Robert E. Murray | 08/18/06 | |
| P. Bruce Hill | 08/18/06 | 11/05/09 |
| David W. Hibbs | 12/11/09 | |

Owner:

Andalex Resources, Inc., 100% ownership

**Section 7**

**ANDALEX RESOURCES MANAGEMENT, INC.**
P.O. Box 910
East Carbon, Utah 84520

Appointment of Officers:

| | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| Douglas H. Smith | President | 08/18/06 | 12/16/06 |
| P. Bruce Hill | President and Chief | 12/16/06 | 11/05/09 |
| | | | |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |

Directors:

| | | | |
|---|---|---|---|
| Robert E. Murray | | 08/18/06 | |
| P. Bruce Hill | | 08/18/06 | 11/05/09 |
| David W. Hibbs | | 12/11/09 | |

Shareholders:

| | | |
|---|---|---|
| Andalex Resources, Inc. | 100% | 08/18/06 |

**Section 8**

**GENWAL RESOURCES, INC.**
P.O. Box 910
East Carbon, Utah 84520

| Officers: | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| Douglas H. Smith | President | 08/18/06 | 12/16/06 |
| P. Bruce Hill | President and Chief Executive Officer | 12/16/06 | 11/05/09 |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |

| Directors: | | |
|---|---|---|
| Robert E. Murray | 08/18/06 | |
| P. Bruce Hill | 08/18/06 | 11/05/09 |
| David W. Hibbs | 12/11/09 | |

| Former Directors: | |
|---|---|
| Peter B. Green | 08/09/06 |
| Ronald C. Beedie | 08/09/06 |
| Douglas H. Smith | 08/18/06 |
| Gordon Ulrich | 10/30/96 |

| Former Officers: | | |
|---|---|---|
| Peter B. Green | Chairman & CEO | 08/09/06 |
| Samuel C. Quigley | Vice President | 08/18/06 |
| John Bradshaw | Vice President | 05/17/05 |
| John Bradshaw | Secretary & Treasurer | 08/18/06 |
| Douglas H. Smith | President | 12/16/06 |

Owner:

ANDALEX Resources, Inc. is and remains the sole shareholder of Genwal Resources, Inc.[I]

MSHA Numbers

| | |
|---|---|
| Crandall Canyon Mine | 42-01715 |

I Intermountain Power Agency held, as a tenant in common, an undivided 50% interest in certain real property interests regarding the Crandall Canyon Mine. Effective September 29, 2010, Intermountain Power Agency conveyed these interests to ANDALEX Resources, Inc.

**Section 9**

**WEST RIDGE RESOURCES, INC.**[I]
P.O. Box 910
East Carbon, Utah 84520

| Officers: | | Begin | End |
|---|---|---|---|
| David W. Hibbs | President | 12/11/09 | |
| Peter J. Vuljanic | Interim President | 11/06/09 | 12/11/09 |
| Douglas H. Smith | President | 08/18/06 | 12/16/06 |
| P. Bruce Hill | President and CEO | 12/16/06 | 11/05/09 |
| Robert D. Moore | Treasurer | 08/18/06 | |
| Michael O. McKown | Secretary | 08/18/06 | |
| Directors: | | | |
| Robert E. Murray | | 08/18/06 | |
| P. Bruce Hill | | 08/18/06 | 11/05/09 |
| David W. Hibbs | | 12/11/09 | |
| Owner: | | | |
| Andalex Resources, Inc.[II] | 100% | | |
| Former Directors[III] | | Begin Date | End Date |
| Peter B. Green | | 04/01/98 | 08/09/06 |
| Ronald C. Beedie | | 04/01/98 | 08/09/06 |
| Douglas H. Smith | | 04/01/98 | 09/18/06 |
| Former Officers[VV] | Position | Begin Date | End Date |
| Peter B. Green | Chairman & CEO | 04/15/98 | 08/09/06 |
| Samuel C. Quigley | Vice President | 04/15/98 | 08/18/06 |
| John Bradshaw | Secretary | 04/15/98 | 08/18/06 |
| Douglas H. Smith | President | 04/15/98 | 12/16/06 |
| MSHA Number | West Ridge Mine 42-022444 | | |

I WEST RIDGE Resources, Inc. ("WRRI") was formed on March 10, 1998. No actions of WRRI occurred before that date.

II ANDALEX Resources is (and remains) the sole shareholder of WRRI. WRRI and the Intermountain Power Agency held certain real property interests as tenants in common, each owning a 50% interest therein. Effective as of September 29, 2010, Intermountain Power Agency conveyed all of its interest in these real property interests to ANDALEX Resources, Inc.

III The initial directors of WRRI (as shown above) were appointed on April 1, 1998; the "Begin Date[s]" for each such director shown on the OFT form are incorrect.

IV The initial officers of WRRI (as shown above) were appointed on April 15, 1998; the "Begin Date[s]" for each such officer shown on the OFT form are incorrect. Also, Christopher G. Van Bever never served as an officer of WRRI; the information shown on the OFT form to the contrary is incorrect.

**Section 10**

**MURRAY ENERGY AFFILIATE COMPANIES**

**A. AMCOAL HOLDINGS, INC.**
101 Prosperous Place, Suite 125
Lexington, Kentucky 40509

**B. THE AMERICAN COAL COMPANY**
P. O. Box 727
Harrisburg, Illinois 62946

**C. THE AMERICAN COAL SALES COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

**D. AMERICAN COMPLIANCE COAL, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**E. AMERICAN ENERGY CORPORATION**
43521 Mayhugh Hill Road
Township Highway 88
Beallsville, Ohio 43716

**F. ANCHOR LONGWALL AND REBUILD, INC.**
One Industrial Park Drive
Wheeling, West Virginia 26003

**G. AVONMORE RAIL LOADING, INC.**
125 Old Farm Drive,
Pittsburgh, PA 15239

**H. BELMONT COAL, INC.**
P. O. Box 146
Powhatan, Ohio 43942

**I. CANTERBURY COAL COMPANY**
125 Old Farm Drive
Pittsburgh, PA 15239

**J. COAL RESOURCES HOLDINGS CO.**
46226 National Road
St. Clairsville, Ohio 43950

**K. COAL RESOURCES, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**L. CONSOLIDATED LAND COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

**M. ENERGY RESOURCES, INC.**
P. O. Box 259
R. D.#2, Fermantown Road
Brockway, PA 15824

**N. KENAMERICAN RESOURCES, INC.**
101 Prosperous Place, Suite 125
Lexington, Kentucky 40509

**O. MAPLE CREEK MINING, INC.**
981 Route 917
Bentleyville, Pennsylvania 15314

**P. MILL CREEK MINING COMPANY**
P. O. Box 259
R. D. #2, Fermantown Road
Brockway, PA 15824

**Q. MONVALLEY TRANSPORTATION CENTER, INC.**
P. O. Box 135
1060 Ohio Avenue
Glassport, Pennsylvania 15045

**R. OHIOAMERICAN ENERGY INCORPORATED**
46226 National Road
St. Clairsville, Ohio 43950

**S. THE OHIO VALLEY COAL COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

**T. OHIO VALLEY RESOURCES, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**U. THE OHIO VALLEY TRANSLOADING COMPANY**
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

**V. THE OKLAHOMA COAL COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

**W. ONEIDA COAL COMPANY, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**X. PENNAMERICAN COAL, INC.**
125 Old Farm Drive
Pittsburgh, PA 15239

**Y. PENNAMERICAN COAL LP**
125 Old Farm Drive
Pittsburgh, PA 15239

**Z. PENNSYLVANIA TRANSLOADING, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**AA. PINSKI CORP.**
125 Old Farm Drive
Pittsburgh, PA 15239

**BB. SPRING CHURCH COAL COMPANY**
125 Old Farm Drive
Pittsburgh, PA 15239

**CC. SUNBURST RESOURCES, INC.**
586 National Road
Wheeling, West Virginia 26003

**DD. TDK COAL SALES, INCORPORATED**
P. O. Box 259
R. D. #2, Fermantown Road
Brockway, PA 15824

**EE. UMCO ENERGY, INC.**
46226 National Road
St. Clairsville, Ohio 43950

**FF. WEST VIRGINIA RESOURCES, INC.**
953 National Road, Suite 207
Wheeling, West Virginia 26003

**GG. MURRAY AMERICAN ENERGY, INC.**
6226 National Road
St. Clairsville, Ohio 43950

**A. AMCOAL HOLDINGS, INC.**

101 Prosperous Place, Suite 125
Lexington, Kentucky 40509

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | President | 05/23/03 | |
| P. Bruce Hill | Vice President – Human Resources | 10/01/98 | 10/03/09 |
| Robert D. Moore | Treasurer | 10/01/98 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Jeffrey L. Cash | Assistant Treasurer | 11/01/99 | |

Incorporation Information:

State of Incorporation: Ohio;
Charter No. 1007981

Date of Incorporation: June 12, 1998

ID #34-1867389

Shareholders: Murray Energy Corporation

Directors: Robert E. Murray

**B. THE AMERICAN COAL COMPANY**
P. O. Box 727
Harrisburg, Illinois 62946

Officers:

| | | |
|---|---|---|
| Robert E. Murray | President | 11/02/02 |
| John R. Forrelli | Vice President | 09/07/04 |
| Michael O. McKown | Vice President, General Counsel and Secretary | 03/15/99<br>03/01/05 |
| Robert D. Moore | Treasurer | 10/01/98 |
| Jeffrey L. Cash | Assistant Treasurer and Assistant Secretary | 11/01/99<br>06/01/01 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Delaware;<br>Charter No. 2881631 |
| Date of Incorporation | June 2, 1998 |
| ID #73-1543124 | |
| Shareholders: | AmCoal Holdings, Inc. |
| Directors: | Robert E. Murray |

**C. THE AMERICAN COAL SALES COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | Chief Executive Officer | 11/11/88 | |
| B. J. Cornelius | President | 09/08/95 | |
| Edwin D. Lane | Vice President | 11/01/99 | 03/01/05 |
| William E. Hollars | Vice President | 03/01/05 | |
| Richard Rice | Vice President | 11/11/88 | 11/01/99 |
| Michael O. McKown | Secretary | 03/01/05 | |
| Steven C. Ellis | Secretary | 11/10/88 | 03/01/05 |
| James R. Turner, Jr. | Treasurer and Assistant Secretary | 03/01/05 | |
| Duane A. Smith | Assistant Treasurer and Assistant Secretary | 06/25/01 | 03/01/05 |
| | | 06/25/01 | 03/01/05 |
| Brenda L. Murray | Assistant Secretary | 090/8/95 | 06/25/01 |

Incorporation Information:

State of Incorporation — Ohio; Charter No. 727836

Date of Incorporation — June 29, 1988

ID #34-1603699

Shareholder: Coal Resources, Inc.

Directors: Robert E. Murray 09/08/95

**D. AMERICAN COMPLIANCE COAL, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Stanley T. Piasecki | President | 03/01/05 | |
| Charles E. Shestak | Vice President | 03/10/03 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Robert D. Moore | Treasurer and | 06/25/01 | |
| | Assistant Secretary | 06/25/01 | |
| Elmer A. Mottillo | Assistant Treasurer | 08/22/03 | 05/31/08 |
| Robert L. Putsock | Assistant Treasurer | 06/01/08 | |

Former Officers:

| | | | |
|---|---|---|---|
| Clyde I. Borrell | President | 06/02/97 | 03/01/05 |
| William W. Taft | Secretary | 05/24/94 | 03/01/05 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Colorado;<br>Charter No. 19941059260 |
| Date of Incorporation | May 24, 1994 |
| ID #34-1797161 | |

| | | | |
|---|---|---|---|
| Shareholder: | Murray Energy Corporation (100%) | 06/1/01 | |
| | Robert E. Murray | 05/24/94 | 06/01/01 |
| Director: | Robert E. Murray | 05/24/94 | |

**E. AMERICAN ENERGY CORPORATION**
43521 Mayhugh Hill Road
Township Highway 88
Beallsville, Ohio 43716

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | President | 12/15/04 | |
| Robert D. Moore | President | 06/25/01 | 12/15/04 |
| Michael O. McKown | Secretary | 11/01/99 | |
| James R. Turner, Jr. | Treasurer | 03/1/05 | |
| Robert D. Moore | Treasurer | 06/25/01 | 12/15/04 |
| Robert L. Putsock | Assistant Treasurer | 01/27/04 | |

Incorporation Information:

State of Incorporation — Ohio;
Charter No. 00842695

Date of Incorporation — April 12, 1993
ID #31-1550443

Shareholder: Murray Energy Corporation
(100%)

Director:

| | | |
|---|---|---|
| Robert E. Murray | 12/15/04 | |
| P. Bruce Hill | 07/02/01 | 12/15/04 |

**F. ANCHOR LONGWALL AND REBUILD, INC.**
One Industrial Park Drive
Wheeling, West Virginia 26003

Officers:

| | | Begin | End |
|---|---|---|---|
| P. Bruce Hill | President and | 02/16/99 | 11/10/06 |
| | Assistant Secretary | 02/16/99 | |
| Chad Underkoffler | President | 11/10/06 | |
| Michael O. McKown | Secretary | 11/01/99 | |
| James R. Turner, Jr. | Treasurer | 09/16/05 | |
| Duane A. Smith | Assistant Secretary | 11/01/99 | 01/03/06 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | West Virginia;<br>Charter No. 00961100093212818 |
| Date of Incorporation | April 18, 1996 |

ID #55-0749933

| | | | |
|---|---|---|---|
| Shareholder:<br>I.D. # 34-1586390<br>Address: 29325 Chagrin Boulevard<br>Suite 300<br>Pepper Pike, OH 44122 | Coal Resources, Inc. | | |
| Director: | Charles E. Shestak | 11/01/99 | |
| | P. McGliton | 11/01/99 | 08/01/07 |

**G. AVONMORE RAIL LOADING, INC.**
125 Old Farm Drive,
Pittsburgh, PA 15239

Officers:

| | | Begin | End |
|---|---|---|---|
| **[VACANT]** | President | | |
| Robert D. Moore | Treasurer | 06/25/01 | |
| Michael O. McKown | Secretary | 03/1/05 | |
| Robert L. Putsock | Assistant Treasurer | 01/02/03 | |
| James R. Turner, Jr. | Assistant Secretary | 05/31/08 | |
| Elmer A. Mottillo | Assistant Secretary | 01/02/03 | 05/31/08 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Delaware;<br>Charter No. 0798860 |
| Date of Incorporation | February 19, 1974 |
| Qualified | May 6, 1974<br>Pennsylvania;<br>PA Entity #000302999 |

ID #25-1253970

| | |
|---|---|
| Shareholder: | Mill Creek Mining Company |
| Director: | Charles E. Shestak |

**H. BELMONT COAL, INC.**
P. O. Box 146
Powhatan, Ohio 43942

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert D. Moore | President | 06/25/01 | |
| Maynard St. John | Vice-President | 01/02/02 | 06/26/02 |
| James R. Turner, Jr. | Secretary/Treasurer | 09/16/05 | |
| Kristi D. Brown | Secretary/Treasurer | 11/08/01 | 09/16/05 |

Incorporation Information:

| | | | |
|---|---|---|---|
| State of Incorporation | Ohio;<br>Charter No. 00842697 | | |
| Date of Incorporation | April 12, 1993 | | |
| ID #31-1536602 | | | |
| Shareholder: | Murray Energy Corporation (100%) | 06/01/01 | |
| | Robert E. Murray | 04/19/93 | 06/01/01 |
| Director: | Duane A. Smith | 04/12/93 | 12/15/06 |
| | Robert E. Murray | 12/15/06 | |

## I. CANTERBURY COAL COMPANY

125 Old Farm Drive
Pittsburgh, PA 15239

Officers:

| | | |
|---|---|---|
| Robert D. Moore | President & Treasurer | 05/26/07 |
| Michael O. McKown | Secretary | 05/26/07 |
| Robert L. Putsock | Asst Treasurer | 01/02/03 |
| James R. Turner, Jr. | Asst Secretary | 06/01/08 |
| Neil M. Kok | Vice President | 03/08/2010 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #000055242 |
| Date of Incorporation | July 26, 1963 |

ID #25-1127473

| | |
|---|---|
| Shareholder: | Mill Creek Mining Company<br>(100%) |
| Director: | Charles E. Shestak |

**J. COAL RESOURCES HOLDINGS CO.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | President, CEO, Chairman | 03/01/05 | |
| Michael D. Loiacono | Treasurer | 01/28/05 | |
| | CFO | 12/20/05 | 04/23/07 |
| Robert D. Moore | CFO | 04/23/07 | |
| Scott A. Boyle | Chief Financial Officer | 10/29/05 | 12/20/05 |
| P. Bruce Hill | Secretary | 03/01/05 | 11/01/05 |
| Michael O. McKown | Secretary | 11/06/09 | |
| Robert L. Putsock | Assistant Secretary and Assistant | 06/25/01 | |
| | Treasurer | 06/25/01 | |
| Michael D. Loicano | Treasurer | 01/28/05 | |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | Delaware;<br>Charter No. 3676954 | |
| Date of Incorporation | June 27, 2003 | |
| ID #20-0100479 | | |
| Shareholder: | Murray American Energy, Inc. | |
| Director: | Robert E. Murray | 06/27/03 |

**K. COAL RESOURCES, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert E. Murray | Chairman, President and Chief Executive Officer | 03/01/05 | |
| Michael D. Loiacono | Treasurer | 04/08/96 | |
| | CFO | 12/20/05 | 04/23/07 |
| Robert D. Moore | Senior Vice President & CFO | 09/11/07 | |
| Scott A. Boyle | Chief Financial Officer | 10/17/05 | 12/20/05 |
| P. Bruce Hill | Secretary | 03/01/05 | 11/01/05 |
| Michael O. McKown | Vice President, General Counsel & Secretary | 07/16/07 | |
| Robert L. Putsock | Assistant Secretary and Assistant Treasurer | 06/25/01<br>06/25/01 | |
| Robert Edward Murray | Vice President | 09/11/07 | |
| Ryan M. Murray | Vice President | 09/11/07 | |
| John R. Forrelli | Vice President | 09/11/07 | |
| Roy A. Heidelbach | Asst. Vice President | 09/11/07 | |
| G. Christopher Van Bever | Asst. Secretary | 10/22/07 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation: | Ohio;<br>Charter No. 717546 |
| Date of Incorporation: | January 29, 1988 |
| ID #34-1586390 | |

| | | | |
|---|---|---|---|
| Shareholder: | Coal Resources Holdings Co. | 10/21/03 | |
| | Robert E. Murray | 01/29/88 | 10/21/03 |
| Directors: | Robert E. Murray | 05/24/88 | |
| | Henry W. Fayne | 02/05 | |
| | Richard L. Lawson | 02/05 | |
| | Robert D. Moore | 04/23/07 | |
| | Andrew Weissman | 10/20/03 | 08/27/09 |

**L. CONSOLIDATED LAND COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert D. Moore | President | 08/11/04 | |
| Robert D. Moore | Treasurer | 06/25/01 | |
| Robert L. Putsock | Assistant Secretary | 06/01/08 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Elmer A. Mottillo | Assistant Secretary | 08/22/03 | 05/30/08 |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | Ohio;<br>Charter No. 00842696 | |
| Date of Incorporation | April 12, 1993 | |
| ID #34-1769562 | | |
| Shareholder: | Murray Energy Corporation (100%) | 06/01/01 |
| Director: | Robert D. Moore | 08/11/04 |

**M. ENERGY RESOURCES, INC.**
P. O. Box 259
R. D.#2, Fermantown Road
Brockway, PA 15824

Officers:

| | | Begin | End |
|---|---|---|---|
| Stanley T. Piasecki | President and Chief Executive Officer | 08/11/04 | |
| Elmer A. Mottillo | Treasurer | 08/22/03 | 05/30/08 |
| James R. Turner | Treasurer | 06/01/08 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Charles E. Shestak | Assistant Secretary | 04/30/93 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #762734 |
| Date of Incorporation | September 14, 1982 |
| ID #31-1044044 | |

| | | |
|---|---|---|
| Shareholder: | Mill Creek Mining Company | |
| Director: | Stanley T. Piasecki | 08/11/04 |

**N. KENAMERICAN RESOURCES, INC.**
101 Prosperous Place, Suite 125
Lexington, Kentucky 40509

Officers:

| | | Begin | End |
|---|---|---|---|
| Mark Nelson | President | 03/18/09 | |
| Robert N. Sandidge | President | 12/16/06 | 12/08/08 |
| Dennis W. Bryant | President/Manager | 10/01/05 | 12/16/06 |
| B. J. Cornellius | Senior Vice-President--Sales | 11/01/05 | |
| James R. Turner, Jr. | Treasurer | 03/01/05 | |
| Robert D. Moore | Assistant Treasurer | 03/01/05 | |
| Michael O. McKown | Secretary | 02/13/06 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Kentucky;<br>Charter No. 0331655 |
| Date of Incorporation | June 9, 1994 |
| ID #61-1264385 | |

| | | |
|---|---|---|
| Shareholder: | Mill Creek Mining Company | |
| Director: | Robert E. Murray | 06/01/05 |

**O. MAPLE CREEK MINING, INC.**
981 Route 917
Bentleyville, Pennsylvania 15314

Officers:

| | | Begin | End |
|---|---|---|---|
| [**VACANT]** | President | 11/02/09 | |
| Paul B. Piccolini | | 04/28/06 | 09/11/08 |
| Ronnie D. Dietz | Vice President and Treasurer | 03/01/05 | |
| [**VACANT]** | Secretary | | |
| Michael B. Gardner | Secretary | 03/01/05 | 05/01/07 |
| Roberta K. Heil | Assistant Secretary | 11/01/99 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #2607113 |
| Date of Incorporation | November 9, 1994 |
| ID #25-1755305 | |

| | | |
|---|---|---|
| Shareholder: | Sunburst Resources, Inc. | 01/11/95 |
| Director: | Robert E. Murray | |

**P. MILL CREEK MINING COMPANY**
P. O. Box 259
R. D. #2, Fermantown Road
Brockway, PA 15824

Officers:

| | | Begin | End |
|---|---|---|---|
| Charles E. Shestak | President | 08/18/98 | |
| James R. Turner, Jr. | Treasurer | 03/1/05 | |
| Robert D. Moore | Treasurer | 06/25/01 | 03/01/05 |
| Robert D. Moore | Assistant Treasurer | 03/01/05 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Michael E. Elliott | Secretary | 08-18-98 | 03/01/05 |
| Robert L. Putsock | Assistant Secretary and | 06/25/01 | |
| | Assistant Treasurer | 06/25/01 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #0007447787 |
| Date of Incorporation | December 1, 1981 |
| Certificate of Amendment | July 7, 1988;<br>#8854525 |

ID #31-1040986

| | | |
|---|---|---|
| Shareholder: | Coal Resources, Inc. | |
| Director: | Robert E. Murray | 05/14/04 |

**Q. MONVALLEY TRANSPORTATION CENTER, INC.**
P. O. Box 135
1060 Ohio Avenue
Glassport, Pennsylvania 15045

Officers:

| | | |
|---|---|---|
| Paul B. Piccolini | President | 04/28/06 |
| James R. Turner, Jr. | Secretary and Treasurer | 03/01/05 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #856918 |
| Date of Incorporation | February 15, 1985 |

ID #25-1490495

| | | |
|---|---|---|
| Shareholders: | Pennsylvania Transloading, Inc. | |
| Directors: | Robert E. Murray and | 08/28/95 |
| | Michael D. Loiacono | 11/01/99 |

**R. OHIOAMERICAN ENERGY INCORPORATED**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| [**VACANT**] | President | | |
| D. Michael Jamison | | 05/01/05 | 12/01/07 |
| Charles O. Kapp | Vice President | 07/15/09 | |
| Stanley T. Piasecki | Vice President | 12/01/07 | |
| Mark D. Nelson | Vice President | 12/01/07 | 07/15/09 |
| Michael O. McKown | Secretary | 05/02/05 | |
| Robert D. Moore | Treasurer | 05/02/05 | |
| Robert L. Putsock | Assistant Treasurer | 06/01/08 | |
| Elmer A. Mottillo | Assistant Treasurer | 06/30/06 | 05/30/08 |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | Ohio | |
| Date of Incorporation | February 1, 2005 | |
| ID # 20-3044610 | Ohio Charter No. 1518533 | |
| Director: | Robert E. Murray | 05/01/05 |
| Shareholder: | Murray Energy Corporation | 05/01/05 |

**S. THE OHIO VALLEY COAL COMPANY**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| **[VACANT**] | President | 11/04/05 | |
| Paul B. Piccolini | Vice President | 01/01/07 | |
| Ronnie D. Dietz | Treasurer, Assistant Secretary, Corporate Comptroller | 03/01/05 | |
| **[VACANT]** | Secretary | 05/01/07 | |
| Michael B. Gardner | Secretary | 03/01/05 | 05/01/07 |
| Roberta K. Heil | Assistant Secretary | 11/01/99 | |
| Bonnie M. Froehlich | Assistant Secretary and Assistant Treasurer | 06/25/01<br>06/25/01 | |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | Ohio;<br>Charter No. 384971 | |
| Date of Incorporation | June 6, 1969 | |
| Certificate of Amendment | October 4, 1988;<br>#201274 | |

ID #34-1041310

| | | |
|---|---|---|
| Shareholder: | Ohio Valley Resources, Inc. | |
| Director: | Robert E. Murray | 03/10/95 |

**T. OHIO VALLEY RESOURCES, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Paul B. Piccolini | President | 04/28/06 | |
| John Forrelli | President | 11/01/99 | 04/28/06 |
| Ronnie D. Dietz | Treasurer, Assistant Secretary, Corporate Comptroller | 03/01/05 | |
| Michael D. Loiacono | Treasurer, Assistant Secretary, Corporate Comptroller | 03/10/95 | 04/28/06 |
| **[VACANT]** | Secretary | 05/01/07 | |
| Stephen Ellis | Secretary | 03/10/95 | 03/01/05 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Ohio;<br>Charter No. 721514 |
| Date of Incorporation | March 29, 1988 |
| ID #34-1586391 | |

| | | | |
|---|---|---|---|
| Shareholders: | Murray Energy Corporation (100%) | 06/01/01 | |
| | Robert E. Murray | 03/10/95 | 06/01/01 |
| Director: | Robert E. Murray | 11/01/99 | |

**U. THE OHIO VALLEY TRANSLOADING COMPANY**
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

Officers:

| | | Begin | End |
|---|---|---|---|
| **[VACANT]** | President | 11/04/05 | |
| Paul B. Piccolini | Vice-President | 01/01/07 | |
| Ronnie D. Dietz | Treasurer, Assistant Secretary, Corporate Comptroller | 03/01/05 | |
| Michael B. Gardner | Secretary | 03/01/05 | 05/01/07 |
| Roberta K. Heil | Assistant Secretary | 9/01/00 | no end date |

Incorporation Information:

State of Incorporation — Ohio;
Charter No. 727835

Date of Incorporation — June 29, 1988

ID #34-1611209

Shareholder: Ohio Valley Resources, Inc.

Director: Robert E. Murray 04/06/93

## V. THE OKLAHOMA COAL COMPANY

46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Paul B. Piccolini | President | 04/28/06 | |
| Gregory C. Smith | President | 11/01/99 | 04/28/06 |
| Michael O. McKown | Secretary | 03/01/05 | |
| Gregory A. Gorospe | Secretary | 09/15/94 | 11/01/99 |
| James R. Turner, Jr. | Treasurer and Assistant Secretary | 03/01/05 | |
| Kathleen Bednarek | Treasurer | 06/20/00 | 06/26/00 |
| Robert L. Putsock | Assistant Secretary | 01/10/03 | |
| Kathleen Bednarek | Assistant Secretary | 09/03/96 | 06/26/00 |

Incorporation Information:

State of Incorporation: Oklahoma;
Charter No. DB00477836

Date of Incorporation: April 17, 1989

Licensed in Ohio: February 27, 1991;
FL 790739

ID #34-1673480

Shareholder: The American Coal Sales Company

Director: Robert E. Murray 04/17/92

**W. ONEIDA COAL COMPANY, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert D. Moore | President and | 06/25/01 | |
| | Treasurer | 11/01/99 | |
| Robert L. Putsock | Assistant Secretary | 06/25/01 | |
| Michael O. McKown | Secretary | 03/1/05 | |

Former Officers:

| | | | |
|---|---|---|---|
| John Blaine Earles | Vice-President | 02/28/92 | 07/02/93 |
| Tivis Arnold Graybeal | Secretary | 02/28/92 | 04/28/94 |
| Anthony Carl Laplaca | Secretary | 04/28/94 | 11/1/99 |
| Joseph R. Bourgo | Vice-President | 09/01/92 | 10/20/00 |
| Joseph R. Bourgo | Treasurer | 04/28/94 | 10/20/00 |
| Norma Jean McCourt | Assistant Secretary | 04/28/94 | 11/01/99 |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | West Virginia;<br>Charter No.<br>00000020004097TAX | |
| Date of Incorporation | August 29, 1983 | |
| ID #62-1011712 | | |
| Shareholder: | West Virginia Resources, Inc.<br>(100%) | 02/28/92 |
| Director: | Robert E. Murray | 02/28/92 |

**X. PENNAMERICAN COAL, INC.**
125 Old Farm Drive
Pittsburgh, PA 15239

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert D. Moore | President, | 08/28/07 | |
| | Treasurer and Secretary | 06/25/01 | |
| P. Bruce Hill | President | 06/25/01 | 05/03/07 |
| Robert L. Putsock | Assistant Secretary | 06/25/01 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #2545905 |
| Date of Incorporation | September 13, 1993 |

ID #25-1722115

| | | |
|---|---|---|
| Shareholder: | Mill Creek Mining Co. | 11/08/93 |
| Director: | Robert E. Murray | |

**Y. PENNAMERICAN COAL LP**
125 Old Farm Drive
Pittsburgh, PA 15239

Partners:

| | | |
|---|---|---|
| Pinski Corp. | Managing Partner | 08/19/96 |
| PennAmerican Coal, Inc. | Limited Partner | 07/08/98 |

EIN# 25-1800809
Partnership Effective 07/08/98

**Z. PENNSYLVANIA TRANSLOADING, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| Paul B. Piccolini | President | 04/28/06 | 09/01/08 |
| James R. Turner, Jr. | Treasurer | 03/01/05 | |
| Michael O. McKown | Secretary | 03/01/05 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Ohio;<br>Charter No. 736747 |
| Date of Incorporation | November 18, 1988 |
| Qualified: | Pennsylvania;<br>December 28, 1988 |
| Certificate of Authority | No. 8898868 |
| ID #34-1603748 | |

| | | |
|---|---|---|
| Shareholder: | Sunburst Resources, Inc.<br>(100%) | 04/01/96 |
| Director: | Robert E. Murray | 11/18/88 |

I

I Sunburst Resources, Inc. has always been a shareholder and has no relation to Consolidated Land Company.

**AA. PINSKI CORP.**
125 Old Farm Drive
Pittsburgh, PA 15239

Officers:

| | | |
|---|---|---|
| **[VACANT]** | President and General Manager | |
| Robert D. Moore | Treasurer and | 06/25/01 |
| | Secretary | 06/25/01 |
| Robert L. Putsock | Assistant Treasurer and | 06/25/01 |
| | Assistant Secretary | 06/25/01 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #002710766 |
| Date of Incorporation | August 19, 1996 |
| ID #25-1800870 | |
| Shareholder: | PennAmerican Coal, Inc. |
| Director: | Charles E. Shestak |

**BB. SPRING CHURCH COAL COMPANY**
125 Old Farm Drive
Pittsburgh, PA 15239

Officers:

| | | Begin | End |
|---|---|---|---|
| Robert D. Moore | President | 05/26/07 | |
| P. Bruce Hill | President | 06/25/01 | 07/16/07 |
| Robert D. Moore | Secretary/Treasurer | 06/25/01 | |
| Michael O. McKown | Secretary | 05/26/07 | |
| Robert L. Putsock | Asst Treasurer | 01/02/03 | |
| James R. Turner, Jr. | Asst Secretary | 06/01/08 | |
| Elmer Motillo | Asst Secretary | 01/02/03 | 05/30/08 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #000696663 |
| Date of Incorporation | November 2, 1979 |
| ID #25-1372128 | |

| | |
|---|---|
| Shareholder: | Mill Creek Mining Company |
| Director: | Charles E. Shestak |

**CC. SUNBURST RESOURCES, INC.**
586 National Road
Wheeling, West Virginia 26003

Officers:

| | | Begin | End |
|---|---|---|---|
| Paul B. Piccolini | President | 04/28/06 | |
| Ronnie D. Dietz | Treasurer | 03/01/05 | |
| Ronnie D. Dietz | Secretary | 10/26/09 | |
| Michael B. Gardner | Secretary | 03/01/05 | 05/01/07 |

Incorporation Information:

| | | |
|---|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #2616384 | |
| Date of Incorporation | January 10, 1995 | |
| ID #25-1766427 | | |
| Shareholder: | Ohio Valley Resources, Inc. | 04/01/97 |
| Director: | Robert E. Murray | |

**DD. TDK COAL SALES, INCORPORATED**
P. O. Box 259
R. D. #2, Fermantown Road
Brockway, PA 15824

Officers:

| | | Begin | End |
|---|---|---|---|
| Stanley T. Piasecki | President and Chief Executive Officer | 08/11/04 | |
| Elmer A. Mottillo | Treasurer | 08/22/03 | 05/31/08 |
| James R. Turner, Jr. | Treasurer | 06/01/08 | |
| Michael O. McKown | Secretary | 03/01/05 | |
| Charles E. Shestak | Assistant Secretary | 02/01/99 | |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #00758582 |
| Date of Incorporation | June 28, 1982 |
| ID #25-1422374 | |

| | | |
|---|---|---|
| Shareholder: | Energy Resources, Inc. | |
| Director: | Stanley T. Piasecki | 08/11/04 |

**EE. UMCO ENERGY, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | Begin | End |
|---|---|---|---|
| **[VACANT]** | President | 11/02/09 | |
| Paul B. Piccolini | | 04/28/06 | 09/11/08 |
| Ronnie D. Dietz | Treasurer and Assistant Secretary | 03/01/05 | |
| **[VACANT]** | Secretary | 05/01/07 | |
| Michael B. Gardner | | 03/01/05 | 05/01/07 |
| Ronnie D. Dietz | Vice-President | 07/12/10 | |
| Michael B. Gardner | | 05/03/05 | 05/01/07 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Pennsylvania;<br>PA Entity #1072295 |
| Date of Incorporation | December 29, 1988 |
| ID #52-1615668 | |
| Shareholder: | Maple Creek Mining, Inc.<br>and Toni J. Southern |
| Director: | Robert E. Murray |

**FF. WEST VIRGINIA RESOURCES, INC.**
953 National Road, Suite 207
Wheeling, West Virginia 26003

Officers:

| | | Begin | End |
|---|---|---|---|
| Neil Kok | President | 10/2/06 | |
| Robert D. Moore | President | 10/20/00 | 10/20/00 |
| Robert E. Murray | President, CEO | 12/27/91 | 10/20/00 |
| Charles E. Shestak | Vice President | 10/02/06 | |
| Anne Besece | Treasurer and Secretary | 10/2/06 | 12/01/07 |
| Robert L. Putsock | Treasurer and Secretary | 12/01/07 | |
| | Assistant Secretary | 06/25/01 | 10/02/06 |
| Robert E. Murray | Treasurer | 12/27/91 | 06/25/01 |
| Michael O. McKown | Secretary | 03/01/05 | 10/2/06 |
| Anthony Carl Laplaca | Secretary | 12/27/91 | 03/01/05 |

Incorporation Information:

State of Incorporation: West Virginia;
Charter No.
00913610154813604

Date of Incorporation: December 27, 1991

ID #55-0713676

Shareholder: Mill Creek Mining Company (100%) 12/27/91

Director: Robert E. Murray

**GG. MURRAY AMERICAN ENERGY, INC.**
46226 National Road
St. Clairsville, Ohio 43950

Officers:

| | | |
|---|---|---|
| Robert D. Moore | President, Treasurer and Secretary | 05/03/06 |

Incorporation Information:

| | |
|---|---|
| State of Incorporation | Wyoming;<br>Charter No. 1998003378171 |
| Date of Incorporation | September 22, 1998 |

ID #34-1875051

| | |
|---|---|
| Shareholder: | Murray Energy Corporation |
| Director: | Robert E. Murray |

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
P.O. Box 45155
Salt Lake City, UT 84145-0155
http://www.blm.gov

JUL 27 2006

IN REPLY REFER TO:
3425
UTU-81893
(UT-923)

CERTIFIED MAIL – Return Receipt Requested

DECISION

| | | |
|---|---|---|
| ANDALEX Resources, Inc.<br>45 West 10000 South, Suite 401<br>Sandy, Utah 84070 | :<br>:<br>:<br>: | Coal Lease<br>UTU-81893 |

Lease Issued
Bond Accepted

Pursuant to the June 8, 2006, Lease By Application Coal Sale, the bid of ANDALEX Resources, Inc., was determined to be the acceptable high bid for the Kenilworth Tract. Satisfactory evidence of the qualifications and holdings of the bidder has been reviewed and found to be acceptable.

ANDALEX Resources, Inc. has furnished to this office a satisfactory personal bond and Power of Attorney in the Amount of $6,000 which provides bond coverage for coal lease UTU-81893. Cash in the amount of $6,000 in lieu of a surety bond has been submitted to this office. The personal bond and power of attorney are accepted as of July 27, 2006, the date of filing in this office. The cash deposit will be held in our suspense account until either (1) this office is satisfied that there is no further requirement for the bond, or (2) satisfactory replacement bond coverage is furnished.

First year's rental of $5,280 has been submitted by the bidder, and a check for $499.20 has been submitted to cover the cost of advertising the sale. Four copies of the lease have been executed by the bidder. Therefore, coal lease UTU-81893 is hereby issued effective August 1, 2006.

Annual rental of $5,280 and a bonus bid payment of $563,200 are due by August 1, 2007.

James Kohler
Chief, Branch of
Solid Minerals

Enclosures:

1. Coal Lease UTU-81893

cc: ANDALEX Resources, Inc., P.O. Box 1077, Price, Utah 84501
Price Coal Office (Attn: Steve Falk) (w/encl.)
MMS, Solid Minerals Staff (w/encl,)
Resource Development Coordinating Committee (w/encl,)
Mr. John Baza, Director, UDOGM, Box 145801, SLC, UT 84114-5801 (w/encl,)

Form 3400-12
(January 2004)

# UNITED STATES
# DEPARTMENT OF THE INTERIOR
# BUREAU OF LAND MANAGEMENT

## COAL LEASE

FORM APPROVED
OMB NO. 1004-0073
Expires: January 31, 2007

Serial Number

UTU-81893

PART 1. LEASE RIGHTS GRANTED

This lease, entered into by and between the UNITED STATES OF AMERICA, hereinafter called lessor, through the Bureau of Land Management (BLM), and *(Name and Address)*

ANDALEX Resources, Inc.
45 West 10000 South, Suite 401
Sandy Utah 84070

hereinafter called lessee, is effective *(date)* 8 / 1 / 06 , for a period of 20 years and for so long thereafter as coal is produced in commercial quantities from the leased lands, subject to readjustment of lease terms at the end of the 20th lease year and each 10-year period thereafter.

Sec. 1. This lease is issued pursuant and subject to the terms and provisions of the:

[X] Mineral Lands Leasing Act of 1920, Act of February 25, 1920, as amended, 41 Stat. 437, 30 U.S.C. 181-287, hereinafter referred to as the Act;
[ ] Mineral Leasing Act for Acquired Lands, Act of August 7, 1947, 61 Stat. 913, 30 U.S.C. 351-359;

and to the regulations and formal orders of the Secretary of the Interior which are now or hereafter in force, when not inconsistent with the express and specific provisions herein.

Sec. 2. Lessor, in consideration of any bonuses, rents, and royalties to be paid, and the conditions and covenants to be observed as herein set forth, hereby grants and leases to lessee the exclusive right and privilege to drill for, mine, extract, remove, or otherwise process and dispose of the coal deposits in, upon, or under the following described lands:

T. 12 S., R. 10 E., SLM, Utah
Sec. 26, N½SW¼, SE¼SW¼, SE¼;
Sec. 27, S½;
Sec. 34, S½NE¼, NW¼NE¼, NW¼, S½;
Sec. 35, NE¼, S½NW¼, S½.

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containing 1,760.00 acres, more or less, together with the right to construct such works, buildings, plants, structures, equipment and appliances and the right to use such on-lease rights-of-way which may be necessary and convenient in the exercise of the rights and privileges granted, subject to the conditions herein provided.

PART II. TERMS AND CONDITIONS

Sec. 1. (a) RENTAL RATE - Lessee must pay lessor rental annually and in advance for each acre or fraction thereof during the continuance of the lease at the rate of $ 3.00 for each lease year.

(b) RENTAL CREDITS - Rental will not be credited against either production or advance royalties for any year.

Sec. 2. (a) PRODUCTION ROYALTIES - The royalty will be 8 percent of the value of the coal as set forth in the regulations. Royalties are due to lessor the final day of the month succeeding the calendar month in which the royalty obligation accrues.

(b) ADVANCE ROYALTIES - Upon request by the lessee, the BLM may accept, for a total of not more than 10 years, the payment of advance royalties in lieu of continued operation, consistent with the regulations. The advance royalty will be based on a percent of the value of a minimum number of tons determined in the manner established by the advance royalty regulations in effect at the time the lessee requests approval to pay advance royalties in lieu of continued operation.

Sec. 3. BONDS - Lessee must maintain in the proper office a lease bond in the amount of $ 6,000 . The BLM may require an increase in this amount when additional coverage is determined appropriate.

Sec. 4. DILIGENCE - This lease is subject to the conditions of diligent development and continued operation, except that these conditions are excused when operations under the lease are interrupted by strikes, the elements, or casualties not attributable to the lessee. The lessor, in the public interest, may suspend the condition of continued operation upon payment of advance royalties in accordance with the regulations in existence at the time of the suspension. Lessee's failure to produce coal in commercial quantities at the end of 10 years will terminate the lease. Lessee must submit an operation and reclamation plan pursuant to Section 7 of the Act not later than 3 years after lease issuance.

The lessor reserves the power to assent to or order the suspension of the terms and conditions of this lease in accordance with, inter alia, Section 39 of the Mineral Leasing Act, 30 U.S.C. 209.

Sec. 5. LOGICAL MINING UNIT (LMU) - Either upon approval by the lessor of the lessee's application or at the direction of the lessor, this lease will become an LMU or part of an LMU, subject to the provisions set forth in the regulations.

The stipulations established in an LMU approval in effect at the time of LMU approval will supersede the relevant inconsistent terms of this lease so long as the lease remains committed to the LMU. If the LMU of which this lease is a part is dissolved, the lease will then be subject to the lease terms which would have been applied if the lease had not been included in an LMU.

(Continued on page 2)

Sec. 6. DOCUMENTS, EVIDENCE AND INSPECTION - At such times and in such form as lessor may prescribe, lessee must furnish detailed statements showing the amounts and quality of all products removed and sold from the lease, the proceeds therefrom, and the amount used for production purposes or unavoidably lost.

Lessee must keep open at all reasonable times for the inspection by BLM the leased premises and all surface and underground improvements, works, machinery, ore stockpiles, equipment, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or under the leased lands.

Lessee must allow lessor access to and copying of documents reasonably necessary to verify lessee compliance with terms and conditions of the lease.

While this lease remains in effect, information obtained under this section will be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 7. DAMAGES TO PROPERTY AND CONDUCT OF OPERATIONS - Lessee must comply at its own expense with all reasonable orders of the Secretary, respecting diligent operations, prevention of waste, and protection of other resources.

Lessee must not conduct exploration operations, other than casual use, without an approved exploration plan. All exploration plans prior to the commencement of mining operations within an approved mining permit area must be submitted to the BLM.

Lessee must carry on all operations in accordance with approved methods and practices as provided in the operating regulations, having due regard for the prevention of injury to life, health, or property, and prevention of waste, damage or degradation to any land, air, water, cultural, biological, visual, and other resources, including mineral deposits and formations of mineral deposits not leased hereunder, and to other land uses or users. Lessee must take measures deemed necessary by lessor to accomplish the intent of this lease term. Such measures may include, but are not limited to, modification to proposed siting or design of facilities, timing of operations, and specification of interim and final reclamation procedures. Lessor reserves to itself the right to lease, sell, or otherwise dispose of the surface or other mineral deposits in the lands and the right to continue existing uses and to authorize future uses upon or in the leased lands, including issuing leases for mineral deposits not covered hereunder and approving easements or rights-of-way. Lessor must condition such uses to prevent unnecessary or unreasonable interference with rights of lessee as may be consistent with concepts of multiple use and multiple mineral development.

Sec. 8. PROTECTION OF DIVERSE INTERESTS, AND EQUAL OPPORTUNITY - Lessee must: pay when due all taxes legally assessed and levied under the laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; restrict the workday to not more than 8 hours in any one day for underground workers, except in emergencies; and take measures necessary to protect the health and safety of the public. No person under the age of 16 years should be employed in any mine below the surface. To the extent that laws of the State in which the lands are situated are more restrictive than the provisions in this paragraph, then the State laws apply.

Lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor. Neither lessee nor lessee's subcontractors should maintain segregated facilities.

Sec. 9. (a) TRANSFERS

☒ This lease may be transferred in whole or in part to any person, association or corporation qualified to hold such lease interest.

☐ This lease may be transferred in whole or in part to another public body or to a person who will mine the coal on behalf of, and for the use of, the public body or to a person who for the limited purpose of creating a security interest in favor of a lender agrees to be obligated to mine the coal on behalf of the public body.

☐ This lease may only be transferred in whole or in part to another small business qualified under 13 CFR 121.

Transfers of record title, working or royalty interest must be approved in accordance with the regulations.

(b) RELINQUISHMENT - The lessee may relinquish in writing at any time all rights under this lease or any portion thereof as provided in the regulations. Upon lessor's acceptance of the relinquishment, lessee will be relieved of all future obligations under the lease or the relinquished portion thereof, whichever is applicable.

Sec. 10. DELIVERY OF PREMISES, REMOVAL OF MACHINERY, EQUIPMENT, ETC. - At such time as all portions of this lease are returned to lessor, lessee must deliver up to lessor the land leased, underground timbering, and such other supports and structures necessary for the preservation of the mine workings on the leased premises or deposits and place all workings in condition for suspension or abandonment. Within 180 days thereof, lessee must remove from the premises all other structures, machinery, equipment, tools, and materials that it elects to or as required by the BLM. Any such structures, machinery, equipment, tools, and materials remaining on the leased lands beyond 180 days, or approved extension thereof, will become the property of the lessor, but lessee may either remove any or all such property or continue to be liable for the cost of removal and disposal in the amount actually incurred by the lessor. If the surface is owned by third parties, lessor will waive the requirement for removal, provided the third parties do not object to such waiver. Lessee must, prior to the termination of bond liability or at any other time when required and in accordance with all applicable laws and regulations, reclaim all lands the surface of which has been disturbed, dispose of all debris or solid waste, repair the offsite and onsite damage caused by lessee's activity or activities incidental thereto, and reclaim access roads or trails.

Sec.11. PROCEEDINGS IN CASE OF DEFAULT - If lessee fails to comply with applicable laws, existing regulations, or the terms, conditions and stipulations of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to cancellation by the lessor only by judicial proceedings. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver will not prevent later cancellation for the same default occurring at any other time.

Sec. 12. HEIRS AND SUCCESSORS-IN-INTEREST - Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Sec.13. INDEMNIFICATION - Lessee must indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under this lease.

Sec. 14. SPECIAL STATUTES - This lease is subject to the Clean Water Act (33 U.S.C. 1252 et seq.), the Clean Air Act (42 U.S.C. 4274 et seq.), and to all other applicable laws pertaining to exploration activities, mining operations and reclamation, including the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.).

Sec. 15. SPECIAL STIPULATIONS

This coal lease is subject to termination if the lessee is determined at the time of issuance to be in noncompliance with Section 2(a)2(A) of the Mineral Leasing Act.

SEE ATTACHED STIPULATIONS

(Continued on page 3)

Sec. 15. SPECIAL STIPULATIONS (Cont'd.) -

The Privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this application.

**AUTHORITY:** 30 U.S.C. 181-287 and 30 U.S.C. 351-359.

**PRINCIPAL PURPOSE:** BLM will use the information you provide to process your application and determine if you are eligible to hold a lease on BLM Land.

**ROUTINE USES:** BLM will only disclose the information according to the regulations at 43 CFR 2.56(d).

**EFFECT OF NOT PROVIDING INFORMATION:** Disclosing the information is necessary to receive a benefit. Not disclosing the information may result in BLM's rejecting your request for a lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:

This information is being collected to authorize and evaluate proposed exploration and mining operations on public lands.

Response to the provisions of this lease form is mandatory for the types of activities specified.

BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT

Public reporting burden for this form is estimated to average one hour per response including the time for reading the instructions and provisions, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to: U.S. Department of the Interior, Bureau of Land Management (1004-0073), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, Mail Stop 401 LS, Washington, D.C. 20240.

THE UNITED STATES OF AMERICA

ANDALEX Resources, Inc.
(Company or Lessee Name)

(Signature of Lessee)

Douglas H. Smith, President
(Title)

July 26, 2006
(Date)

By _____

(BLM)

Chief, Br. of Solid Minerals
(Title)

July 27, 2006
(Date)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

## LEASE STIPULATIONS

Kenilworth LBA

1. In accordance with Sec. 523(b) of the "Surface Mining Control and Reclamation Act of 1977," surface mining and reclamation operations conducted on this lease are to conform with the requirements of this act and are subject to compliance with Office of Surface Mining regulations, or as applicable, a Utah program equivalent approved under cooperative agreement in accordance with Sec. 523(c). The United States Government does not warrant that the entire tract will be susceptible to mining.

2. Before undertaking activities that may disturb the surface of previously undisturbed leased lands, the Lessee may be required to conduct a cultural resource inventory and a paleontological appraisal of the areas to be disturbed. These studies shall be conducted by qualified professional cultural resource specialists or qualified paleontologists, as appropriate, and a report prepared itemizing the findings. A plan will then be submitted making recommendations for the protection of, or measures to be taken to mitigate impacts for identified cultural or paleontological resources.

If cultural resources or paleontological remains (fossils) of significant scientific interest are discovered during operations under this lease, the Lessee prior to disturbance shall immediately bring them to the attention of the appropriate authorities. Paleontological remains of significant scientific interest do not include leaves, ferns, or dinosaur tracks commonly encountered during underground mining operations.

The cost of conducting the inventory, preparing reports, and carrying out mitigating measures shall be borne by the Lessee.

3. If there is reason to believe that Threatened or Endangered (T&E) species of plants or animals, or migratory bird species of high Federal interest occur in the area, the Lessee shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted. The inventory shall be conducted by a qualified specialist and a report of findings will be prepared. A plan will be prepared making recommendations for the protection of these species or action necessary to mitigate the disturbance. The cost of conducting the inventory, preparing reports, and carrying out mitigating measures shall be borne by the Lessee.

4. The Lessee shall be required to perform a study to secure adequate baseline data to quantify the existing surface resources on and adjacent to the lease area. Existing data may be used if such data are adequate for the intended purposes. The study shall be adequate to locate, quantify, and demonstrate the interrelationship of the geology, topography, surface and groundwater hydrology, vegetation and wildlife. Baseline data will be established so that future programs of observation can be incorporated at regular intervals for comparison.

5. Powerlines used in conjunction with the mining of coal from this lease shall be constructed so as to provide adequate protection for raptors and other large birds. When feasible, powerlines will be located at least 100 yards from public roads.

6. The Lessee shall be required to establish a monitoring system to locate, measure, and quantify the progressive and final effects of underground mining activities on the topographic surface, underground and surface hydrology and vegetation. The monitoring system shall utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a number of points over the lease area. The monitoring shall incorporate and be an extension of the baseline data.

7. Except at locations specifically approved by the Authorized Officer, underground mining operations shall be conducted in such a manner so as to prevent surface subsidence that would: (1) cause the creation of hazardous conditions such as potential escarpment failure and landslides, (2) cause damage to existing surface structures, or (3) damage or alter the flow of perennial streams. The Lessee shall provide specific measures for the protection of escarpments, and determine corrective measures to assure that hazardous conditions are not created.

8. In order to avoid surface disturbance on steep canyon slopes and to preclude the need for surface access, all surface breakouts for ventilation tunnels shall be constructed from inside the mine, except at specifically approved locations.

9. If removal of timber is required for clearing of construction sites, etc., such timber shall be removed in accordance with the regulations of the Authorized Officer.

10. In order to protect big game wintering areas, elk calving and deer fawning areas, sagegrouse strutting areas, and other critical wildlife habitat and/or activities, specific surface uses outside the mine development area may be curtailed during specific periods of the year.

11. Support facilities, structures, equipment, and similar developments will be removed from the lease area within 2 years after the final termination of use of such facilities. This provision shall apply unless the requirement of Section 10 of the lease form is applicable. Disturbed areas and those areas previously occupied by such facilities will be stabilized and rehabilitated, drainages re-established, and the areas returned to a premining land use.

12. The Lessee at the conclusion of the mining operation, or at other times as surface disturbance related to mining may occur, will replace all damaged, disturbed, or displaced corner monuments (section corners, quarter corners, etc.) their accessories and appendages (witness trees, bearing trees, etc.), or restore them to their original condition and location, or at other locations that meet the requirements of the rectangular surveying system. This work shall be conducted at the expense of the Lessee, by the Bureau of Land Management (BLM) land surveyors to the standards and guidelines found in the Manual of Surveying Instructions, U.S. Department of Interior.

13. The Lessee, at his expense, will be responsible to replace any surface and/or developed ground water sources identified for protection that may be lost or adversely affected by mining operations, with water from an alternate source in sufficient quantity and quality to maintain existing riparian habitat, fishery habitat, livestock and wildlife use, or other land uses.

14. Notwithstanding the approval of a resource recovery and protection plan by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (I) the operator/lessee fails to achieve maximum economic recovery [as defined at 43 CFR §3480.0-5(21)] of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecovered coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unminable by the operation, the operator shall submit appropriate justification to obtain approval by the AO to leave such reserves unmined. Upon approval by the AO, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or a portion of the lease as authorized by statute and regulation.

In the event the AO determines that the R2P2 modification will not attain MER resulting from changed conditions, the AO will give proper notice to the operator/lessee as required under applicable regulations. The AO will order a new R2P2 modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the AO that the coal reserves have been rendered unminable or at such time that the lessee has demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the MMS demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

15. The lessee shall provide on a yearly basis and prior to lease relinquishment, certification to the lessor that, based upon a complete search of all the operator's records for the mine and upon their knowledge of past operations, there has been no **hazardous substances** per (40 CFR 302.4) or **used oil** as per Utah State Management Rule R-315-15, deposited within the lease, either on the surface or underground, or that all remedial action necessary has been taken to protect human health and the environment with respect to any such substances remaining on the property. The back-up documentation to be provided shall be described by the lessor prior to the first certification and shall include all documentation applicable to the Emergency Planning and Community Right-to-know Act (EPCRA, Public Law 99-499), Title III of the Superfund Amendments and Reauthorization Act of 1986 or equivalent.

16. The lessee/operator is responsible for compliance with reporting regarding toxic and hazardous material and substances under Federal Law and all associated amendments and regulations for the

handling such materials on the lad surface and in underground mine workings.

The lessee/operator must remove mine equipment and materials not needed for continued operations, roof support and mine safety from underground workings prior to abandonment of mine sections. Exceptions can be approved by the Authorized Officer (BLM) in consultation with the surface management agency. Creation of a situation that would prevent removal of such material and by retreat or abandonment of mine sections without prior authorization would be considered noncompliance with lease terms and conditions and subject to appropriate penalties under the lease.

17. All safe and accessible areas shall be inspected prior to being sealed. The lessee shall notify the Authorized Officer in writing 30 days prior to the sealing of any areas in the mine and state the reason for closure. Prior to seals being put into place, the lessee shall inspect the area and document any equipment/machinery, hazardous substances, and used oil that is to be left underground.

The Authorized Officer may participate in this inspection. The purpose of this inspection will be: (1) to provide documentation for compliance with 42 U.S.C. 9620 section 120(h) and State Management Rule R-315-15, and to assure that certification will be meaningful at the time of lease relinquishment, (2) to document the inspection with a mine map showing location of equipment/machinery (model, type of fluid, amount remaining, batteries etc.) that is proposed to be left underground. In addition, these items will be photographed at the lessee's expense and shall be submitted to the Authorized Officer as part of the certification. The abandonment of any equipment/machinery shall be on a case by case basis and shall not be accomplished unless the Authorized Officer has granted a written approval. Any on-site disposal of non-coal waste must comply with 30 CFR § 817.89 and must be approved by the regulatory authority responsible for the enforcement of the Surface Mining Control and Reclamation Act (30 U.S.C. 1201, et seq.).

# Appendix 1 (Part 3)

## Centennial

| Date Issued | Violation Number | Issuing Agency | Description | Status (Abated Term etc.) | Abatment Action |
|---|---|---|---|---|---|
| 9/8/2010 | 10067 | DOGM | Noxious weeds (thistle) | | terminated |

## Crandall

| Date Issued | Violation Number | Issuing Agency | Description | Status (Abated Term etc.) | Abatment Action |
|---|---|---|---|---|---|
| 8/25/2010 | 10065 | DOGM | Failure to maintain sed control | terminated | ditch cleaned |
| 2/16/2011 | 10073 | DOGM | Failure to submit cost information | terminated | cost info submitted |
| 12/3/2012 | 10099 | DOGM | Failure to report flow daily | terminated | Flow meter fixed |
| 12/3/2012 | 10100 | DOGM | Failure to report DO readings | terminated | DO meter repaired |
| 3/18/2013 | 10105 | DOGM | Failure to maintain 10yr 24hr | Vacated | NA |

## West Ridge

| Date Issued | Violation Number | Issuing Agency | Description | Status (Abated Term etc.) | Abatment Action |
|---|---|---|---|---|---|
| 4/29/2010 | 10051 | DOGM | storage shed CO | terminated | permitted storage |
| 4/29/2010 | 10052 | DOGM | plugged culvert | terminated | unpluged |
| 7/21/2010 | 10063 | DOGM | coal fines in stream (second offense) | terminated | banks cleaned |
| 1/10/2013 | 10103 | DOGM | Missing Data in water data base | terminated | data submitted |

## Lila Canyon

| Date Issued | Violation Number | Issuing Agency | Description | Status (Abated Term etc.) | Abatment Action |
|---|---|---|---|---|---|
| 6/30/2010 | 10058 | DOGM | Failure to maintain ditch | terminated | ditch cleaned |
| 12/12/2011 | 10093 | DOGM | Failure to Comply with permit | terminated | permit revised |
| 7/11/2012 | 10097 | DOGM | Failure to Control Fines | terminated | Fines cleaned |
| 3/14/2013 | 10122 | DOGM | Failure to Control Fines | terminated | Fines cleaned |
| 6/26/2013 | 10130 | DOGM | Raptor Follow up | terminated | NONE |

# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 5/24/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| PRODUCER | CONTACT NAME: Karen Williams |
|---|---|
| Reschini Agency, Inc.<br>922 Philadelphia Street<br>P.O. Box 449<br>Indiana PA 15701 | PHONE (A/C, No, Ext): (724) 349-1300 FAX (A/C, No): (724) 349-1446<br>E-MAIL ADDRESS: kwilliams@reschini.com |
| INSURED | INSURER(S) AFFORDING COVERAGE / NAIC # |
| Andalex Resources, Inc.<br>A Subsidiary of UtahAmerican Energy, Inc.<br>6750 N. Airport Road<br>Price UT 84501 | INSURER A: Federal Insurance Company 20281<br>INSURER B:<br>INSURER C:<br>INSURER D:<br>INSURER E:<br>INSURER F: |

COVERAGES CERTIFICATE NUMBER: Andalex 13-14 REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS | |
|---|---|---|---|---|---|---|---|---|
| A | GENERAL LIABILITY<br>X COMMERCIAL GENERAL LIABILITY<br>CLAIMS-MADE X OCCUR<br>GEN'L AGGREGATE LIMIT APPLIES PER:<br>POLICY PRO-JECT X LOC | | | 37104410 | 6/1/2013 | 6/1/2014 | EACH OCCURRENCE<br>DAMAGE TO RENTED PREMISES (Ea occurrence)<br>MED EXP (Any one person)<br>PERSONAL & ADV INJURY<br>GENERAL AGGREGATE<br>PRODUCTS - COMP/OP AGG | $ 1,000,000<br>$ 1,000,000<br>$ 10,000<br>$ 1,000,000<br>$ 2,000,000<br>$ 2,000,000 |
| | AUTOMOBILE LIABILITY<br>ANY AUTO<br>ALL OWNED AUTOS<br>SCHEDULED AUTOS<br>HIRED AUTOS<br>NON-OWNED AUTOS | | | | | | COMBINED SINGLE LIMIT (Ea accident)<br>BODILY INJURY (Per person)<br>BODILY INJURY (Per accident)<br>PROPERTY DAMAGE (Per accident) | $<br>$<br>$<br>$ |
| | UMBRELLA LIAB OCCUR<br>EXCESS LIAB CLAIMS-MADE<br>DED RETENTION $ | | | | | | EACH OCCURRENCE<br>AGGREGATE | $<br>$ |
| | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY<br>ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N<br>(Mandatory in NH)<br>If yes, describe under DESCRIPTION OF OPERATIONS below | N/A | | | | | WC STATU-TORY LIMITS OTH-ER<br>E.L. EACH ACCIDENT<br>E.L. DISEASE - EA EMPLOYEE<br>E.L. DISEASE - POLICY LIMIT | $<br>$<br>$ |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Centennial Mine Act 007/019. Should Any of the above described policies be changed and/or cancelled before the expiration date thereof, the issuing company will mail (certified) 45 days written notice to the certificate holder. General Liability is inclusive of XCU coverage.

CERTIFICATE HOLDER

State of Utah Dept of Natural Resources
Division of Oil, Gas & Mining/STE1210
Attn: Daron Haddock
1594 W N. Temple, Box 145801
Salt Lake City, UT 84114-5801

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Karen Williams/KAREN Karen Williams


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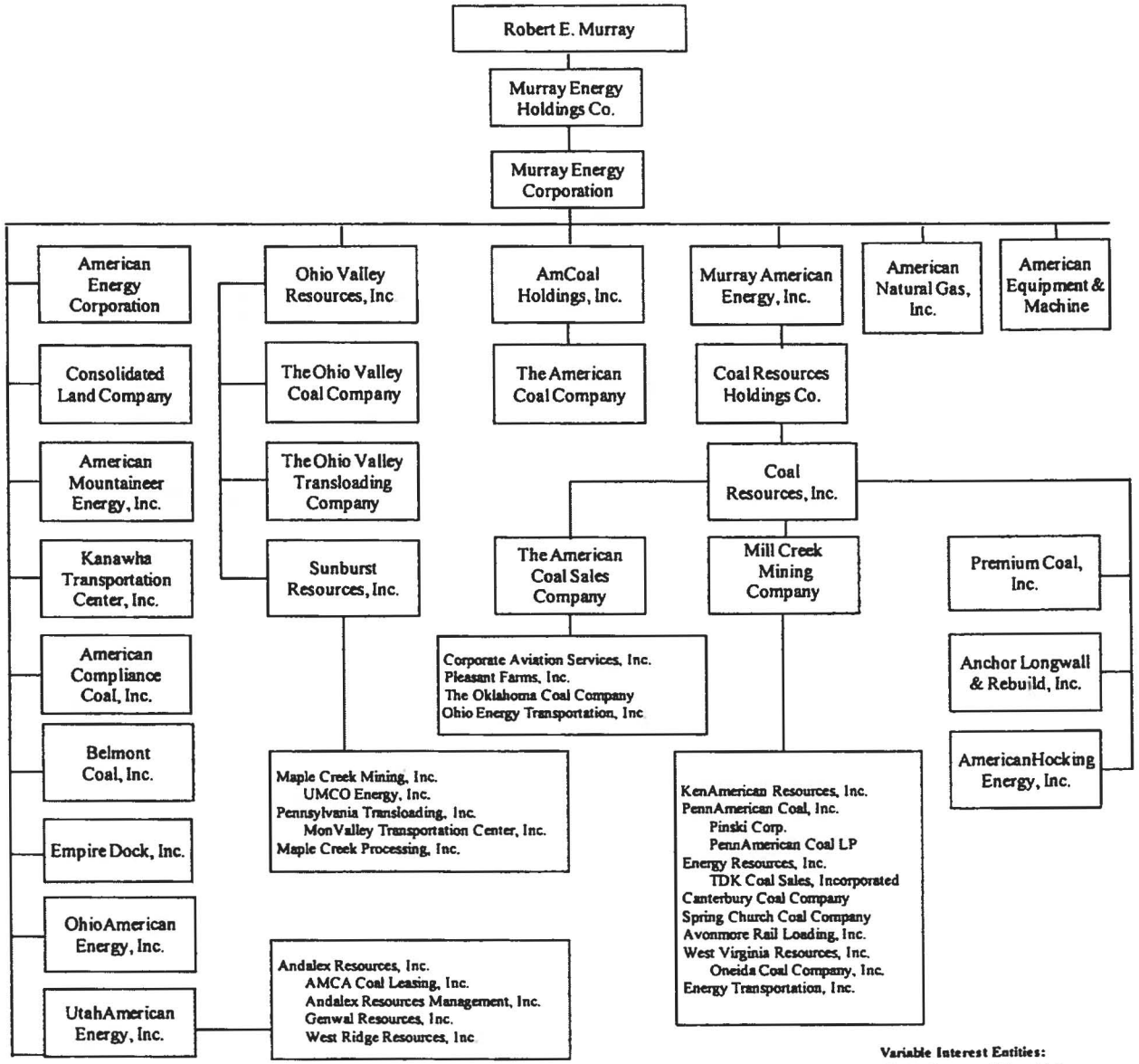
Robert E. Murray
Murray Energy Holdings Co.
Murray Energy Corporation
American Energy Corporation
Consolidated Land Company
American Mountaineer Energy, Inc.
Kanawha Transportation Center, Inc.
American Compliance Coal, Inc.
Belmont Coal, Inc.
Empire Dock, Inc.
OhioAmerican Energy, Inc.
UtahAmerican Energy, Inc.
Ohio Valley Resources, Inc
The Ohio Valley Coal Company
The Ohio Valley Transloading Company
Sunburst Resources, Inc.
Maple Creek Mining, Inc.
UMCO Energy, Inc.
Pennsylvania Transloading, Inc.
MonValley Transportation Center, Inc.
Maple Creek Processing, Inc.
Andalex Resources, Inc.
AMCA Coal Leasing, Inc.
Andalex Resources Management, Inc.
Genwal Resources, Inc.
West Ridge Resources, Inc
AmCoal Holdings, Inc.
The American Coal Company
The American Coal Sales Company
Corporate Aviation Services, Inc.
Pleasant Farms, Inc.
The Oklahoma Coal Company
Ohio Energy Transportation, Inc
Murray American Energy, Inc.
Coal Resources Holdings Co.
Coal Resources, Inc.
Mill Creek Mining Company
KenAmerican Resources, Inc.
PennAmerican Coal, Inc.
Pinski Corp.
PennAmerican Coal LP
Energy Resources, Inc.
TDK Coal Sales, Incorporated
Canterbury Coal Company
Spring Church Coal Company
Avonmore Rail Loading, Inc.
West Virginia Resources, Inc.
Oneida Coal Company, Inc.
Energy Transportation, Inc.
American Natural Gas, Inc.
American Equipment & Machine
Premium Coal, Inc.
Anchor Longwall & Rebuild, Inc.
AmericanHocking Energy, Inc.
Variable Interest Entities:
Chagrin Executive Offices LLC

# LEGAL NOTICE

Andalex Resources, Inc. has filed a complete application with the Division of Oil, Gas and Mining for a revision of the existing Mining and Reclamation Plan, C/007/019 for the Aberdeen Mine. Andalex Resources, Inc. is a subsidiary of UtahAmerican Energy, Inc. and operates the Aberdeen Mine in Dead Canyon which is located approximately 8 miles NE of the town of Price, Utah. The lease revision will increase the lease acreage by approximately 1,760 acres, with no additional surface disturbance proposed.

Underground coal mining will take place in coal reserves owned or leased by Andalex Resource, Inc. A legal description of the proposed areas for additional underground Mining and Reclamation Activities are described as follows:

**Federal Lease UTU-81893** (Kenilworth Lease)
T. 12 S., R. 10 E., SLM, Utah

| | | | |
|---|---|---|---|
| Section 26 | | | |
| | N1/2 SW1/4 | 80.00 | Acres |
| | SE SW | 40.00 | Acres |
| | SE | 160.00 | Acres |
| Section 27 | | | |
| | S1/2 | 320.00 | Acres |
| Section 34 | | | |
| | S1/2 NE 80.00 | Acres | |
| | NW NE 40.00 | Acres | |
| | NW | 160.00 | Acres |
| | S1/2 | 320.00 | Acres |
| Section 35 | | | |
| | NE | 160.00 | Acres |
| | S1/2 NW 80.00 | Acres | |
| | S1/2 | 320.00 | Acres |
| | **Total** | **1,760.00** | **Acres** |

The address of the applicant is : Andalex Resources
794 North “C” Canyon Road
P.O. Box 910
East Carbon, UT 84520-0910

After filing, copies of this permit revision application will be available for inspection at the Carbon County Court House, and at the Utah Division of Oil Gas, and Mining website under the Coal Permit files.

Written comment or requests regarding this permit revision must be made within 30 days of the last publication of this notice, and may be addressed to the Utah Division of Oil, Gas and Mining 1594 West North Temple, Suite 1210, Salt Lake City, Utah84114-5801.
Published in the Sun Advocate June ___ ___ ___ and ___ 2014.