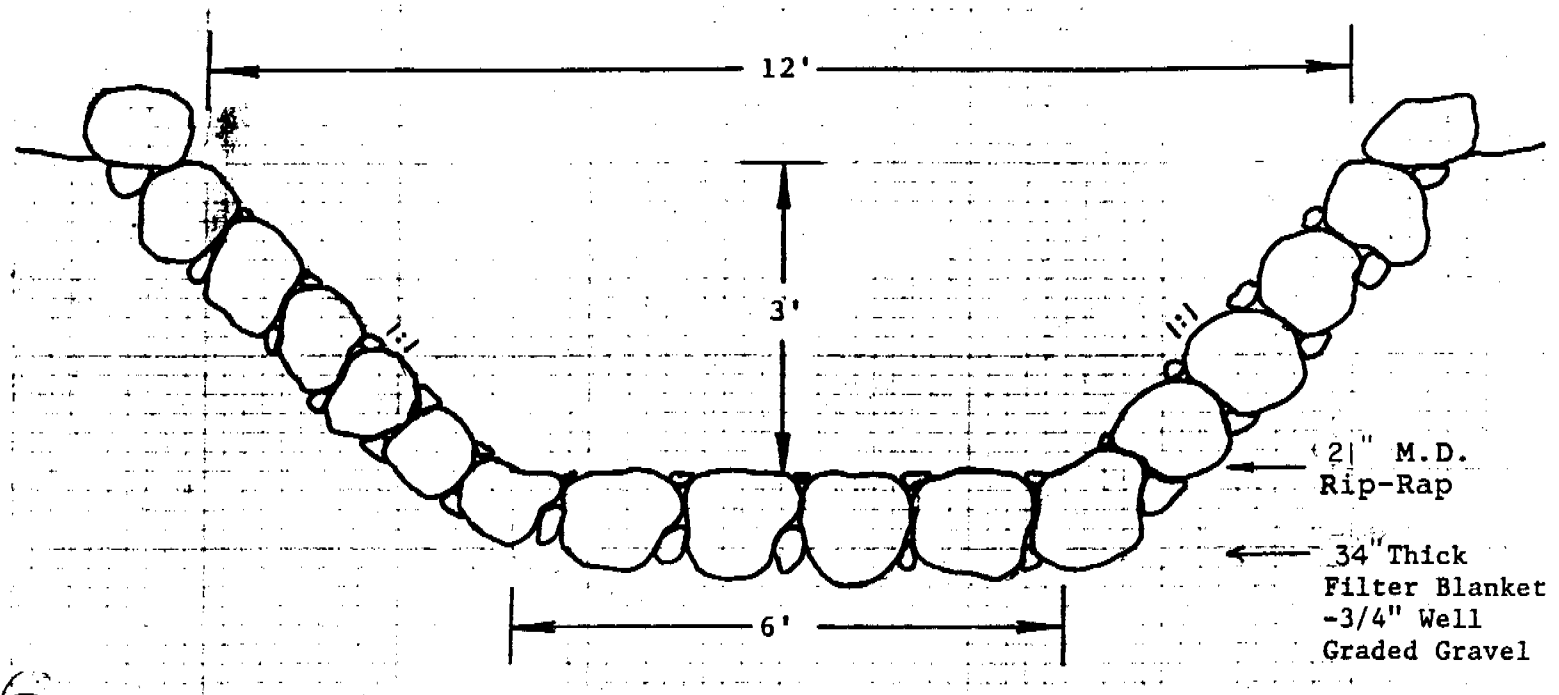
BY D. Guy DATE 3/15/87 SUBJECT RESTORED CHANNEL TYPICALS SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... JOB NO. .....

Scale: 1"= 2'



MAIN CHANNEL - RC-1

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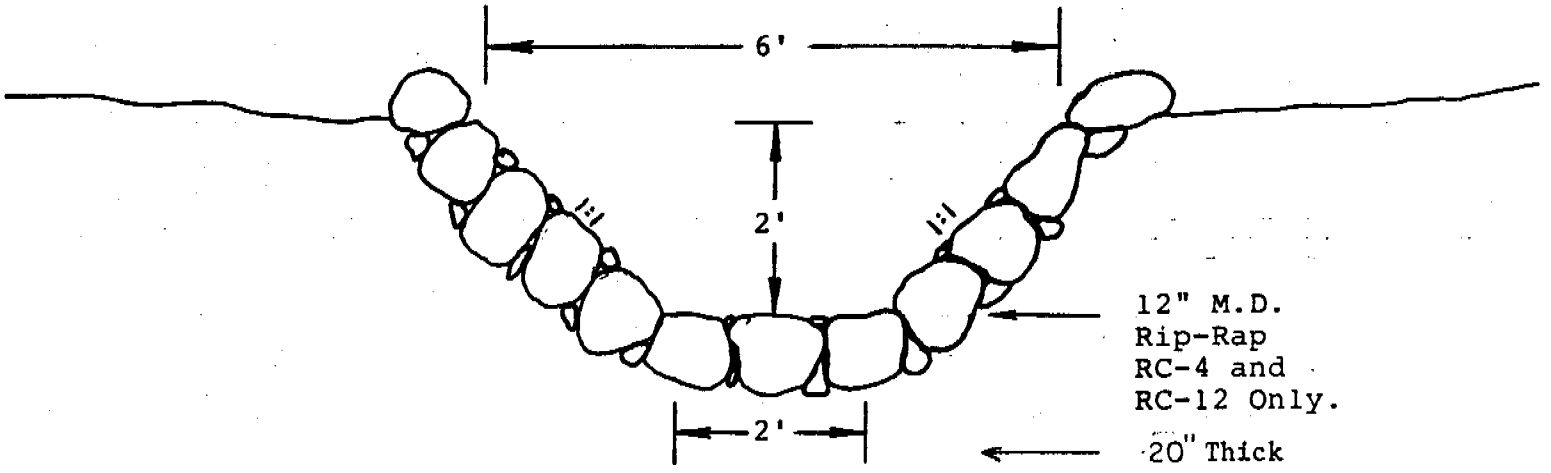


SIDE CHANNELS

FIGURE IV-10

4/10/89

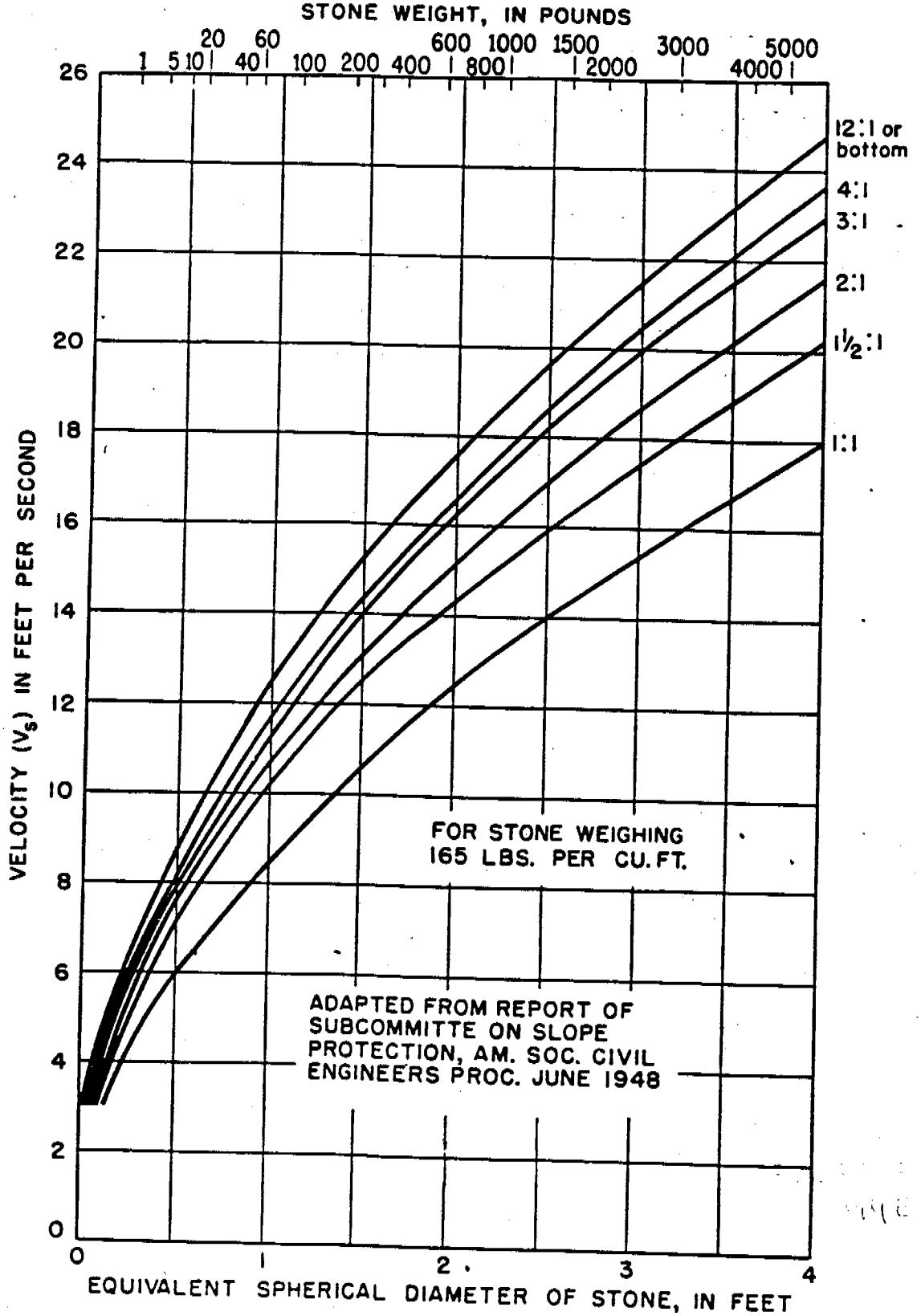
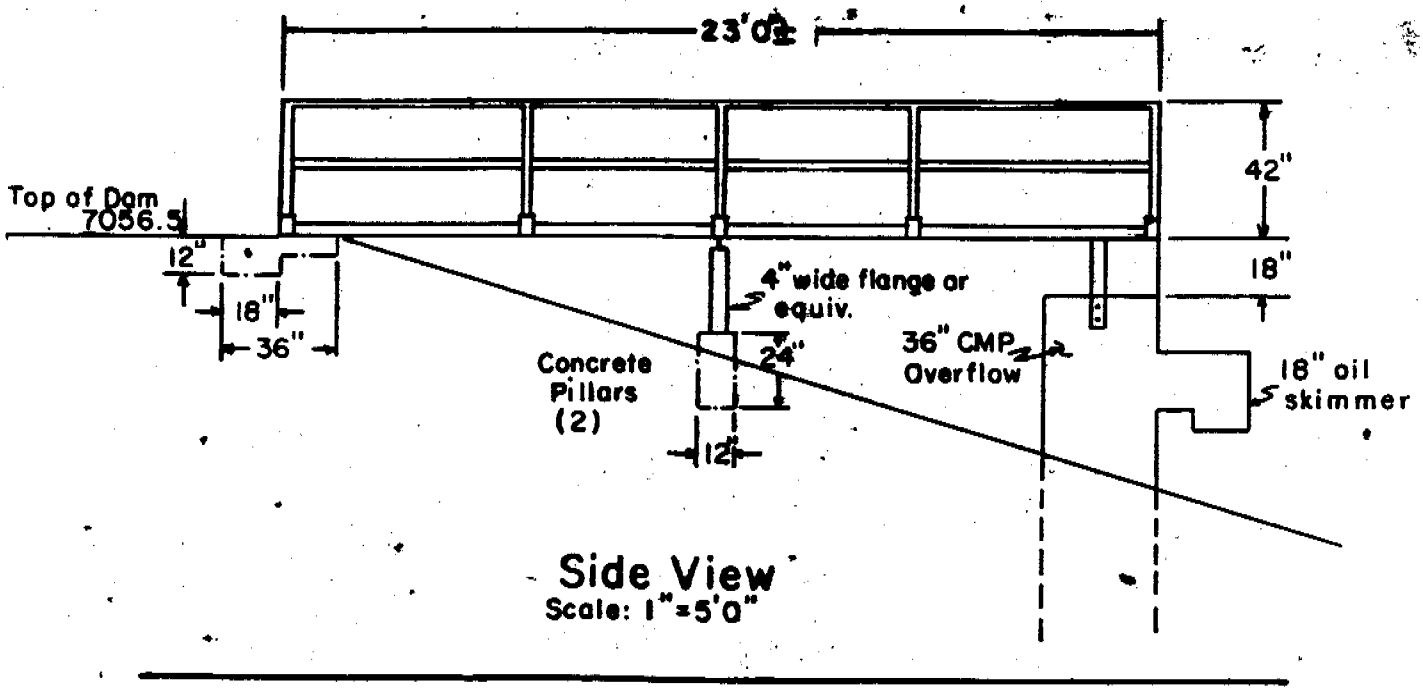
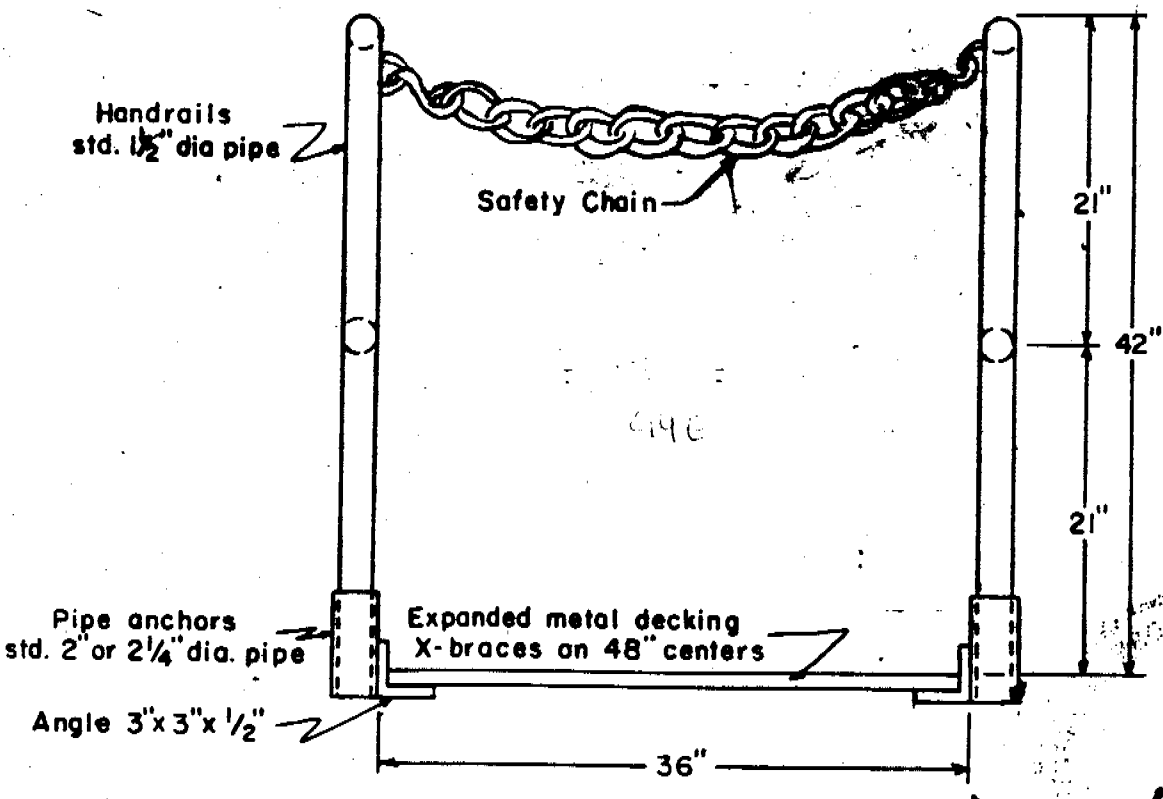


FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

Figure IV-12



Side View
Scale: 1"=5'0"



Front View
Scale: 1"=1'0"

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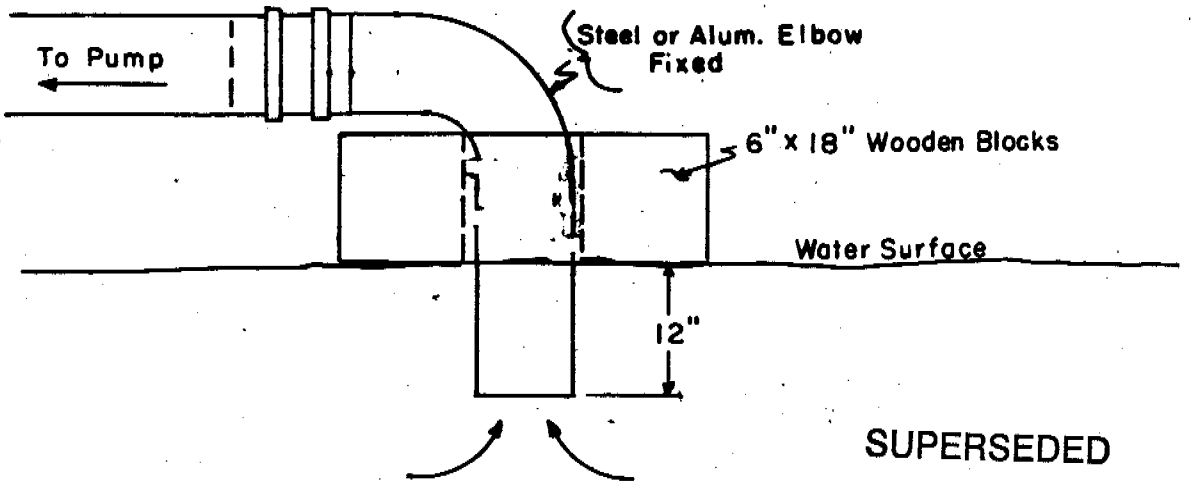
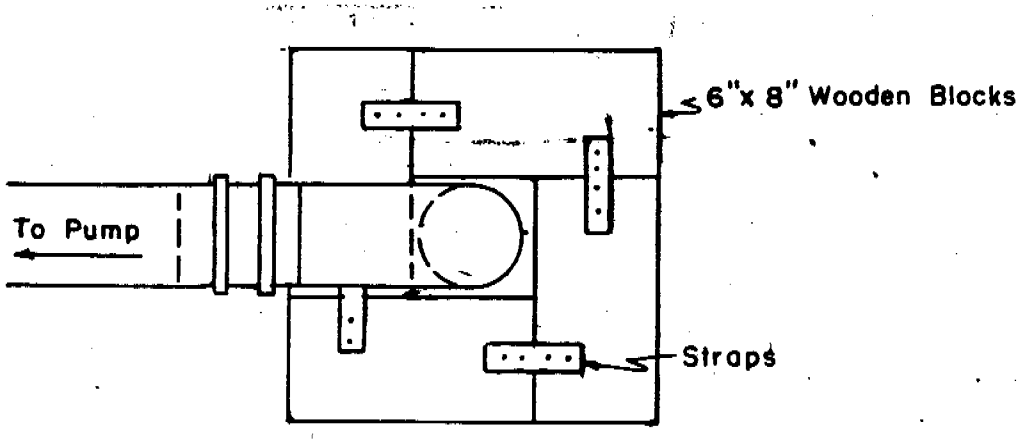
REGISTERED PROFESSIONAL ENGINEER
No. 4548
DAN W. GUY
2/28/90
STATE OF UTAH

Figure IV-13
Pond C-Sampling Access Ramp



Side View



Top View

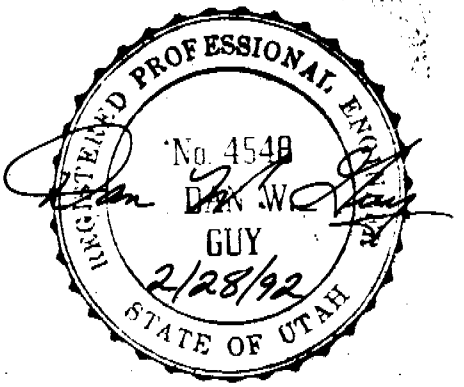


Figure IV-14
Floating Decant- Typical

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 Aztman.
Revised 8/8/95

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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 approved post mining land use. Ancillary roads will be travelled only by light vehicles for routine access. Occasionally, they will be travelled 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 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.

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.

Revised 8/8/95

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

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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

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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 R645-301-512.240.

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.

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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.

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:

34.2 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

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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 R645-301-512.240.

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.

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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

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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)

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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)

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

INCORPORATED

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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.

6/L

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

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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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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.

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See R645-301-510, Volume II.

R645-301-521.162. **AREA AFFECTED ACCORDING TO SEQUENCE AND TIMING OF OPERATIONS**

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R645-301-521.163. BONDED AREA

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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 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 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 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 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.

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. 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.

R645-301-524.100. BLASTER CERTIFICATION

On-Site.

R645-301-524.110. CERTIFIED BLASTER

On-Site.

R645-301-524.120. BLASTING CERTIFICATES

On-Site.

R645-301-524.130. FIRING OF A BLAST

NOTE: Surface blasting is rare at this site; therefore, only a very general plan is submitted in the Permit Application Package (PAP). If additional surface blasting becomes necessary, a more detailed plan will be submitted at that time.

R645-301-524.140. RESPONSIBILITY

See note

R645-301-524.200. BLAST DESIGN

See note

R645-301-524.210. ALL BLASTING OPERATIONS

See note

R645-301-524.211. BUILDINGS WITHIN 1000 FEET OUTSIDE THE PERMIT AREA

See note

R645-301-524.212. WITHIN 500 FEET OF UNDERGROUND MINE

See note

R645-301-524.220. BLAST DESIGN APPROVAL PRIOR TO BLAST

See note

R645-301-524.230. **BLAST DESIGN CRITERIA**

See note

R645-301-524.240. **CERTIFICATION**

See note

R645-301-524.250. **CHANGES TO BLAST DESIGN**

See note

R645-301-524.300. **PRE-BLASTING SURVEY**

See note

R645-301-524.310. **NOTIFICATION OF RESIDENTS**

See note

R645-301-524.320. **REQUESTS FOR PRE-BLASTING SURVEY**

See note

R645-301-524.330. **ASSESSMENT OF FACILITIES**

See note

R645-301-524.340. **REPORT OF SURVEY**

See note

R645-301-524.350. **COMPLETION OF SURVEY PRIOR TO BLAST**

See note

R645-301-524.400. **BLAST SCHEDULE**

See note

R645-301-524.110. CERTIFIED BLASTER

On-Site.

R645-301-524.120. BLASTING CERTIFICATES

On-Site.

R645-301-524.130. FIRING OF A BLAST

NOTE: Surface blasting is rare at this site; therefore, only a very general plan is submitted in the Permit Application Package (PAP). If additional surface blasting becomes necessary, a more detailed plan will be submitted at that time.

R645-301-524.140. RESPONSIBILITY

See note

R645-301-524.200. BLAST DESIGN

See note

R645-301-524.210. ALL BLASTING OPERATIONS

See note

R645-301-524.211. BUILDINGS WITHIN 1000 FEET OUTSIDE THE PERMIT AREA

See note

R645-301-524.212. WITHIN 500 FEET OF UNDERGROUND MINE

See note

R645-301-524.220. BLAST DESIGN APPROVAL PRIOR TO BLAST

See note

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R645-301-524.230. **BLAST DESIGN CRITERIA**

See note

R645-301-524.240. **CERTIFICATION**

See note

R645-301-524.250. **CHANGES TO BLAST DESIGN**

See note

R645-301-524.300. **PRE-BLASTING SURVEY**

See note

R645-301-524.310. **NOTIFICATION OF RESIDENTS**

See note

R645-301-524.320. **REQUESTS FOR PRE-BLASTING SURVEY**

See note

R645-301-524.330. **ASSESSMENT OF FACILITIES**

See note

R645-301-524.340. **REPORT OF SURVEY**

See note

R645-301-524.350. **COMPLETION OF SURVEY PRIOR TO BLAST**

See note

R645-301-524.400. **BLAST SCHEDULE**

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R645-301-524.410. UNSCHEDULED BLASTS

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R645-301-524.420. TIME PERIODS FOR BLASTING

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R645-301-524.430. BLASTING NOTICES FOR UNDERGROUND MINING OPERATIONS

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R645-301-524.450. BLASTING SCHEDULE PUBLICATION AND DISTRIBUTION

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R645-301-524.451. NEWSPAPER PUBLICATION

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R645-301-524.452. DISTRIBUTION OF NOTICES

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R645-301-524.453. REPUBLISHING AND REDISTRIBUTION

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R645-301-524.460. BLASTING SCHEDULE CONTENTS

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R645-301-524.461. OPERATOR IDENTIFICATION

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R645-301-524.462. BLASTING LOCATION

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R645-301-524.463. DATES AND TIME PERIODS OF DETONATIONS

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R645-301-524.464. ACCESS CONTROL METHODS

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R645-301-524.465. WARNING SIGNALS

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R645-301-524.500. DESCRIPTION OF BLASTING SAFEGUARDS

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R645-301-524.600. CONTROL OF ADVERSE BLASTING EFFECTS

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R645-301-524.610. GENERAL REQUIREMENTS

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R645-301-524.620. AIR BLAST LIMITS

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R645-301-524.621. MAXIMUM AIR BLAST LIMITS

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R645-301-524.622. PREVENTION OF DAMAGE

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R645-301-524.630. MONITORING

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R645-301-524.632 MEASURING SYSTEMS

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R645-301-524.641. **GENERAL**

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R645-301-524.643. **SEISMOGRAPHIC RECORD**

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R645-301-524.650. **ALLOWABLE CHARGE WEIGHT**

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R645-301-524.652. **MODIFIED SCALED-DISTANCE FACTOR**

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R645-301-524.700. RECORDS OF BLASTING OPERATIONS

See note

R645-301-524.710. RECORDS

See note

R645-301-524.711. OPERATOR IDENTIFICATION

See note

R645-301-524.712. BLAST LOCATION AND SCHEDULE

See note

R645-301-524.713. BLASTER CERTIFICATION

See note

R645-301-524.720. NEAREST DWELLING OR FACILITY OUTSIDE THE PERMIT AREA

See note

R645-301-524.730. WEATHER CONDITIONS

See note

R645-301-524.740. BLASTING RECORD

See note

R645-301-524.741. TYPE OF MATERIAL BLASTED

See note

R645-301-524.742. BLASTING PATTERN

See note

R645-301-524.743. DIAMETER AND DEPTH OF HOLES

See note

R645-301-524.744. TYPES OF EXPLOSIVES USED

See note

R645-301-524.745. TOTAL WEIGHT OF EXPLOSIVES USED PER HOLE

See note

R645-301-524.746. MAXIMUM WEIGHT OF EXPLOSIVES DETONATED IN AN EIGHT-MILLISECOND PERIOD

See note

R645-301-524.747. INITIATION SYSTEM

See note

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R645-301-524.748. **STEMMING**

See note

R645-301-524.749. **MATS OR OTHER PROTECTIONS USED**

See note

R645-301-524.750. **SEISMOGRAPHIC AND AIR BLAST INFORMATION**

See note

R645-301-524.751. **INSTRUMENTATION**

See note

R645-301-524.752. **LOCATION OF INSTRUMENTATION**

See note

R645-301-524.753. **PERSONS COLLECTING DATA**

See note

R645-301-524.754. **PERSONS ANALYZING DATA**

See note

R645-301-524.755. **VIBRATION AND/OR AIR BLAST LEVEL RECORDED**

See note

R645-301-524.760. **UNSCHEDULED BLASTS**

See note

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.)

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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 along the first proposed longwall mining. (See 6., Monitoring and Plate 28.) 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 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.

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. 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 Plates 26, 27, 28 and 29).

Multiple Seam Considerations

There are 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.

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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.

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.

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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 and State 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 Lease. Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4. Existing structures include the following:

Bathhouse (3)	14' x 60'
Mine Water Storage Tanks (3)	12' x 16'
Warehouse (1)	14' x 60'
Lamphouse (2)	40' x 40'
Main Substation	60' x 100'
Office Building	28' x 60'
Mine Fans (3)	88"
Portals (15)	6' x 20'
Culinary Water Tanks (3)	12' x 10'
Shop	80' x 120'

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 R645-301-512.240.

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

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:

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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

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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 approved post mining land use. Ancillary roads will be travelled only by light vehicles for routine access. Occasionally, they will be travelled 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

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Andalex Resources, Inc.
Mine Plan Cross Reference
To Coal Mining Rules R645
Updated - Technical Analysis 6/15/95

INCORPORATED
EFFECTIVE:
DEC 19 19

UTAH DIVISION OIL, GAS AND MINING

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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.

R645-301-527.100. ROAD CLASSIFICATION

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.

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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.

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R645-301-528.320. COAL MINE WASTE

See R645-301-528.300.

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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.

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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.

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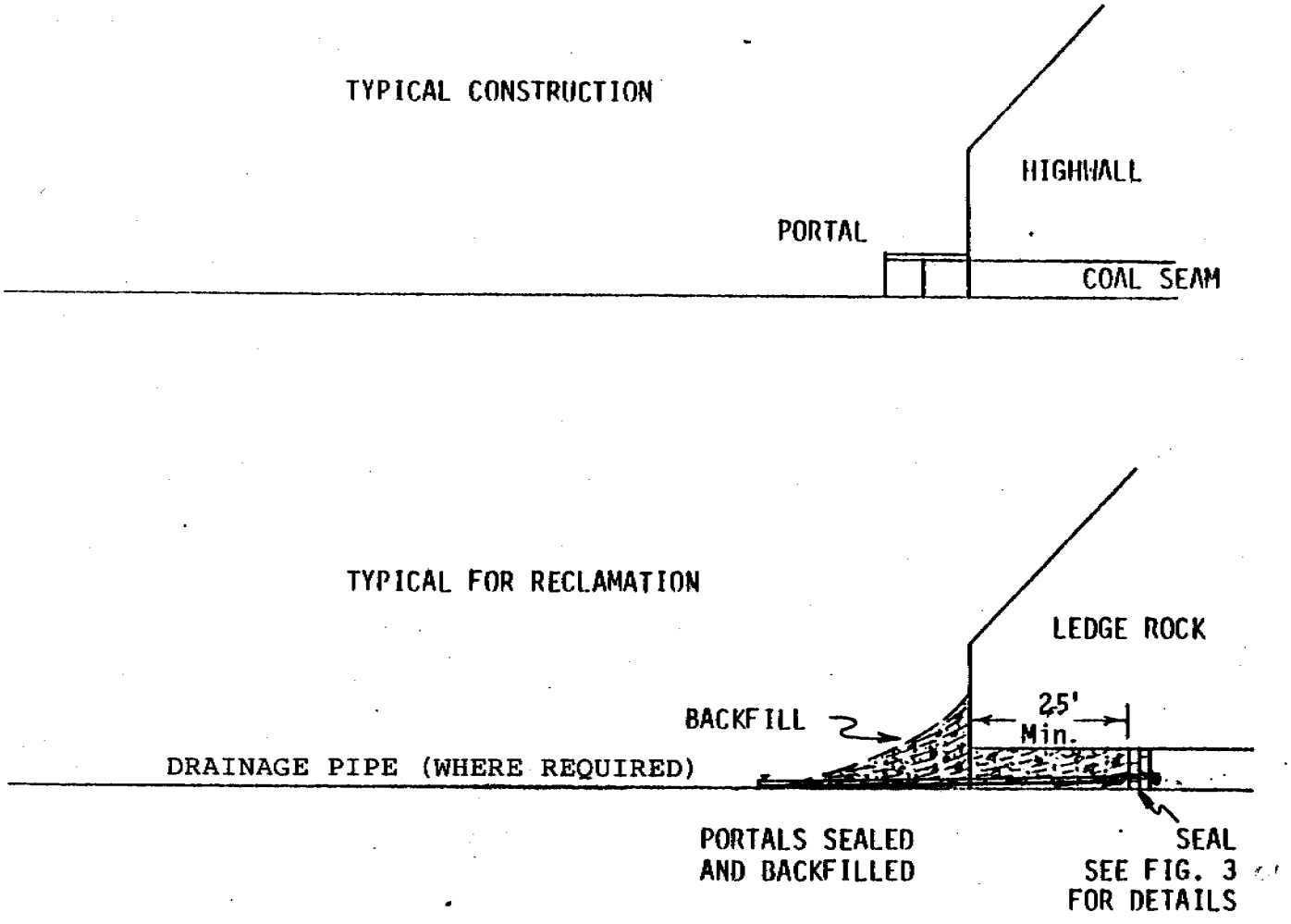
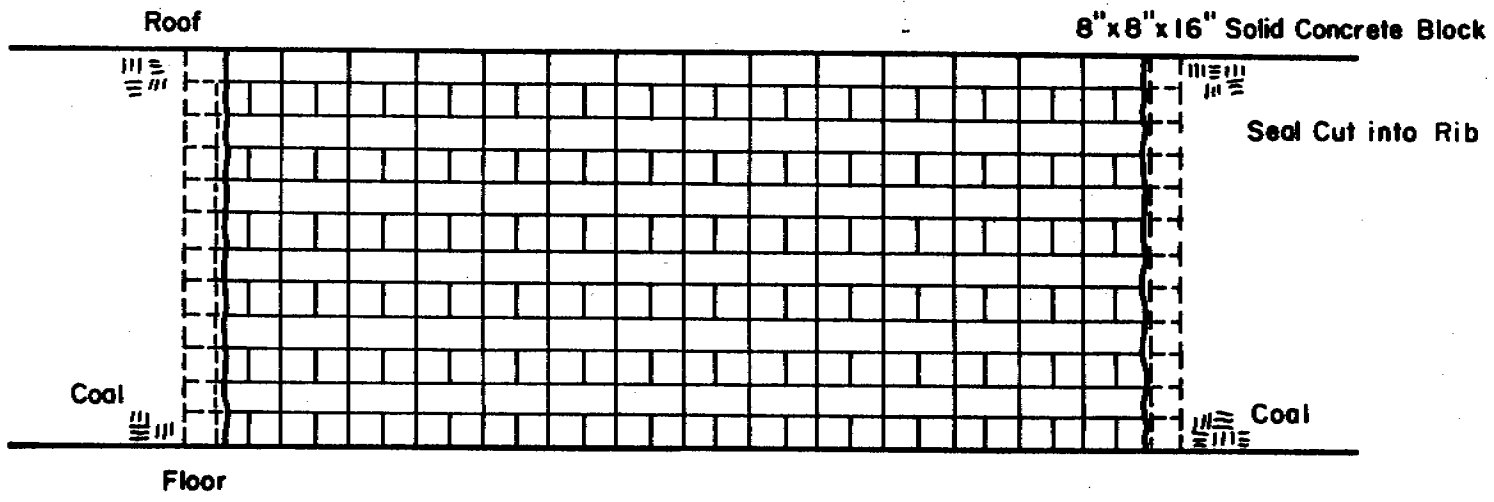
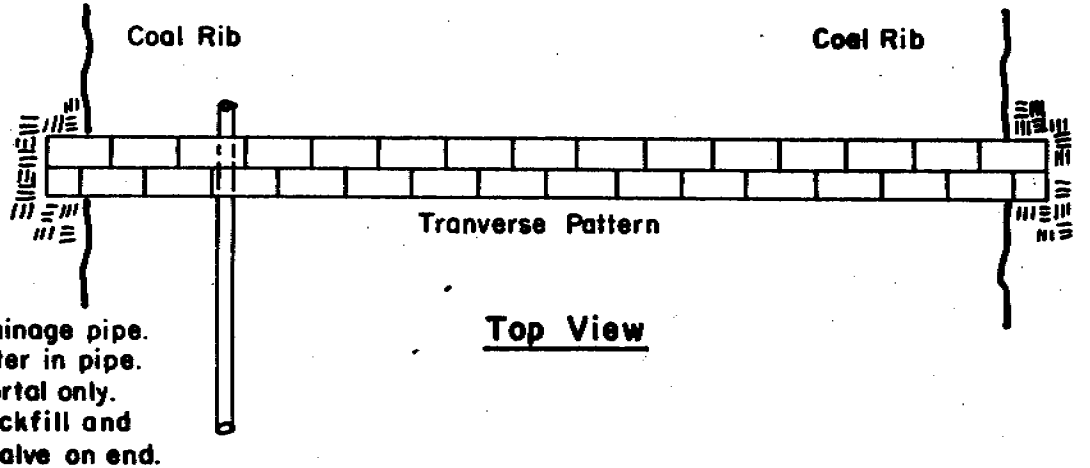


FIGURE IV-1
TYPICAL PORTAL SEALING



Front View



Top View

4"Sch. 80 PVC drainage pipe.
U-Tube to keep water in pipe.
Install in lower portal only.
Extend beyond backfill and
provide cap or valve on end.

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Typical Portal Seal

Scale: 1"=4'0"

Figure IV-2

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.

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.

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

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. 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 Lease. Underground rock tunnels access the Centennial Seam. See 1.1, 2.1-1, 2.1-4. Existing structures include the following:

Bathhouse (3)	14' x 60'
Mine Water Storage Tanks (3)	12' x 16'
Warehouse (1)	14' x 60'
Lamphouse (2)	40' x 40'
Main Substation	60' x 100'
Office Building	28' x 60'
Mine Fans (3)	88"
Portals (15)	6' x 20'
Culinary Water Tanks (3)	12' x 10'
Shop	80' x 120'

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, 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.

R645-301-532.100. 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 34.2 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:

34.2 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 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.

R645-301-533. IMPOUNDMENTS

See R645-301-512.240.

R645-301-533.100. STABILITY

See R645-301-512.240.

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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 R645-301-512.240.

R645-301-533.700. **NON-MSHA IMPOUNDMENTS DESIGN REQUIREMENTS**

See R645-301-512.240.

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

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

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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

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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

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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

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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.

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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

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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.

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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

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.

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 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

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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.

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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.

VOLUME II

Table of Contents

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 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 34.2 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.

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.

Superceded is Appendix B

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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

Superceded see Appendix B

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

Superceded see Appendix B

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. Revegetation	Drill	2	100
	h. Stake slope	Engineer	8	400
	Total Stockpile Area:			$ 7,540

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Office Site Superceded See Appendix B

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.

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.

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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 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.

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R645-301-542.500. IMPOUNDMENTS AND EMBANKMENTS

See R645-301-512.240.

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.

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 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 travelled only by light vehicles for routine access. Occasionally, they will be travelled 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.

R645-301-542.610. 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 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.

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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.

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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.

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R645-301-600. **GEOLOGY**

* SEE ALSO APPENDIX E

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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 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 and III-2. Seam thicknesses are shown on Plates 26, 27, 28, and 29. (R645-301-512.150).

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.

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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

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-DIN	SE1/4 NE1/4 SE1/4 Sec. 8 T13S, R11E, SLBM Elevation - 6,951 ft.	260 ft.	Aberdeen

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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

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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.

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

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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. doesn't apply

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

R645-301-700. HYDROLOGY

The Mathis incidental 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 IBC PHC. (see PHC for the entire lease area).

SEE ALSO APPENDICES L, N, AND O

R645-301-710. 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.

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.

Sediment Control

See R645-301-512.240.

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 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

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

Location of Monitoring Points

Groundwater

Monitoring Plan for Incidental Boundary Change

This monitoring plan is based on the PHC determination presented in Appendix L. As discussed previously, the potential for detrimental impacts resulting from mining activities in the 240 acre IBC area is considered remote. However, to document that no impacts to the hydrologic balance occur, and to provide verification that temporal variations in groundwater and surface water discharge rates are the result of climatic and seasonal variability, we recommend the monitoring of two springs adjacent to the IBC area, B351 and B352. The locations of these springs are shown on Figure IV-11 of the MRP (Groundwater and surface water monitoring locations). B351, which discharges from the Price River Formation, is located in the bottom of Mathis Canyon west of the IBC area. Discharge from B352, which discharges from the North Horn Formation, is located approximately 225 feet west of the IBC boundary in the Mathis Canyon drainage.

The monitoring plan for the 240 acre IBC is summarized in Tables a, b, and c below.

Table a	I.B.C. Monitoring Plan	
Spring	Protocol	Comments
B351	A, 1	Price River Formation spring in the upper Mathis Creek drainage.
B352	A, 1	North Horn Formation seep in the upper Mathis Creek drainage.

Table b	Monitoring protocols for springs in the 240 acre IBC area
Water level and flow measurements: A Spring: quarterly discharge measurements when accessible.	
Water Quality: 1 Spring: quarterly operational water quality measurements (Table 6 List) when accessible.	

Table c	I.B.C. Groundwater operational water quality parameters
Field Measurements	Reported as
pH	pH units
Specific Conductivity	pS/cm@25°C
Temperature	°C
Flow	gpm
Laboratory Measurements	
Total Dissolved Solids	mg/L
Carbonate	mg/L
Bicarbonate	mg/L
Calcium (dissolved)	mg/L
Chloride	mg/L
Iron (total)	mg/L
Iron (dissolved)	mg/L
Magnesium (dissolved)	mg/L
Manganese (total)	mg/L
Manganese (dissolved)	mg/L
Potassium (dissolved)	mg/L
Sodium (dissolved)	mg/L
Sulfate	mg/L

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Groundwater monitoring sites are depicted on Figure IV-11, and include Well #1, S18-1 and S25-1. (The latter two are springs in the vicinity of the permit area, stratigraphically below any coal to be mined.) S25-1 is located in Hoffman Creek and has been monitored since the issuance of the emergency lease permit. This drainage also exclusively serves the new Sunedco Lease. Well #1 penetrates the first aquifer below the lowermost coal to be mined. The Aberdeen Sandstone is discussed in Appendix L.

The new AEP does not expose any new groundwater.

As stated earlier, the mines in this area are relatively dry. Like most any underground mine, minor "drippers" and some seepage is encountered. Such areas can accumulate moderate amounts of water underground, particularly in the areas of old workings. Such was the case when, in 1981, the new mine cut into some old works, releasing a surge of water that had to be discharged from the mine. Currently the mine "makes" enough water to discharge approximately 50% of the time via our approved UPDES point 002.

No flows presently exist underground that warrant monitoring; however, if significant flows are encountered underground, Andalex Resources will initiate monitoring according to the Division guidelines for groundwater baseline (and later, operational) monitoring. For the purpose of this section, "significant flows" shall be defined as: "Underground mining flows from a single source of 3 gpm or greater and sustained at a rate of 3 gpm or greater for a period of 30 days". If such flows are encountered, monitoring will be initiated. If the flow is being monitored and decreases below the above described "significant flow" amount, monitoring will be discontinued after a period of 60 days.

Surface Water

It should be noted that there are no new surface water monitoring sites associated with the Mathis Tract I.B.C. addition.

Surface water monitoring sites are depicted on Figure IV-11 and include 7-1, 8-1, 18-3, 18-4, 18-2, 25-2 and 12-1. 25-2 is located in Hoffman Creek and has been monitored since the issuance of the emergency lease permit (no flow to date). This drainage also exclusively serves the new Sunedco leases. A new surface water monitoring location (12-1) will be situated at the month of Alrad Canyon in T.13S., R.10E., section 12 . The left fork of Deadman Canyon is already monitored at 18-3. These locations assure that all major drainages beneath the permit area are monitored. Also included in the surface monitoring are points 1, 2, and 3, part of UPDES Permit #UTG-040007 also shown on Figure IV-11. New surface water monitoring stations will be set up as needed for all new lease additions.

Andalex commits to monitoring surface water stations with an emphasis on storm events. These samples are considered a priority and every effort will be made to collect samples during runoff, should runoff occur on a quarterly basis. At least one sample will be taken per quarter unless runoff does not occur. Andalex will state that a sample was not collected due a lack of precipitation events in a given quarter as documented by rain gauge records. These samples will be added to our permit as they are collected to supplement Andalex's baseline data. Also please note that Andalex will maintain a permanent rain gauge at the minesite. It will be a continual recording device. If this devise is not functioning then a standard NWS rain gauge is used. Daily records of events or non-occurrence of events will be kept at the minesite and will be available for inspection upon request by Division staff.

Once samples are collected from the various monitoring stations they will be analyzed by a commercial laboratory and results will be submitted to the Division, as well as being kept onsite. The data will be interpreted as needed in order to observe unusual flows or chemical anomalies which might suggest influence from mining activity. To date no such observations have been made and interpretation of the data will continue.

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Parameters to be Monitored

The sample reports will contain the following information:

1. Date and time of sample
2. Date of analysis
3. Cation - anion balance
4. Distinction for total or dissolved analysis
5. Field parameters
6. Parameter units
7. Sampler's initials or name

All samples will be collected and preserved in accordance with E.P.A. standards. Analysis of all samples will be done (or performed) within allowable holding times as given in the E.P.A. guidelines. (40 CFR 136 and 434)

The following field parameters will be measured on all samples:

1. Flow
2. Field pH
3. Specific Conductivity
4. Field Temperature

The following parameters will be measured of samples taken from the monitoring points during operations:

Acidity	Manganese - Total
Alkalinity	Nitrate
Ammonia	Oil & Grease
Bicarbonate	Potassium
Calcium	Sodium
Carbonate	Sulfate
Chloride	TDS
Iron-Dissolved	TSS
Iron-Total	pH
Magnesium	EC
Boron	Arsenic
Selenium	Hardness
Cation-Anion	Settleable Solids

Also, should there ever be a discharge at either NPDES location, field measurements of air and water temperature, pH, and EC will be made, as well as flow.

Further, Andalex will monitor the static water level in Well #1.

In addition to the operational parameters listed above Andalex will include the following parameters for the baseline monitoring described.

Aluminum	Mercury
	Molybdenum
Barium	Nickel
	Nitrogen: Ammonia
Cadmium	Nitrite
Chromium	
Copper	Phosphate
Fluoride	
Lead	Sulfide
	Zinc

Frequency

Each monitoring station will be checked, access permitting on a quarterly basis, and reported to the Division within 45 days of the end of that quarter. Each station will be described as "analysis attached", "no access", or "no flow".

A complete baseline parameter sample will be collected from each monitoring site (if flow exists) during the year preceding each re-permitting action. For surface sites, two samples will be taken (if flow exists), one at high flow and one at low flow. For springs and wells, one sample will be taken at low flow or water table conditions.

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.

2. Once revegetation and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

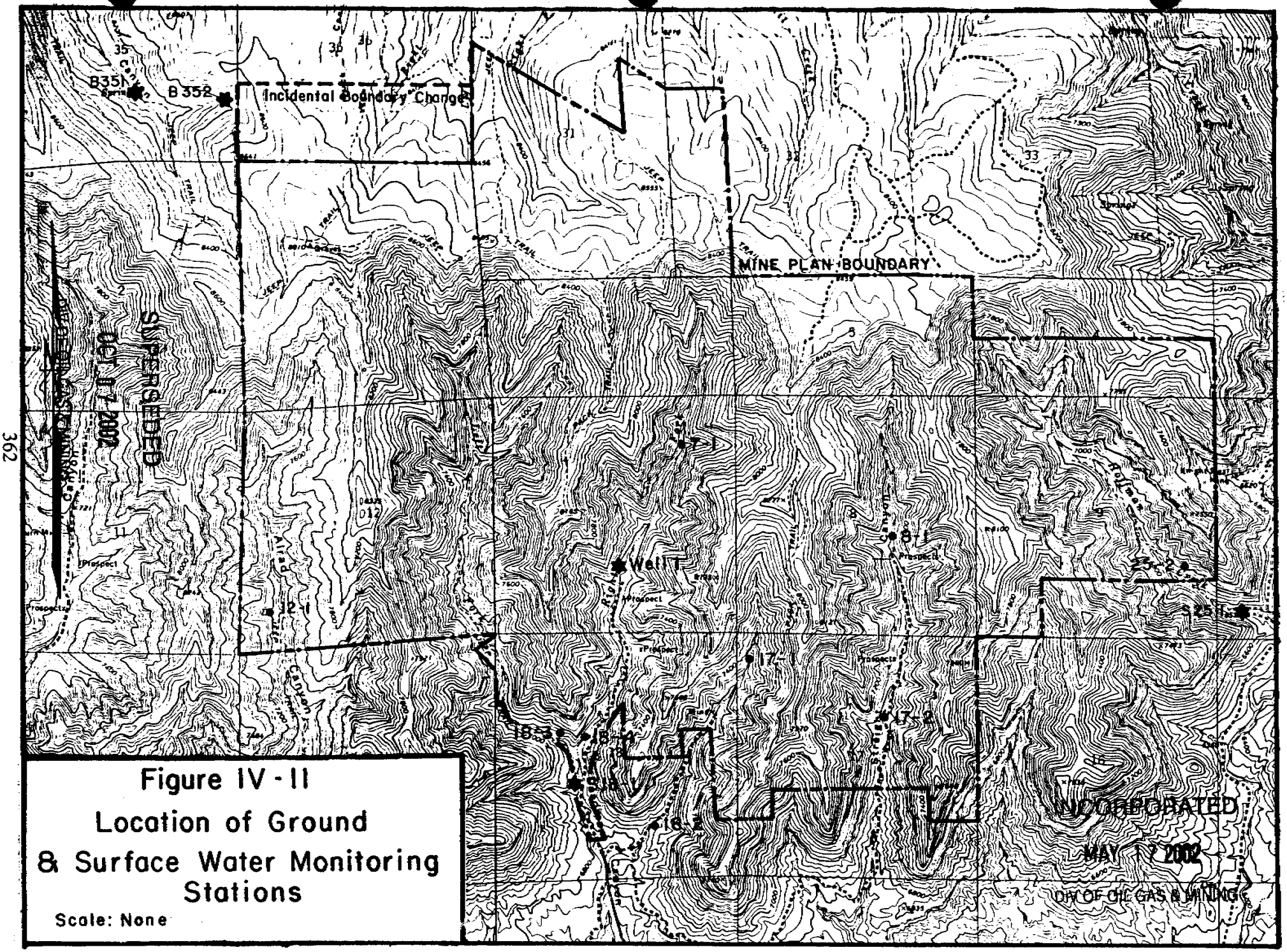


Figure IV - 11

Location of Ground & Surface Water Monitoring Stations

Scale: None

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.

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 R645-301-512.240.) and comply with the N.P.D.E.S. Permit No. UTG-040008 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

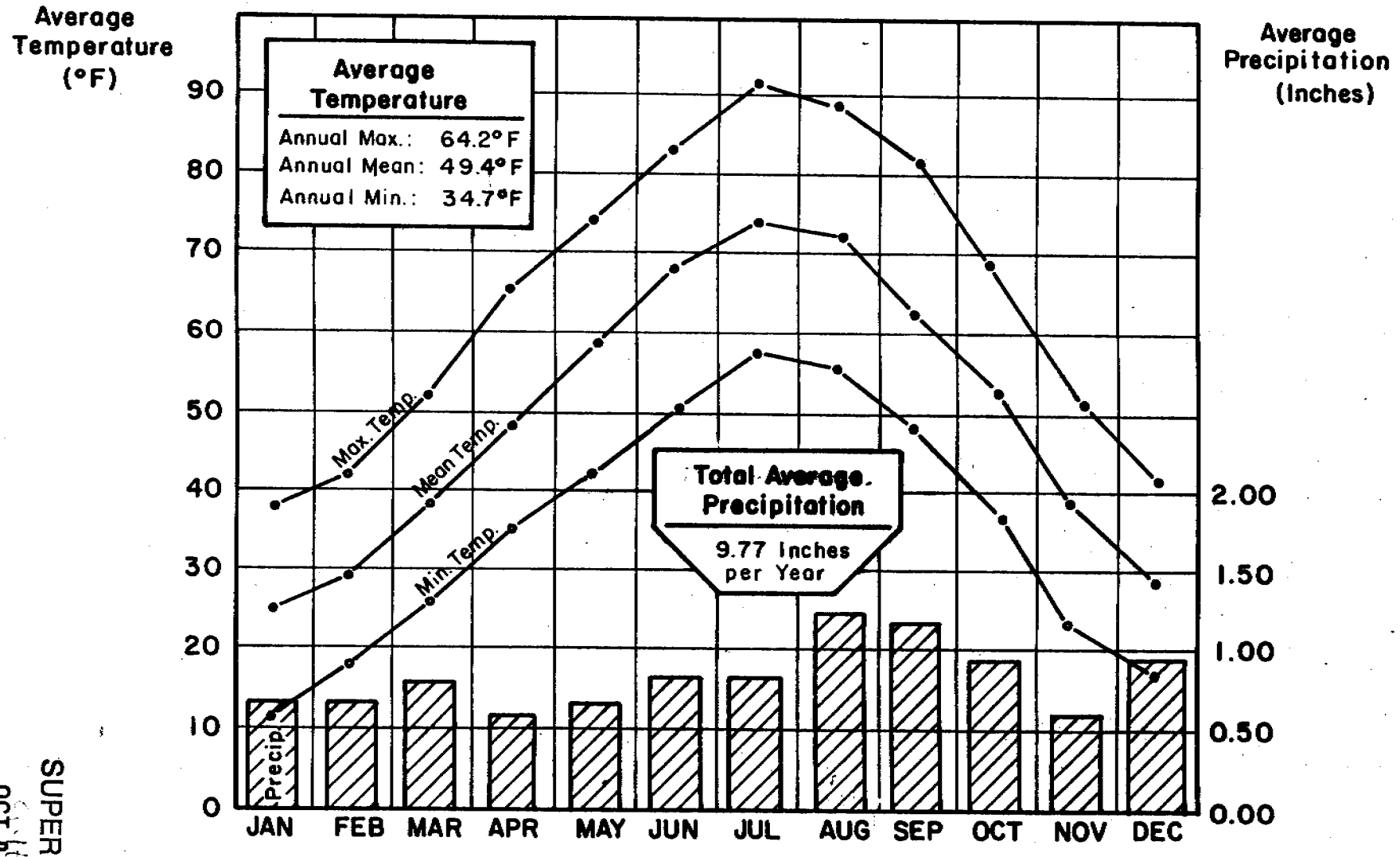
Maximum and Minimum Monthly Precipitation

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



Price Climatological Summery

Monthly Average 1936-1965

Figure III-4

TABLE III-5

ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)

Station: Price
Latitude: 39° 37'

Elevation: 5680
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

OK

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1936	0.51	1.21	0.54	0.15	0.20	0.55	2.73	1.72	0.70	1.00	0.05	2.08	11.44
1937	1.37	1.08	0.96	0.08	1.45	0.68	1.11	0.68	1.15	0.44	0.08	0.95	10.03
1938	0.56	0.39	1.81	0.13	1.12	1.22	0.91	1.05	1.57	1.53	0.20	0.58	11.07
1939	1.03	1.00	1.24	0.48	0.68	0.25	0.44	0.87	3.88	0.89	0.15	0.25	11.16
1940	1.77	1.40	0.15	0.57	0.21	0.50	0.10	1.12	4.39	0.76	0.32	0.83	12.12
1941	0.92	1.04	1.23	2.22	1.26	1.47	0.75	0.57	1.02	3.24	0.73	1.03	15.48
1942	0.16	0.23	0.43	0.72	0.04	0.00	0.33	0.59	0.40	1.14	0.25	0.18	4.47
1943	0.37	0.45	0.90	0.55	0.40	1.40	0.19	1.05	0.95	1.04	1.16	0.30	8.76
1944	1.38	0.62	1.29	1.86	0.80	1.10	0.35	0.30	0.02	0.31	0.56	0.18	8.77
1945	0.41	1.17	0.91	0.21	0.13	1.28	0.69	0.82	0.51	0.94	0.32	0.57	7.96
1946	0.44	T	1.04	0.23	0.24	0.02	0.38	1.06	0.05	1.76	1.45	0.92	7.59
1947	0.13	0.12	0.19	0.37	1.34	0.70	0.14	2.83	0.07	0.90	0.41	0.93	8.13
1948	0.00	0.59	0.40	0.00	0.07	1.41	0.90	0.66	0.22	1.58	0.09	1.55	7.47
1949	1.60	0.74	0.11	0.22	1.66	3.24	1.89	1.22	0.66	1.73	0.01	2.35	15.43
1950	0.92	0.27	0.37	0.08	0.14	0.00	1.98	0.11	0.70	T	0.56	0.49	5.62
1951	0.03	0.07	0.74	1.08	0.88	1.89	0.26	1.85	0.16	0.98	1.22	2.80	11.26
1952	1.09	0.17	1.97	0.81	0.79	1.06	0.27	1.59	0.37	0.00	0.21	1.58	9.91
1953	0.43	0.12	0.24	0.45	0.42	0.15	1.67	1.12	0.04	1.39	0.43	0.17	6.63
1954	0.76	T	0.80	0.57	0.35	0.52	1.80	0.92	2.38	0.79	0.49	0.62	10.00
1955	1.06	1.40	0.09	0.05	0.39	0.38	0.30	1.52	0.31	0.01	0.17	0.38	6.06
1956	1.44	0.15	0.00	0.35	0.44	T	0.69	0.42	0.15	0.50	0.00	0.19	4.33
1957	0.87	0.63	0.40	0.65	1.86	1.20	1.07	2.30	T	1.86	2.84	0.98	14.66
1958	0.10	1.17	2.12	0.81	1.19	0.12	0.10	0.83	1.41	0.22	0.43	0.06	8.56
1959	0.06	1.57	0.12	0.59	0.66	0.25	0.75	2.09	1.18	0.45	0.17	1.04	8.93
1960	0.98	1.20	-	0.51	0.40	0.31	0.54	0.23	1.35	2.93	0.67	0.00	-
1961	0.00	0.03	1.02	0.23	0.11	0.08	0.76	2.43	4.85	1.06	0.88	0.82	12.27
1962	0.92	2.36	0.58	0.13	0.23	0.26	0.70	0.00	2.07	1.05	0.03	0.05	8.38
1963	0.68	0.32	0.73	1.50	0.12	0.58	0.05	3.33	1.89	0.76	0.18	0.02	10.16
1964	0.12	0.06	1.06	1.05	2.19	0.76	-	1.26	0.33	0.01	0.69	2.29	-
1965	0.32	-	1.28	-	-	3.31	1.79	1.24	0.98	0.32	2.06	2.47	-

TABLE III-6

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annl
1966	.00	.87	.12	.00	.57	.32	1.16	1.25	.50	1.14	.14	2.86	8.93
1967	1.06	.00	.29	.65	1.40	1.42	.84	.66	1.14	.08	.19	2.01	9.74
1968	.48	1.11	1.04	1.41	1.03	-----	.79	1.82	.29	.49	T	.96	----
1969	2.50	1.37	.24	.28	.37	2.41	1.46	1.83	.59	.38	.33	.10	11.86
1970	.77	.01	.48	.12	.03	2.11	.65	.82	1.03	.56	.38	.38	7.34
1971	.22	.35	.03	.61	.80	.17	.68	.89	.24	3.26	.22	1.51	8.98
1972	.00	.00	.00	.19	.21	.66	.33	.91	1.33	4.34	.83	.68	9.48
1973	.62	.41	1.51	.84	1.15	1.40	1.97	1.17	.21	.56	.42	.36	10.62
1974	.81	.10	.07	.56	T	.04	2.12	.35	.21	4.08	.22	.53	9.09
1975	.76	.69	1.11	T	.74	.92	1.54	.06	1.26	.14	.45	.08	7.75
1976	T	1.16	.20	.91	.77	.13	.39	.30	1.62	.37	.03	.00	5.88

Source: National Oceanic and Atmospheric Administration,
National Climatic Center,
Asheville, North Carolina

TABLE III-6 (con't)

Climatological Summary

Means and Extremes for Period 1936 - 1965

Month	Temperature (°F)							Precipitation Totals (Inches)								Mean Number of days				
	Means			Extremes							Snow, Sleet						Temperatures			
																	Max.		Min.	
	Daily Maximum	Daily Minimum	Monthly	Record Highest	Year	Record Lowest	Year	Mean	Greatest Daily	Year	Mean	Maximum Monthly	Year	Greatest Daily	Year	Precip. + .1"	90° and above	32° and below	32° and below	0° and below
Jan.	37.1	11.0	24.1	58	1961	-29	1937	.68	.67	1956	9.2	21.5	1944	8.5	1956	2	0	8	31	4
Feb.	42.3	17.4	29.8	68	1958	-17	1963	.68	.80	1962	7.0	27.0	1939	13.0	1939	2	0	4	27	3
Mar.	51.6	25.2	38.4	75	1956	-7	1964	.78	.97	1938	3.9	26.0	1952	6.0	1963	3	0	-	27	-
Apr.	63.8	34.2	49.0	86	1946	8	1945	.57	.66	1944	0.1	2.0	1944	2.0	1944	2	0	0	12	0
May	74.1	42.9	58.5	94	1962	20	1959	.68	1.45	1937	0.4	10.0	1964	8.0	1964	2	1	0	2	0
June	83.6	50.0	66.9	101	1954	29	1939	.80	1.47	1941	0.0	T	1955	0.0		2	7	0	-	0
July	90.6	56.7	73.7	106	1938	40	1962	.82	1.05	1954	0.0	T	1954	0.0		2	20	0	0	0
Aug.	88.2	55.3	71.7	102	1940	32	1960	1.19	1.03	1949	0.0	0.0		0.0		3	12	0	-	0
Sep.	80.0	47.2	63.6	96	1950	23	1938	1.13	1.67	1962	0.1	2.5	1965	2.5	1965	3	2	0	6	0
Oct.	67.7	36.6	52.2	87	1963	15	1960	.99	1.75	1960	0.2	4.5	1949	3.5	1949	3	0	0	8	0
Nov.	50.5	23.7	37.1	73	1962	0	1959	.56	1.97	1957	2.4	12.5	1951	8.0	1951	2	0	-	26	-
Dec.	40.6	15.9	28.2	60	1962	-10	1948	.89	1.07	1964	8.8	42.0	1951	13.0	1951	3	0	6	28	2
Year	64.2	34.7	49.4	106	July 1938	-29	Jan. 1937	9.77	1.97	Nov. 1957	32.1	42.0	Dec. 1951	13.0	Dec. 1951	29	42	18	167	9

TABLE III-7

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

Average Temperature (°F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annl
1936	23.8	31.6	41.0	52.0	61.6	70.2	73.0	71.3	-	-	-	27.6	-
1937	26.0	20.1	37.5	44.5	-	66.1	72.9	75.6	-	52.6	38.6	31.4	-
1938	27.0	32.4	39.0	48.7	55.4	69.4	73.7	73.2	64.8	50.4	29.8	28.4	49.4
1939	24.2	16.1	39.0	51.2	60.3	64.8	-	73.0	63.0	50.0	41.7	32.6	-
1940	23.0	32.2	40.7	50.0	65.6	72.7	73.2	74.4	62.5	54.5	33.3	27.6	50.7
1941	21.8	31.4	41.4	43.9	58.3	-	70.6	70.0	58.9	47.6	37.6	29.9	-
1942	23.4	27.0	35.6	49.0	54.6	67.8	73.2	70.8	61.4	-	-	-	-
1943	24.9	-	-	-	-	66.4	75.1	71.8	67.4	54.0	39.1	31.3	-
1944	23.8	28.2	37.8	46.5	68.9	62.8	73.6	72.6	66.4	55.1	38.6	31.2	49.6
1945	30.5	35.4	38.5	45.0	59.6	63.9	74.5	73.0	62.5	52.6	35.2	23.3	49.5
1946	22.8	31.0	42.7	56.0	57.2	69.8	75.7	72.6	65.4	46.8	36.3	33.6	50.8
1947	25.8	36.3	43.4	49.0	62.6	63.8	75.2	71.2	67.2	56.0	33.2	29.0	51.1
1948	28.6	29.0	34.2	49.1	60.2	67.2	74.0	72.4	67.4	51.1	33.5	25.1	49.3
1949	16.9	20.1	41.2	54.1	58.8	63.6	74.3	72.5	66.0	47.8	43.5	23.6	48.5
1950	17.6	30.5	39.5	51.2	56.2	67.4	69.7	71.1	62.7	56.1	40.9	34.4	49.8
1951	27.7	32.0	39.2	50.0	58.8	64.4	76.9	71.6	65.2	50.3	34.2	20.8	49.3
1952	19.9	25.6	32.4	52.0	61.1	67.9	74.9	72.7	65.9	56.0	35.3	23.9	49.0
1953	28.1	31.9	42.3	47.8	52.9	-	76.6	70.5	66.6	52.6	40.3	27.5	-
1954	30.5	40.6	38.7	54.4	63.2	67.7	76.9	71.3	64.1	53.5	42.5	25.4	52.4
1955	18.0	17.1	35.3	46.6	57.9	66.0	74.7	74.0	66.1	53.3	35.3	30.8	47.9
1956	33.1	28.2	42.2	50.0	61.3	72.1	74.8	70.4	67.7	52.4	33.2	26.3	51.0
1957	24.4	33.9	42.5	47.2	54.8	68.3	73.5	-	-	49.5	33.7	29.4	-
1958	28.8	37.3	35.9	44.8	60.3	67.4	70.7	73.7	62.6	52.9	36.8	33.7	50.4
1959	27.4	32.8	38.9	48.8	54.9	69.4	73.8	70.6	62.4	52.2	38.1	30.6	50.0
1960	19.4	23.2	-	50.8	57.4	67.9	74.1	71.2	64.2	52.6	39.4	31.7	49.3
1961	29.0	33.4	38.2	46.1	57.5	69.8	73.6	61.4	55.3	47.9	33.8	23.5	48.3
1962	24.3	32.7	34.6	52.3	55.3	66.2	71.4	69.6	61.8	52.4	42.3	29.8	49.4
1963	16.3	38.0	36.4	45.2	60.3	63.7	73.7	70.0	64.4	55.3	39.1	25.6	49.0
1964	23.3	27.5	30.4	45.0	55.1	63.2	-	68.9	60.8	53.4	32.6	23.9	-
1965	31.5	-	37.1	-	-	62.0	69.9	68.5	54.8	53.6	41.4	26.9	-

TABLE III-9

TABLE III-9

Average Temperatures (^{o}F.) [1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annl
1966	M	25.6	38.8	48.6	58.7	63.5	73.1	70.1	60.7	51.5	39.7	26.2	----
1967	22.0	30.8	39.9	41.7	52.8	61.0	73.4	71.2	62.7	51.1	42.4	17.8	47.2
1968	15.8	32.2	40.7	42.5	53.3	----	73.7	67.3	62.6	53.1	39.3	23.8	----
1969	26.8	25.8	33.0	50.4	61.6	64.1	75.5	75.4	65.6	45.2	39.0	33.3	49.6
1970	28.6	37.7	38.2	43.0	59.1	67.5	75.4	75.4	60.6	48.1	39.7	28.3	50.1
1971	27.8	33.4	37.6	48.1	55.3	67.6	74.3	75.4	59.7	49.6	35.8	24.7	49.1
1972	27.8	35.6	47.4	48.3	59.7	68.4	76.7	73.9	63.9	52.3	35.0	22.0	50.9
1973	16.9	26.8	37.1	45.1	57.9	65.1	71.9	72.3	63.9	55.7	38.4	29.2	48.4
1974	18.6	23.2	42.1	45.0	61.6	74.2	78.0	73.6	68.4	M	M	31.3	----
1975	25.0	31.6	41.3	43.7	53.6	59.9	72.3	71.0	63.9	52.1	M	----	----
976	25.5	36.2	38.2	46.8	58.1	65.4	76.0	70.4	64.0	50.5	----	----	----

Source: National Oceanic and Atmospheric Administration,
National Climatic Center,
Asheville, North Carolina

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

R645-301-512.240.

R645-301-728.332. WATER QUALITY PARAMETERS

R645-301-512.240.

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

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.

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. VOLITION 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

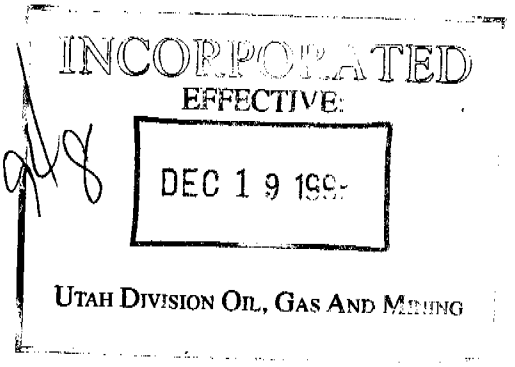
See R645-301-512.240, Culvert Design

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.

Revised 8/8/95



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

SUPERSEDED

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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.

R645-301-732.100. SILTATION STRUCTURES

See R645-301-512.240.

R645-301-732.200. SEDIMENTATION PONDS

See R645-301-512.240.

R645-301-732.210. COMPLIANCE REQUIREMENTS

See R645-301-512.240.

R645-301-732.220. MSHA REQUIREMENTS

N/A

R645-301-732.300. DIVERSIONS

See R645-301-512.240.

R645-301-732.400. ROAD DRAINAGE

See R645-301-512.240., also R645-301-512.250.

R645-301-732.410. ALTERATION OR RELOCATION OF A NATURAL DRAINAGEWAY

See R645-301-512.240.

R645-301-732.420. INLET PROTECTIONS

See R645-301-512.240.

R645-301-733. IMPOUNDMENTS

See R645-301-512.240.

R645-301-733.100. GENERAL PLANS

See R645-301-512.240.

R645-301-733.110. CERTIFICATION

See R645-301-512.240.

R645-301-733.120. MAPS AND CROSS SECTIONS

See R645-301-512.240., also R645-301-510.

R645-301-733.130. NARRATIVE

See R645-301-512.240.

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.

R645-301-733.200. PERMANENT AND TEMPORARY IMPOUNDMENTS

See R645-301-512.240.

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.

R645-301-733.240. HAZARD NOTIFICATIONS

See R645-301-512.240.

R645-301-734. DISCHARGE STRUCTURES

See R645-301-512.240.

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.

R645-301-741. GENERAL REQUIREMENTS

See R645-301-512.240.

R645-301-742. SEDIMENT CONTROL MEASURES

See R645-301-512.240.

R645-301-742.100. GENERAL REQUIREMENTS

See R645-301-512.240.

R645-301-742.110. DESIGN

See R645-301-512.240.

R645-301-742.111. PREVENTION

See R645-301-512.240.

R645-301-742.112. EFFLUENT LIMITATIONS

Appendix J

R645-301-742.113. EROSION PROTECTION

See R645-301-512.240.

R645-301-742.120. MEASURES AND METHODS

See R645-301-512.240.

R645-301-742.121. RETAINING SEDIMENT WITHIN DISTURBED AREAS

See R645-301-512.240.

R645-301-742.122. DIVERTING RUNOFF AWAY FROM DISTURBED AREAS

See R645-301-512.240.

R645-301-742.123. DIVERTING RUNOFF USING PROTECTED CHANNELS

See R645-301-512.240.

R645-301-724.124. PHYSICAL TREATMENT TO REDUCE FLOW OR TRAP SEDIMENT

See R645-301-512.240.

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.

R645-301-742.210. GENERAL REQUIREMENTS

See R645-301-512.240.

R645-301-742.211. DESIGN

See R645-301-512.240.

R645-301-742.212. REQUIREMENTS

See R645-301-512.240.

R645-301-742.213. SILTATION STRUCTURES WHICH IMPOUND WATER

See R645-301-512.240.

R645-301-742.214. POINT SOURCE DISCHARGES

See R645-301-711.300.

R645-301-742.220. SEDIMENTATION PONDS

See R645-301-512.240.

R645-301-742.221. USE

See R645-301-512.240.

R645-301-742.221.1 INDIVIDUALLY OR IN SERIES

See R645-301-512.240.

R645-301-742.221.2 LOCATION

See R645-301-512.240., Plate 6

R645-301-742.221.3 DESIGN, CONSTRUCTION AND MAINTENANCE

See R645-301-512.240.

R645-301-742.221.31 SEDIMENT STORAGE VOLUME

See R645-301-512.240.

R645-301-742.221.32 DETENTION TIME

See R645-301-512.240.

R645-301-742.221.33 DESIGN EVENT

See R645-301-512.240.

R645-301-742.221.34 DEWATERING DEVICE

See R645-301-512.240.

R645-301-742.221.35 SHORT CIRCUITING

See R645-301-512.240.

R645-301-742.221.36 SEDIMENT REMOVAL

See R645-301-512.240.

R645-301-742.221.37 EXCESSIVE SETTLEMENT

See R645-301-512.240.

R645-301-742.221.38 EMBANKMENT MATERIAL

See R645-301-512.240.

R645-301-742.221.39 COMPACTION

See R645-301-512.240.

R645-301-742.222. MSHA SEDIMENTATION PONDS

N/A

R645-301-742.223. OTHER SEDIMENTATION PONDS

See R645-301-512.240.

R645-301-745.223.1 OPEN CHANNEL SPILLWAY

See R645-301-512.240.

R645-301-742.223.2 LINING

See R645-301-512.240.

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.

R645-301-742.310. GENERAL REQUIREMENTS

See R645-301-512.240.

R645-301-742.311. REQUIREMENTS

See R645-301-512.240.

R645-301-742.312. DESIGN

See R645-301-512.240.

R645-301-742.312.1 STABILITY

See R645-301-512.240.

R645-301-742.312.2 FLOOD PROTECTION

See R645-301-512.240.

R645-301-742.312.3 SUSPENDED SOLIDS

See R645-301-512.240.

R645-301-742.312.4 COMPLY WITH OTHER REGULATIONS

See R645-301-512.240.

R645-301-742.313. TEMPORARY AND PERMANENT DIVERSIONS

See R645-301-512.240.

R645-301-742.314. ADDITIONAL DESIGN CRITERIA

See R645-301-512.240.

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.

R645-301-742.331. REQUIREMENTS

See R645-301-512.240.

R645-301-742.332. DESIGN

See R645-301-512.240.

R645-301-742.333. DESIGN EVENT

See R645-301-512.240.

R645-301-742.400. ROAD DRAINAGE

See R645-301-512.240., .250.

R645-301-742.410. ALL ROADS

See R645-301-512.240., .250.

R645-301-742.411. PROTECTION AND SAFETY

See R645-301-512.240., .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.

R645-301-742.420. PRIMARY ROADS

See R645-301-512.240., .250.

R645-301-742.421. EROSION PROTECTION

See R645-301-512.240., .250.

R645-301-742.422. STREAM FORDS

N/A

R645-301-742.423. DRAINAGE CONTROL

See R645-301-512.240.

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.

R645-301-742.423.3 DRAINAGE DITCHES

See R645-301-512.240.

R645-301-742.423.4 NATURAL STREAM CHANNELS

See R645-301-512.240.

R645-301-742.423.5 REQUIREMENTS

See R645-301-512.240.

R645-301-743. IMPOUNDMENTS

See R645-301-512.240.

R645-301-743.100. GENERAL REQUIREMENTS

See R645-301-512.240.

R645-301-743.110. MSHA IMPOUNDMENTS

N/A

R645-301-743.120. CERTIFICATION AND FREEBOARD REQUIREMENTS

See R645-301-512.240.

R645-301-743.130. SPILLWAYS

See R645-301-512.240.

R645-301-743.140. INSPECTIONS

See R645-301-512.240.

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.

R645-301-744. **DISCHARGE STRUCTURES**

See R645-301-512.240.

R645-301-744.100. **EROSION CONTROL**

See R645-301-512.240.

R645-301-744.200. **DESIGN**

See R645-301-512.240.

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. Envirionmental 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.

R645-301-752.200. ROAD DRAINAGE

See R645-301-512.250.

R645-301-752.210. CONTROL OF EROSION AND POLLUTION

See R645-301-512.240.

R645-301-752.220. CONTROL OF SUSPENDED SOLIDS

See R645-301-512.240.

R645-301-752.230. COMPLIANCE WITH EFFLUENT STANDARDS

See R645-301-512.240.

R645-301-752.240. MINIMIZE DIMINUTION OF DEGRADATION OF WATER QUALITY

See R645-301-512.240.

SUPERSEDED

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R645-301-752.250. ALTERATION OF STREAM FLOW OR CHANNELS

See R645-301-512.240.

R645-301-753. IMPOUNDMENTS AND DISCHARGE STRUCTURES

See R645-301-512.240.

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 R645-301-512.240.

R645-301-763.100. RESTRICTIONS

See R645-301-512.240.

R645-301-763.200. REQUIREMENTS

See R645-301-512.240.

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.

R645-301-800. BONDING AND INSURANCE

R645-301-800. BONDING AND INSURANCE

As the "Mathis" incidental boundary change 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

SUPERSEDED

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R645-301-812.400. SELF-BOND

N/A -- DIVISION

R645-301-812.500. BOND RELEASE

N/A -- DIVISION

INCORPORATED

MAY 17 2002

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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

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R645-301-820.112. INCREMENTAL BONDING .

Appendix B

R645-301-820.113. BONDING MAP

SUPERSEDED

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DIV OF OIL GAS & MINING

Plates 5 & 7

R645-301-820.114. REQUIREMENTS

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 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 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**

Appendix B

R645-301-820.220. **ALLOWABLE TYPES OF BONDS**

Appendix B

R645-301-820.221. **SURETY BOND**

Appendix B

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

Appendix B

R645-301-820.310. REQUIREMENTS

Appendix B

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 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

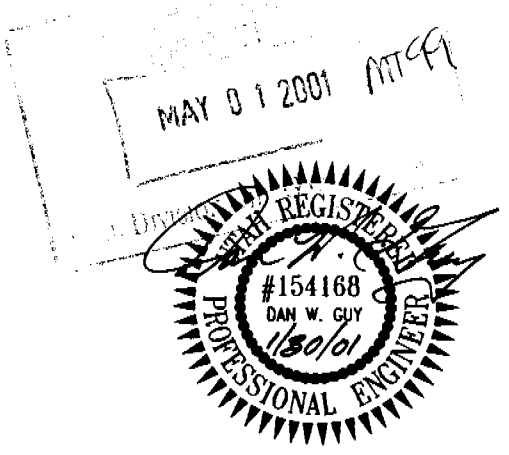
See original in Appendix B

Andalex Resources, Inc.

Centennial Project

Reclamation Cost Estimate

(Addendum to Appendix B)



January 2001

See Original in Appendix B

RECLAMATION COST ESTIMATE

COST OF RECLAMATION

INTRODUCTION

Reclamation cost estimates for the Centennial Project have been recalculated per Division requirements listed in the 02/14/00 Midterm Review and deficiency letter on 12/19/00. Demolition and labor costs have been taken from the "Means Heavy Construction Data," 12th Annual Edition, 1998. Equipment productivity rates were taken from the "Caterpillar Performance Handbook", Edition 28, 1997.

Reclamation costs have been divided into the following major categories:

Demolition / Disposal
Recontouring/Ground Preparation
Portal Sealing
Reseeding
Monitoring

The following assumptions have been used in these calculations:

(1) All steel demolition costs include haulage to a recycling facility within 20 miles of the loadout. No salvage value is assumed;

(2) All exposed concrete will be broken up and buried on site. Calculations are based on haulage and disposal of the concrete in the proposed highwall and cut slope fill areas;

(3) Certain portable structures will be hauled off site as units; however, no salvage value is assumed;

(4) Calculations include removal and revegetation of the sediment ponds;

(5) Cost estimates taken from "Means Heavy Construction Cost Data" have not been adjusted;

(6) Earthwork calculations were performed per attached O.S.M. Bond Calculation Worksheets;

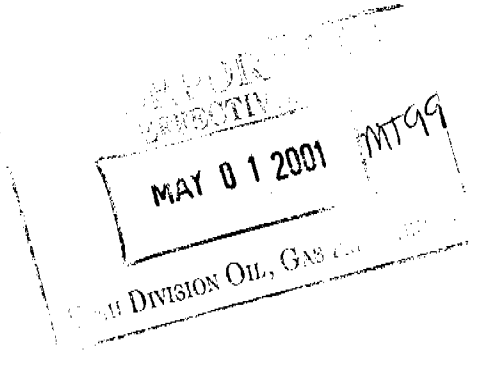
(7) Portal Sealing costs were based on costs provided by the Division, based on AML experience;

(8) Costs have been recalculated based on results of an on-site meeting with Mr. Wayne Western of the Division.

See Original in Appendix B

The following is a list of labor and equipment rates, as well as disposal costs, used in these calculations:

ITEM	*COST / UNIT*	*SOURCE*	*REMARKS*
Labor	*32.55/MH*	*Means*	*Includes O&P*
Demolition			
Chain Link	*2.42/LF*	*Means*	*Includes O&P*
Concrete	*39.65/CY*	*Means*	*Includes on-site Disposal*
12" C.M.P.	*6.15/LF*	*Means*	*Includes O&P*
18" C.M.P.	*8.00/LF*	*Means*	*Includes O&P*
24" C.M.P.	*8.95/LF*	*Means*	*Includes O&P*
36" C.M.P.	*11.95/LF*	*Means*	*Includes O&P*
42" C.M.P.	*15.00/LF*	*Means*	*Includes O&P*
Small Buildings	*0.24/CF*	*Means*	*Includes 20 mile Haul*
Steel Structures	*0.24/CF*	*Means*	*Includes 20 mile Haul*
Disposal (Land Fill)	*35.00/CY*	*Means*	*Approved Land Fill*
Equipment			
627 F Scraper	*152.00/hr.*	*Cat Handbook/Means*	*Includes O&P*
D7R-SU Dozer	*133.00/hr.*	*Cat Handbook/Means*	*Includes O&P*
D8N-SU Dozer	*178.00/hr.*	*Cat Handbook/Means*	*Includes O&P*
D9R-9U Dozer	*212.23/hr.*	*Cat Handbook/Means*	*Includes O&P*
988 Cat Loader	*210.47/hr.*	*Cat Handbook/Means*	*Includes O&P*
Cat 769D Dump Truck	*126.38/hr.*	*Cat Handbook/Means*	*Includes O&P*
235 Cat Excavator	*264.63/hr.*	*Cat Handbook/Means*	*Includes O&P*
Hydraulic Hammer	*25.45/hr.*	*Cat Handbook/Means*	*Includes O&P*

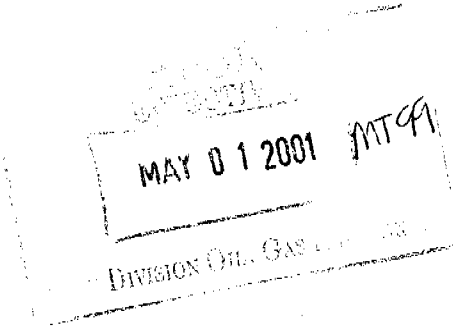


See Original in Appendix B

SUMMARY OF RECLAMATION COSTS

1- Demolition / Disposal	-	*$223,178.00*
2- Recontouring / Ground Preparation	-	*224,761.00*
3- Portal Sealing	-	*34,000.00*
4- Reseeding	-	*113,494.00*
5- Monitoring	-	*18,000.00*
Sub-Total	=	*$613,433.00*
Projected Indirect Costs (+ 27% Per Division)	=	*165,627.00*
Sub- Total Reclamation Cost (2000 Dollars)	=	*$779,060.00*
+ Inflation @ 3.27% for 4 Years	=	*107,009.00*
Total Inflated Reclamation Cost	=	*$886,069.00*

Total estimated reclamation cost in 2004 dollars is $886,069.00. The reclamation bond presently posted for this site is $1,080,000.00. Based on these calculations, the existing bond is adequate.



See original in Appendix B

Concrete Demolition / Burial

(a) Assumptions:

1- Concrete will be broken up with a Balderson Hydraulic Hammer, Model H115, mounted on a Cat 235 Excavator;

2- The Hydraulic Hammer productivity was based on breakage of reinforced concrete taken from the Breaker Production Chart supplied by the Division.

3- Breakage productivity was reduced by 50% due to moving from location to location and size differential;

4- Operating costs of $290.08/hr. for the excavator and hammer were taken from the 1998 Means "Heavy Construction Cost Index".

5- Disposal cost of $6.50/c.y. for on-site disposal was taken directly from Means.

(b) Calculation:

Hydraulic Hammer Productivity	=	*140 c.y./8 Hr.*
50% Efficiency	=	*70 c.y./8 Hr.*
Production (Breakage) per hour	=	*8.75 c.y./Hr.*
Demolition Cost:		
$290.08/Hr. Divided by 8.75 cy / Hr.	=	*$33.15 /c.y.*
Disposal Cost (On-Site)	=	*$6.50 /c.y.*
TOTAL Concrete Cost	=	*$39.65 /c.y.*

See original in Appendix B

The following is a detailed summary of costs and justifications used in the reclamation cost estimate.

Andalex - Centennial Bond
Demolition

STRUCTURE	SIZE	MATERIAL	DEMOLISH REMOVE	DISPOSAL	COST/UNIT	COST
ABERDEEN MINE						
Loadout Bin	20'x20'x20'	Steel	Demolish	Haul	0.24/CF	1,920.00
Concrete	20'x28'x0.75'	Concrete	Demolish	On-Site	39.65/CY	616.78
Reclaim	8'x12'x150'	Steel	Demolish	Haul	0.24/CF	3,456.00
Conveyor	4'x4'x250'	Steel	Demolish	Haul	0.24/CF	960.00
Hopper	20x20x15'	Steel	Demolish	Haul	0.24/CF	1,440.00
Conveyor	5'x5'x260'	Steel	Demolish	Haul	0.24/CF	1,560.00
Tunnel	8'x12'x90'	Steel	Demolish	Haul	0.24/CF	2,073.60
Fan	8'x20'x20'	Steel	Remove	Haul	0.24/CF	768.00
Sub Transformers	2	Unit	Remove	Haul	100/EA	200.00
Sub. Fence	104'	Chain Link	Demolish	Haul	2.42/LF	251.68
Water Tank	941 CF	Steel	Remove	Haul	0.24/CF	225.84
4 Portal Structures	20'x20'x8'	Steel	Demolish	Haul	0.24/CF	3,072.00
Sub Total						$16,543.90
MAIN OFFICE						
Office	32'x60'x16'	Mix	Demolish	Haul	0.24/CF	7,372.80
Concrete	47.15 CY	Concrete	Demolish	On-Site	39.65/CY	1,869.50
Trailer	8'x12'x70'	Unit	Remove	Haul	0.24/CF	1,612.80
Water Tank	706 CF	Unit	Remove	Haul	0.24/CF	169.44
Sub Total						$11,024.54
BATH HOUSE						
Bathhouse 1	14'x65'x8'	Mix	Demolish	Haul	0.24/CF	1,747.20
Bathhouse 2	12'x50'x8'	Mix	Demolish	Haul	0.24/CF	1,152.00
Trailer	12'x42'x8'	Unit	Remove	Haul	0.24/CF	967.68
(2) Water Tanks	941 CF EA	Unit	Remove	Haul	0.24/CF	225.84
Concrete 1	14'x65'x0.50'	Concrete	Demolish	On-Site	39.65/CY	668.18
Concrete 2	12'x50'x0.50'	Concrete	Demolish	On-Site	39.65/CY	440.56
Sub Total						$5,201.46
UPPER PINNACLE						
Sub. Trans.	3	Unit	Remove	Haul	100/EA	300.00
Sub-Fence	328'	Chain Link	Demolish	Haul	2.42/LF	793.76
Loadout Bin	20'x20'x24'	Steel	Demolish	Haul	0.24/CF	2,304.00
Concrete	20'x24'x0.75'	Concrete	Demolish	On-Site	39.65/CY	528.66
Conveyor	4'x4'x200'	Steel	Demolish	Haul	0.24/CF	768.00

See original in Appendix B

Reclaim	*8'x12'x100'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*9,600.00*
Hopper	*10'x24'x24'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*1,382.40*
Conveyor	*4'x5'x185'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*888.00*
Tunnel	*8'x12'x90'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*2,073.60*
Water Tank	*1412 CF*	*Steel*	*Remove*	*Haul*	*0.24/CF*	*338.88*
Rock Dust Tank	*1570 CF*	*Steel*	*Remove*	*Haul*	*0.24/CF*	*376.80*
Trailer	*10'x55'x8'*	*Unit*	*Remove*	*Haul*	*0.24/CF*	*1,056.00*
Trailer	*10'x50'x8'*	*Unit*	*Remove*	*Haul*	*0.24/CF*	*960.00*
Trailer	*10'x40'x8'*	*Unit*	*Remove*	*Haul*	*0.24/CF*	*768.00*
4 Portal Structures	*20'x20'x8'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*3,072.00*
Sub Total						*$25,210.10*

LOWER PINNACLE

Office	*24'x42'x8'*	*Steel/Mix*	*Demolish*	*Haul*	*0.24/CF*	*1,935.36*
Concrete	*24'x42'x0.5'*	*Concrete*	*Demolish*	*On-Site*	*39.65/CY*	*740.14*
3 Portal Structures	*20'x20'x7'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*2,016.00*
Sub Total						*$4,691.50*

SHOP/WAREHOUSE

Building	*150'x60'x18'*	*Steel/Mix*	*Demolish*	*Haul*	*0.24/CF*	*38,880.00*
Concrete	*150'x60'x1'*	*Concrete*	*Demolish*	*On-Site*	*39.65/CY*	*13,216.66*
Sub Total						*$52,096.66*

APEX

Loadout	*20'x20'x18'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*1,728.00*
Concrete	*20'x20'x.75'*	*Concrete*	*Demolish*	*On-Site*	*39.65/CY*	*440.56*
Conveyor	*4'x4'x350'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*1,344.00*
Reclaim	*8'x12'x170'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*3,916.80*
Hopper	*24'x24'x16'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*2,211.84*
Conveyor	*5'x4'x250'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*1,200.00*
Tunnel	*8'x12'x125'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*2,880.00*
4 Portal Structures	*20'x20'x6'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*2,304.00*
Water Tank	*941 CF*	*Steel*	*Remove*	*Haul*	*0.24/CF*	*225.84*
Shed	*10'x50'x8'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*960.00*
2 Magazines	*4'x4'x6'*	*Steel*	*Remove*	*Haul*	*0.24/CF*	*46.08*
Sub-Trans.	*2*	*Unit*	*Remove*	*Haul*	*100/EA*	*200.00*
Sub-Fence	*105'*	*Chain Link*	*Demolish*	*Haul*	*2.42/LF*	*254.10*
Office	*25'x40'x8'*	*Mix*	*Demolish*	*Haul*	*0.24/CF*	*1,920.00*
Concrete	*25'x40'x0.5'*	*Concrete*	*Demolish*	*On-Site*	*39.65/CY*	*734.25*
Sub Total						*$20,365.47*

LEFT FORK

Fan	*20'x25'x8'*	*Steel*	*Remove*	*Haul*	*0.24/CF*	*960.00*
2 Portal Structures	*20'x20'x8'*	*Steel*	*Demolish*	*Haul*	*0.24/CF*	*1,536.00*
Sub Total						*$2,496.00*

See original in Appendix B

CULVERTS

12" CMP	*260 LF*	*Steel*	*Demolish*	*Haul*	*6.15/LF*	*1,599.00*
18" CMP	*1340 LF*	*Steel*	*Demolish*	*Haul*	*8.00/LF*	*10,720.00*
24" CMP	*330 LF*	*Steel*	*Demolish*	*Haul*	*8.95/LF*	*2,953.50*
36" CMP	*1885 LF*	*Steel*	*Demolish*	*Haul*	*11.95/LF*	*22,525.75*
42" CMP	*2950 LF*	*Steel*	*Demolish*	*Haul*	*15.00/LF*	*44,250.00*
Sub Total						*$82,048.25*
Power Poles	*35*	*Wood*	*Demolish*	*Haul*	*100/EA*	*3,500.00*
Sub Total						*$3,500.00*

TOTAL DEMOLITION ESTIMATE ***$223,177.88***

See original in Appendix B

PROJECT	QUANTITY	EQUIPMENT	COST/UNIT	COST
RECONTOURING / GROUND PREPARATION/TOPSOILING				
(Per Worksheet 13)				*224,761.00*
** See Worksheet 4A, Appendix A*				
		Sub-Total		*$224,761.00*
PORTAL SEALING				
(Per Worksheet 15)	*17 Portals*		*2000/Ea*	*34,000.00*
			Sub-Total	*$34,000.00*
REVEGETATION				
Ground Prep.	*34.2 Ac.*	*Grader/Scarifier*	*188.18/Ac.*	*6,435.76*
Seeding	*34.2 Ac.*	*Tractor Spreader*	*958.32/Ac.*	*32,774.54*
Mulching/Fert.	*34.2 Ac.*	*Large Power Mulcher*	*958.32/Ac.*	*32,774.54*
Seed Mix	*34.2 Ac.*	*Includes Trees/Shrubs*	*550.00/Ac.*	*18,810.00*
			Sub-Total	*$90,794.84*
RESEEDING				
25% of Revegetation Cost			=	*22,698.71*
			Sub-Total	*$22,698.71*
MONITORING COSTS				
120 Mandays @ 150.00/day			=	*18,000.00*
			Sub-Total	*$18,000.00*

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DIVISION OF

All original in Appendix B

EARTHWORK COSTS

(1) General:

The Centennial Minesite is located in a relatively narrow, winding canyon. The majority of the mine portal sites are located along the canyon walls and do contain cut slopes and highwalls. Reclamation plans call for complete elimination of highwalls and restoration of the natural drainage channel.

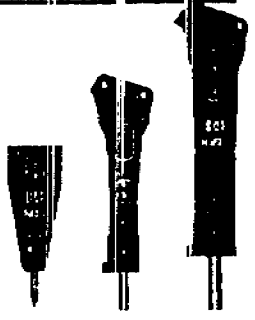
Based on an examination of the Mass Balance, and the adjusted volumes on Worksheet 4A, it is estimated that approximately 50% of the earthwork can be accomplished with a dozer with a push distance of 300' and an average grade of 15%. The remaining 50% of the earthwork volume will be moved by scrapers. For purposes of calculation, the average distance for hauling backfill with the scrapers is conservatively taken as 1500', with an average grade of +12%. Topsoil is also proposed to be moved by scrapers, with an average distance of 1100' and an average grade of +12%.

Detailed earthwork quantities and equipment calculations are shown on the following worksheets.

Breaker Production Chart

	Non-reinforced Concrete	Reinforced Concrete	Sedimentary Rock	Volcanic Rock
H115s	150 - 375 yd^3	140 - 240 yd^3	165 - 365 yd^3	75 - 150 yd^3
H120Cs	200 - 450 yd^3	160 - 300 yd^3	200 - 340 yd^3	110 - 200 yd^3
H130s	275 - 490 yd^3	200 - 350 yd^3	250 - 400 yd^3	135 - 275 yd^3
H140s	n/a	n/a	300 - 700 yd^3	150 - 350 yd^3
H160s	n/a	n/a	350 - 900 yd^3	200 - 600 yd^3
H180s	n/a	n/a	400 - 1600 yd^3	250 - 900 yd^3

Production Rates listed are based on 8 hour shift.
The above figures are for guideline only and must not be used to guarantee any production figure to the customer, the actural working results may vary according to the quality and structure of the material to be broken, required degree of reduction, installation, condition of carrier, conditions at the worksite, haulage of the broken material, skills of the operator,etc.



See appendix B for original

APPENDIX A

BOND CALCULATION WORKSHEETS

Centennial Bond
Date: 01/30/01
Prepared by: D. Guy

WORKSHEET 3
MATERIAL HANDLING PLAN SUMMARY

Earthmoving Activity	Volume (LCY)	Origin	Destination	Haul Distance (ft)	Grade * (%)	Equipment To Be Used
1- SITE GRADING	81,913	Benches/Canyon	Backfill/Contour	1500 AVG.	+12 AVG.	627F Scraper w/D8N Push Tractor
2- SITE GRADING	81,912	Benches/Canyon	Backfill/Contour	300 AVG.	+15	D9R-9U Dozer
3- TOPSOIL	27,588	Stockpile	Disturbed Area	1100 AVG.	+12 AVG.	627F Scraper w/D8N Push Tractor
4- RIPPING/RONSHONING	110,352	—	Disturbed Area	—	—	D7R-5U Dozer w/3 Shank Ripper

* Record grade resistance (% grade) here.

Original in Appendix B

Original in Appendix B

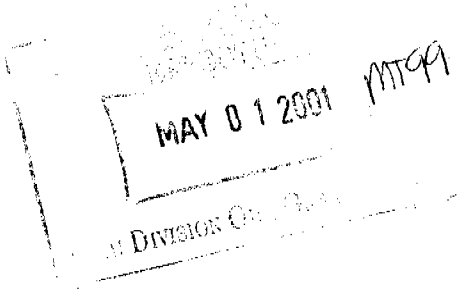
Project: Centennial Road
Date: 01/30/01
Prepared by: D. Guy

WORKSHEET 4A
EARTHWORK QUANTITY

Cross-Section/ Station	Distance Between Stations (ft)	End Area (ft^2)	Volume (yd^3)*	Adjust-ment Factor * (%)	Adjusted Volume (LCY)
-1+00	0	520	963	1.11	1069
1+00	200	440	1815		2015
3+00	200	480	4407		4893
5+00	200	80	5482		6087
7+00	200	2180	15,815		17,558
9+00	200	1760	14,259		15,832
11+00	200	2000	12,703		14,104
13+00	200	3600	16,259		18,051
15+00	200	0	740		822
17+00	200	20	2296		2549
19+00	200	560	4889		5429
21+00	200	1880	13,148		14,597
23+00	200	1800	12,297		13,653
25+00	200	400	2074		2303
TOTALS	(Continued on Next Page)				

* See discussion of material volume estimates in Chapter 2, Step 2, Part II. B. of the Handbook. Select adjustment factor based on the state of the material to be moved.

Data Source(s):



Project: Centennial Bond
Date: 01/30/01
Prepared by: D. Guy

Original in Appendix B

WORKSHEET 4A
EARTHWORK QUANTITY
(Continued)

Cross-Section/ Station	Distance Between Stations (ft)	End Area (ft^2)	Volume (yd^3)*	Adjust-ment Factor * (%)	Adjusted Volume (LCY)
27+00	200	1320	7074	1.11	7854
29+00	200	600	5333		5921
31+00	200	520	3963		4400
33+00	200	300	3519		3907
35+00	200	880	6296		6990
37+00	200	220	3704		4113
39+00	200	760	5741		6374
41+00	200	600	4148		4605
43+00	200	80	630		699
TOTALS			147,555		163,825

* See discussion of material volume estimates in Chapter 2, Step 2, Part II. B. of the Handbook. Select adjustment factor based on the state of the material to be moved.

Data Source(s):

Addendum to worksheet 4A Original in Appendix B

Centennial - Mass Balance Summary

Station	Cubic Yards (Cut)	Cubic Yards (Fill)	Difference Factor 1:1	Accum. Volume 1:1	Diff. Factor 1.11:1	Accum. Volume 1.11:1
-1+00	963.00	2148.00	-1185.00	-1185.00	-1079.00	-1079
0+00	815.00	1889.00	-1074.00	-2259.00	-984.00	-2063
1+00	1000.00	407.00	593.00	-1666.00	703.00	-1360
2+00	1074.00	1259.00	-185.00	-1851.00	-67.00	-1427
3+00	3333.00	1519.00	1814.00	-37.00	2182.00	755
4+00	2593.00	2259.00	334.00	297.00	620.00	1375
5+00	2889.00	1852.00	1037.00	1334.00	1356.00	2731
6+00	6778.00	2704.00	4074.00	5408.00	4821.00	7552
7+00	9037.00	4074.00	4963.00	10371.00	5959.00	13511
8+00	8259.00	2556.00	5703.00	16074.00	6614.00	20125
9+00	6000.00	4297.00	1703.00	17777.00	2365.00	22490
10+00	6444.00	6519.00	-75.00	17702.00	636.00	23126
11+00	6259.00	5593.00	666.00	18368.00	1356.00	24482
12+00	9222.00	5074.00	4148.00	22516.00	5164.00	29646
13+00	7037.00	6148.00	889.00	23405.00	1665.00	31311
14+00	370.00	8852.00	-8482.00	14923.00	-8441.00	22870
15+00	370.00	5815.00	-5445.00	9478.00	-5404.00	17466
16+00	407.00	2111.00	-1704.00	7774.00	-1659.00	15807
17+00	1889.00	5593.00	-3704.00	4070.00	-3496.00	12311
18+00	2889.00	8185.00	-5296.00	-1226.00	-4977.00	7334
19+00	2000.00	5319.00	-3319.00	-4545.00	-3098.00	4236
20+00	4444.00	3059.00	1385.00	-3160.00	1874.00	6110
21+00	8704.00	3185.00	5519.00	2359.00	6479.00	12589
22+00	8556.00	3037.00	5519.00	7878.00	6462.00	19051
23+00	3741.00	3370.00	371.00	8249.00	784.00	19835
24+00	1148.00	2963.00	-1815.00	6434.00	-1688.00	18147
25+00	926.00	4519.00	-3593.00	2841.00	-3491.00	14656
26+00	2630.00	10222.00	-7592.00	-4751.00	-7302.00	7354
27+00	4444.00	7407.00	-2963.00	-7714.00	-2473.00	4881
28+00	3111.00	1741.00	1370.00	-6344.00	1713.00	6594
29+00	2222.00	2815.00	-593.00	-6937.00	-348.00	6246
30+00	2074.00	2222.00	-148.00	-7085.00	81.00	6327
31+00	1889.00	1741.00	148.00	-6937.00	356.00	6683
32+00	1482.00	2185.00	-703.00	-7640.00	-540.00	6143
33+00	2037.00	1815.00	222.00	-7418.00	447.00	6590
34+00	3111.00	852.00	2259.00	-5159.00	2602.00	9192
35+00	3185.00	1630.00	1555.00	-3604.00	1906.00	11098
36+00	1963.00	3482.00	-1519.00	-5123.00	-1302.00	9796
37+00	1741.00	5407.00	-3666.00	-8789.00	-3474.00	6322
38+00	2741.00	4037.00	-1296.00	-10085.00	-994.00	5328
39+00	3000.00	6111.00	-3111.00	-13196.00	-2780.00	2548
40+00	2704.00	5593.00	-2889.00	-16085.00	-2591.00	-43
41+00	1444.00	1148.00	296.00	-15789.00	455.00	412
42+00	482.00	963.00	-481.00	-16270.00	-428.00	-16
43+00	148.00	148.00	0.00	-16270.00	16.00	0
	147555.00	***163825.00***	***-16270.00***			

Project: Centennial Bond
Date: 01/30/01
Prepared by: D. Gray

Original in Appendix B

WORKSHEET 4B
EARTHWORK QUANTITY

SITE GRADING

Earthwork Volume - 163,825 LCY (See Worksheet 4A)

Estimate 1/2 moved by scraper and the remainder by dozer.

Scraper Volume = 81,913 LCY
Dozer Volume = 81,912 LCY

TOPSOIL REPLACEMENT

Cover depth for 34.2 ac. disturbed area = 0.5 ft.

Topsoil Volume = (34.2 ac. x 43560 SF/ac x 0.5 ft.)/27 CF/CY = 27,588 LCY
(To be moved by scraper)

RIPPING

Ripping depth for 34.2 ac. disturbed area = 2.0 ft.

Volume = (34.2 ac. x 43,560 SF/ac x 2 ft)/27 CF/CY = 110,352 BCY

Data Source(s):
Mine Plan

Project: Centennial Bond
Date: 01/30/01
Prepared by: R. Gay

Original in Appendix B

WORKSHEET 5A
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity: (81,912 CY)
Backfill and rough grade pond, canyon and bench areas.

Characterization of Dozer Used (type, size, etc.):
D9R-9U Dozer

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
300 LF push distance @ +15% effective grade.

Productivity Calculations:

Operating Adjustment Factor = 0.75 (operator factor) x 0.80 (material factor) x 0.83 (efficiency factor) x 0.69 (grade factor)

x 0.87 (weight correction factor) x 1.0 (production method/blade factor) x 1.0 (visibility factor) x 1.0 (elevation factor) = 0.30

Net Hourly Production = 480 (normal hourly production) LCY/hr x 0.30 (operating adjustment factor) = 144 LCY/hr

Hours Required = 81,912 (volume to be moved) LCY ÷ 144 (net hourly production) LCY/hr = 569 hr

Data Source(s):
Caterpillar Performance Handbook, Edition 28.

Project: Centennial Bond
Date: 01/30/01
Prepared by: P. Guy

Original in appendix B

WORKSHEET 5B
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Push tractor to assist loading scrapers.

Characterization of Dozer Used (type, size, etc.):
D8N dozer with a "SU" Blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Scrapers loaded with Back-track Loading Method.

Productivity Calculations:

Operating Adjustment Factor = _____ (operator factor) x _____ (material factor) x _____ (efficiency factor) x _____ (grade factor)

x _____ (weight correction factor) x _____ (production method/blade factor) x _____ (visibility factor) x _____ (elevation factor) = _____

Net Hourly Production = _____ (normal hourly production) LCY/hr x _____ (operating adjustment factor) = _____ LCY/hr

Hours Required = _____ (volume to be moved) LCY ÷ _____ (net hourly production) LCY/hr = * 127 hr

* See Worksheets 11B-1 and 11B-2. (97hr. + 30hr. = 127 hr.)

Data Source(s):
Caterpillar Performance Handbook, Edition 28.

Project: Centennial Bond
Date: 01/30/01
Prepared by: D. Guy

Original in Appendix B

WORKSHEET 7
PRODUCTIVITY AND HOURS REQUIRED FOR RIPPER-EQUIPPED DOZER USE

Ripping Activity: Unit will be used for ripping and roughening the site. The activity will involve 34.2 acres.

Characterization of Dozer and Ripper Use:
D7R w/SU blade and 3-shank adjustable ripper.

Description of Ripping (ripping depth, cut spacing, cut length, and material to be ripped):
Ripping depth - 2 ft.
Ripping width - 9.75 ft.

Productivity Calculation:

Cycle Time = (1,000 ft (cut length) ÷ 88 ft/min [speed]) + 0.3 min (fixed turn time *) = 11.66 min/pass

Passes/Hour = 60 min/hr ÷ 11.66 min/pass (cycle time) x .83 (efficiency factor) = 4.27 passes/hr

Volume Cut/Pass = (2.0 ft (tool penetration) x 9.75 ft (cut spacing) x 1,000 ft (cut length)) ÷ 27 ft³/yd³

= 722.2 BCY/pass

Hourly Production = 722.2 BCY/pass x 4.27 passes/hr = 3,083.8 BCY/hr

Hours Required = 110,352 BCY (bank volume to be ripped **) ÷ 3,083.8 BCY/hr (hourly production) = 35.78 hr
(Use 36 Hours)

* Fixed turn time depends upon dozer used. 0.26 min/turn is normal.

** Remember to use the swell factor to convert from bank cubic yards to loose cubic yards when applying these data to *Worksheet 5*. Calculate separate dozer hauling of ripped material for each lift on that worksheet.

Data Source(s):
Caterpillar Performance Handbook, Edition 28.

Project: Centennial Bond
Date: 04/30/01
Prepared by: D. Guy

Original in Appendix B

WORKSHEET 11B - 1
PRODUCTIVITY OF DOZER PUSH-LOADED SCRAPER USE

Earthmoving Activity: (81,913 CY)
Backfill and grade benches, outslope and highwall areas.

Characterization of Scraper Used (type, capacity, etc.):
Cat 627F Non-push pull 14 cy(struck) + 20cy(heaped) = 17cy. avg. capacity.

Description of Scraper Use (origin, destination, grade, haul distance, capacity, etc.):
1500' avg. haul @ +12% effective grade; 1500' return @ -4% effective grade

List Pusher Tractor(s) Used:
D8N dozer

Describe Push Tractor Loading Method (see figure on next page):
Back-track loading method with 1 push tractor.

Scraper Productivity Calculations:

Cycle Time = 0.5 (load time) min + 1.80 (loaded trip time) min + 0.6 (maneuver and spread time) min + 0.70 (return trip time) min = 3.60 min

Hourly Production = 17 (capacity*) LCY x 60 min/hr ÷ 3.60 (cycle time) min x .75 (efficiency factor) = 212.5 LCY/hr

Hours Required = 81,913 (volume to be handled) LCY ÷ 212.5 (hourly production) LCY/hr = 386 hr

* Use the average of the struck and heaped capacities.

Push Tractor Productivity Calculations:

Pusher Cycle Time = 0.5 (scraper load time) min x 1.5 (pusher factor) = 0.75 min

Scrapers/Pusher = 3.60 (scraper cycle time) min ÷ 0.75 (pusher cycle time) min = 4.8 scrapers (Use 4)

Pusher Hours Required = 386 (scraper hours) hr ÷ 4 (scrapers per pusher) = 97 (round up) hr

Data Source(s):
Caterpillar Performance Handbook, Edition 28.

Project: Centennial Road
Date: 01/30/01
Prepared by: P. Guy

Original in Appendix B

WORKSHEET 11B-2
PRODUCTIVITY OF DOZER PUSH-LOADED SCRAPER USE

Earthmoving Activity: (27,588 CY)
Haul and spread topsoil.

Characterization of Scraper Used (type, capacity, etc.):
Cat 627F Non-push pull; 17 CY avg. capacity.

Description of Scraper Use (origin, destination, grade, haul distance, capacity, etc.):
1,100' haul @ +12% effective grade; 1,100' return @ -4% effective grade

List Pusher Tractor(s) Used:
D8N dozer

Describe Push Tractor Loading Method (see figure on next page):
Back-track loading method with 1 push tractor.

Scraper Productivity Calculations:

Cycle Time = 0.5 (load time) min + 1.40 (loaded trip time) min + 0.6 (maneuver and spread time) min + 0.75 (return trip time) min = 3.25 min

Hourly Production = 17 (capacity*) LCY x 60 min/hr ÷ 3.25 (cycle time) min x 0.75 (efficiency factor) = 235 LCY/hr

Hours Required = 27,588 (volume to be handled) LCY ÷ 235 (hourly production) LCY/hr = 118 hr

* Use the average of the struck and heaped capacities.

Push Tractor Productivity Calculations:

Pusher Cycle Time = 0.5 (scraper load time) min x 1.5 (pusher factor) = 0.75 min

Scrapers/Pusher = 3.25 (scraper cycle time) min ÷ 0.75 (pusher cycle time) min = 4.3 scrapers (use 4)

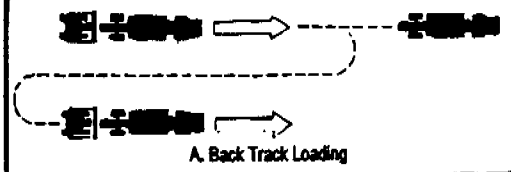
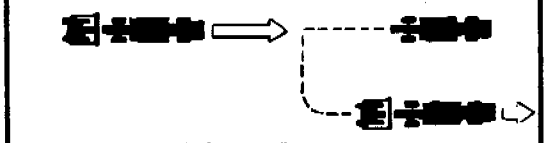
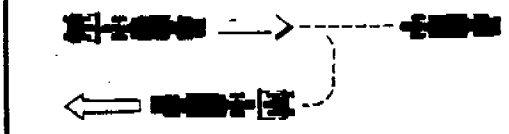
Pusher Hours Required = 118 (scraper hours) hr ÷ 4 (scrapers per pusher) = 30 (round up) hr

Data Source(s):
Caterpillar Performance Handbook, Edition 28.

Original in Appendix B

Project: Centennial Bond
Date: 01/30/01
Prepared by: R. Guy

WORKSHEET 11B (continued)
PRODUCTIVITY OF DOZER PUSH-LOADED SCRAPER USE

PUSHER FACTORS	Single Push	Tandem Push
 A. Back Track Loading	1.5	2.0
 B. Chain Loading	1.3	1.5
 C. Shuttle Loading	1.3	1.5

Modified from Terex, 1981.

The following disclaimer pertains to the above illustration from Terex, "Production and Cost Estimating of Material Movement and Earthmoving Equipment."

This manual is a fundamental text on estimating the production and cost of moving materials. It is intended for people associated with the construction industry who prepare job estimates or who evaluate the performance of earthmoving equipment and related costs.

The manual can be used as a supplementary text in those schools and colleges offering formal training in earthmoving techniques. A metric version of this manual is also available.

It will also serve as a reference for those professional consulting engineers who prepare complete job analyses, of which the earthmoving fundamentals covered in this text are only one element.

Estimating the production and costs of earthmoving equipment is not an exact science. While this manual outlines the basic factors or parameters on which estimates can be made, the user must make judgements, and must apply his own experience and know-how to temper the estimate.

This manual, prepared by TEREX, deals with rubber-tired and track-laying equipment, and does not attempt to deal with other forms of earthmoving or production. While the formulas and other guides in this manual are entirely satisfactory for most earthmoving jobs, the reader should note that more sophisticated haulage analyses can be quickly accomplished through the use of a computer.

While efforts have been made to utilize percentages, formulas, and other notations in this manual which reflect actual on-the-job conditions, none of the statements in this manual, or the illustrative figures given for machine life, or the costs for owning and operating earthmoving equipment, or the production of such earthmoving equipment should be construed as any form of guarantee that these machines will have any such specific service life, or production capabilities, or that costs related to their ownership and operation will be as indicated.

Data Source(s): TEREX AMERICAS, Tulsa, OK 74107, (918) 445-5802

Project: Centennial Bond
Date: 01/30/01
Prepared by: D. Guy

Original in Appendix B

WORKSHEET 13
SUMMARY CALCULATION OF EARTHMOVING COSTS

Equipment *	Ownership & Operation Cost Total / ($/hr)	Labor Cost ($/hr)	Total Hours Required **	Total Cost *** ($)
627 F Scraper	152.00	—	504	76,608
D8N-SU Push Tractor	178.00	—	127	22,606
D7R-SU Dozer	133.00	—	36	4,788
D9R-SU Dozer	212.23	—	569	120,759
			Grand Total	$224,761

* Include all necessary attachments and accessories for each item of equipment. Also, add support equipment such as water wagons and graders to match total project time as appropriate.

** Account for multiple units in truck and/or scraper teams.

*** To compute Total Cost: Add Ownership & Operation Cost and Labor Cost columns then multiply by Total Hours Required column.

Data Source(s):
Means Heavy Construction Cost Data, 12th Annual Edition.

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Project: Centennial Bond
Date: 01/30/01
Prepared by: D. Gray

Original in Appendix B

WORKSHEET 15
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Description of Reclamation, Repair or Pollution Abatement Activity:

Portal Sealing

Assumptions:

17 Portals to be sealed and backfilled.
Portals average 20'W x 7'H and are backfilled 25'.
Seals are double-wall with solid concrete block.

Cost Estimate Calculations:

24 Hrs. Labor/Seal @ 32.55/hr. = 781.20
* 300 Blocks/Seal @ 3.00/ea. = 900.00
130 CY Backfill/Seal @ 1.82/CY = 236.60
COST/Seal = $1917.80 (Use $2000.00)

TOTAL COSTS = $ 34,000.00

Other Documentation or Notes:

(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

*Includes Sand/Mortar

Data Source(s):

Means / Cat Handbook

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Superceded see appendix B

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 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

Superceded see Appendix B

The following cost projection reflects hourly rates. An additional earthwork estimate can be found following the mass balance estimates.

Superceded see appendix B

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

Superceded see appendix B

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

Superceded see appendix B

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. Revegetation	Drill	2	100
	h. Stake slope	Engineer	8	400
	Total Stockpile Area:			$ 7,540

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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

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

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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 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 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.

R645-301-830.100. 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

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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

R645-301-830.500. SUBSIDENCE

Appendix B

R645-301-840. GENERAL TERMS AND CONDITIONS OF THE BOND

Appendix B

R645-301-840.100. AMOUNT

Appendix B

R645-301-840.200. PAYABLE TO DIVISION

Appendix B

R645-301-840.300. PERFORMANCE

Appendix B

R645-301-840.400. DURATION

Appendix B

R645-301-840.500. GENERAL

Appendix B

R645-301-840.510. NOTICE REQUIREMENTS

Appendix B

R645-301-840.520. INADEQUATE BOND COVERAGE

Appendix B

R645-301-850. BONDING REQUIREMENTS FOR UNDERGROUND MINING OPERATIONS

Appendix B

R645-301-850.100. RESPONSIBILITIES

Appendix B

R645-301-850.200. LONG-TERM PERIOD OF LIABILITY

Appendix B

R645-301-850.210. PERIOD OF LIABILITY

Appendix B

R645-301-850.220. SURFACE FACILITIES AND STRUCTURES

Appendix B

R645-301-850.230. CONTINUOUS BOND COVERAGE

Appendix B

R645-301-850.240. EXTENDED RESPONSIBILITY

Appendix B

R645-301-850.300. BOND FORFEITURE

Appendix B

R645-301-850.310. CONTINUOUS COVERAGE

Appendix B

R645-301-850.320. EXTENDED RESPONSIBILITY

Appendix B

R645-301-860. FORMS OF BONDS

Appendix B

R645-301-860.100. SURETY BONDS

Appendix B

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R645-301-860.110. EXECUTION

Appendix B

R645-301-860.120. TERMS

Appendix B

R645-301-820.200. 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

R645-301-860.321. RESIDENT AGENT

N/A

R645-301-860.322. CONTINUOUS OPERATION

N/A

R645-301-860.322.1 JOINT VENTURES OR SYNDICATES

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

R645-301-860.340. REQUIREMENTS

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

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: Michael W Glasson

Taken, subscribed and sworn to me before the undersigned authority in my said county, this 19th day of June, 1995.

Notary Public: Jana K. O'Hearon

My Commission Expires: July 22, 1997

Notary Public
JANA K. O'HEARON
830 North 100 East
Price, Utah 84501
My Commission Expires
July 22, 1997
State of Utah

SUPERSEDED

OCT 0 7 2002

DIV OF OIL GAS & MINING