ANDALEX RESOURCES, INC.
CENTENNIAL PROJECT
007/019

(TOWER MINE)

CHANGE TO
WATER MONITORING PLAN

TASK #2695

Submitted: March 12, 2009

COPY

ANDALEX
RESOURCES, INC.

P.O. BOX 910
EAST CARBON, UTAH 84520
PHONE (435) 888-4000
FAX (435) 888-4002

March 12, 2009

Utah Division of Oil, Gas & Mining
Coal Program
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801

Attn: Daron Haddock
Permit Supervisor

RE: Andalex Resources, Inc., C/007/019
Tower (Centennial) Mine
Change to Water Monitoring Plan
Task 2695

Dear Mr. Haddock:

Enclosed are six (6) copies of Chapter 7 showing the new water monitoring plan for the Centennial Mine (aka, Tower Mine).

Should you have any questions regarding this issue, please feel free to contact me

Sincerely,

David Shaver
Resident Agent

RECEIVED
MAR 12 2009
DIV. OF OIL, GAS & MINING

Form DOGM - C1 (Last Revised January 20, 2009)

COPY

File Folder # 3

APPLICATION FOR PERMIT PROCESSING

Permit Change ☐	New Permit ☐	Renewal ☐	Transfer ☐	Exploration ☐	Bond Release ☐

Permit Number: 007/019

Title of Proposal: Plan to reduce the water monitoring sites, Task 2695

Mine: Centennial Project

Permittee: **Andalex Resources, Inc.**

Description, include reason for application and timing required to implement:.

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

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

☐ **Attach _3_ complete copies of the application.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein. (R645-301-123)

Signed - Name - Position - Date 1/20/09

Subscribed and sworn to before me this 20TH day of January 2009

Notary Public

My Commission Expires: April 6 2009

Attest: STATE OF Utah)

COUNTY OF Carbon)

Notary Public
LINDA KERNS
345 N. 700 E.
Price, UT 84501
My Commission Expires
April, 6, 2009
State of Utah

RECEIVED

Received by Oil, Gas & Mining

MAR 12 2009

DIV. OF OIL, GAS & MINING

ASSIGNED TRACKING NUMBER

Form DOGM - C2 (Last Revised 6/93)

File Folder # 3

COPY

Application for Permit Processing
Detailed Schedule of Changes to the MRP

Title of Application: Plan to reduce water monitoring, Task 2695	Permit Number: 007/019
	Mine: Centennial Project
	Permittee: Andalex Resources, Inc

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

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
~~☒ ADD~~	☐ REPLACE	☐ REMOVE	~~Add~~
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☒ REPLACE	☐ REMOVE	Chapter 7 text all
☐ ADD	☐ REPLACE	☐ REMOVE	
☒ ADD	☐ REPLACE	☐ REMOVE	Chapter 7 Figure 7-1
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

PM" through the restored channel RC-1.

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

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

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.

R645-301-700. HYDROLOGY

The Mathis Tract and New Federal Summit Creek Lease boundary change will not encroach into any new hydrologic basins which are not addressed in the existing MRP (see plate 29). Seeps located within this boundary change have been addressed in the new Summit Creek and North Mathis 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 U.P.D.E.S. Permit ~~No. UTG-040007 issued July, 1989~~ (see Appendix J). ~~Please note~~ Currently, this permit authorizes ~~three~~ four discharge points; two from sedimentation ponds (001, 003) and ~~one~~ two from the underground mine (002 and 004). See IV-11

Andalex has approval from the State Engineer, Division of Water Rights, to collect runoff water from the disturbed area for use as a dust suppressant in the underground mining operation. This runoff is a result of direct precipitation with the runoff area.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

Surface and Groundwater Monitoring

This monitoring plan is an up-to-date, comprehensive plan that describes all current water monitoring requirements. It supersedes all other versions of monitoring plans that have been previously developed for the Centennial Mine and that may be contained in various appendices to this MRP. In the past, as the mining area expanded, changes were made to the permit boundary, and new monitoring sites were added. As a result, several different monitoring plans have been developed for the Centennial Mine. These were described to varying extents in separate Probable Hydrologic Consequences (PHC) determinations that are appended to MRP.

The plan written here draws from the various monitoring plans that have previously been written and approved. It is also based upon an assessment of monitoring data collected to date, and accounts for the status of the mine as inoperable. It meets the requirements of R645-301-731.211 and R645-301-731.221, i.e., to document the suitability of water for current and approved postmining land uses and for protecting the hydrologic balance. Should operations be reinitiated, this monitoring plan will be reexamined for adequacy, and dropped monitoring sites may be

picked back up and/or new sites may be added. Any such changes to the monitoring will be reflected in revisions to this section.

Removal of Monitoring Points

As allowed by R645-301-731.214 and R645-301-731.224, several sites that have been monitored for many years have been omitted from this plan. Sites in Hoffman Canyon (S25-1 and 25-2), Straight Canyon (8-1 and 17-2), and Star Point Fork (17-1 and 18-2) will no longer be monitored. All of these sites are located within or near the eastern portion of the MRP boundary, and were never undermined. The closest mining was completed in 1993 and was about half a mile away from the sites, as shown on Figure 7-1. Further, site 12-1, located in Alrad Canyon in the southwest corner of the permit area, has been omitted from this plan.

In addition, there are numerous sites to the north and west of the permit area which have been omitted from this plan. As shown on Figure 7-1, stream site B263 is located more than a mile away from the nearest underground mining, and stream sites AC-1 and SC-1 are three-quarters of a mile from the closest mine works. Four spring or seep sites (B351, B352, B261, and B362) are similarly located well away from any recent mining. It should also be noted that at these sites the overburden is 3000' deep or greater. All mining in the Aberdeen Mine (Tower Mine) was discontinued in mid-2007, the mine has been shut down and sealed up, and there are not immediate plans to ever reopen the mine in the foreseeable future. Therefore, there is no continued need for monitoring.

Last, one other stream site and one stock pond site within the permit area is also being omitted from the monitoring plan. Ephemeral wash site 7-1 is located upstream of the main surface facilities and is typically dry. Because site 18-4 monitors the same stream further downstream and because operations have ceased, 18-4 is sufficient for tracking potential impacts in this drainage. Site 7-1 was never undermined, and the nearest second-mining (nearly one-half mile away) was completed in 1998. The stock pond site 31-1 is located over a inter-panel barrier pillar and was never undermined. The nearest second mining was done in 2004. Overburden cover at this location is 2500' and subsidence survey show that the area has not been subject to subsidence Further justification for discontinuing monitoring at all of the above-mentioned sites is provided below.

As mentioned above, ANDALEX has long-completed mining under Hoffman Canyon; there were no surface facilities associated with mining in that area and there has been no subsidence reported during annual surveys. Because the spring (S25-1) flows only intermittently and the stream (25-2) flows only ephemerally, few samples have been collected. However, based upon the available data, there has not been any material damage to the hydrologic balance, and postmining land uses have not been compromised. Nor would there be any potential for this to occur in the future from these completed activities.

Similarly, ANDALEX completed mining under Straight Canyon (8-1) in 1995. Site 17-2 was never undermined, and the last mining in the area (nearly half mile away) was done in 1995. The situation is similar for sites in Starpoint Fork (17-1 and 18-2). These sites were originally designated for monitoring to indicate effects of proposed surface facilities in those canyons (Vaughn Hansen Associates 1981); these facilities were never constructed and are no longer proposed. Further, annual subsidence surveys have not indicated subsidence. Though there have been few opportunities to collect water quality samples from these ephemeral channels, available data has not indicated any material damage to the hydrologic balance, and postmining land uses have not been compromised. Nor would there be any potential for this to occur in the future from these completed activities. In addition, the same can be said for site 7-1 in Deadman Canyon above the surface facilities and the continuation of monitoring at site 18-4 ensures that water quality in this watershed is being tracked.

Site 12-1 is located in an ephemeral channel that drains Alrad Canyon. This site was added to the monitoring plan a number of years ago as part of a permit amendment; its purpose was to ensure that any surface runoff effects due to mining could be documented. The site has served its purpose and no effects have been noted during the many years of quaterly monitoring. Located in the southwest corner of the permit area, Alrad Canyon was never undermined, and the closest second-mining (a half-mile away) was completed in 2000.

The Deep Canyon site (B-263) is on an intermittently flowing stream that is more than 7500 feet north of the second-mined area. It was added to the Centennial monitoring plan in 2005, but has been monitored by others as part of the Willow Creek MRP for many years. The Atone Creek site (AC-1) is also an intermittently flowing stream that was added to the monitoring plan in 2005; it is approximately 4500 feet north of the nearest second-mined area. The perennially flowing SC-1 is located below forks of Summit Creek, and is approximately 3800 feet north of the mined area. It has been monitored by ANDALEX since 2004. Although portions of the watersheds of these three streams have been undermined, surface effects from subsidence have not been noted, in part due to the fact that cover ranges from 2,500 to 3,000 feet in these areas.

Regarding the four above-mentioned spring or seep sites, similar rationale is used to justify their removal from the monitoring plan. In Mathis Canyon, B351 is a small perennially flowing spring which has been monitored by ANDALEX since 2002 and was previously monitored as part of the Willow Creek MRP. The closest that mining came to that water source was 3500 feet, and that occurred in mid-2007. B352 has a similar monitoring history, though this small seep is almost always dry; while somewhat closer to the mined area, there is no mining-related mechanism by which future impacts to its hydrologic balance could

occur. A small seep (B261), which may at times support runoff flows stored in Pace Pond, is also a former Willow Creek MRP monitoring site, which was taken over by ANDALEX in 2005; it has been dry in recent years. It is located outside of the permit area and 5500 feet north of second-mined areas. Another seep, which has also been dry essentially throughout its monitoring history (beginning in 2005 for ANDALEX and previously by Willow Creek), is known as B362. It is located on the edge of the permit area, at 3000 feet cover, and has not been undermined.

Last, the stock pond 31-1 was monitored to track any subsidence-related damages. It collects surface runoff and during quarterly monitoring a qualitative record is simply made of whether inflow or outflow is occurring, and the approximately percentage of storage which is currently being used. The nearest mining was in 2004, and at a cover of 2500 feet, no effects from subsidence have been noted.

In sum, none of the above mentioned sites are needed any longer to ensure protection of the hydrologic balance. Further, there is no mechanism by which future mining-related impacts to these water sources could occur, given the current conditions. Should mining be planned for the future, all of these sites have a record with which background conditions could be demonstrated, and any or all of them could be placed back in the plan to collect more data in the future if need be.

The following describes the monitoring plan currently in place, including designation of the sites remaining in the plan, as well as the monitoring methodology, parameter lists, and frequency.

Location of Monitoring Points

Groundwater

~~**Monitoring Plan for** Permit Expansion~~

~~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 North Mathis Tract and Summit Creek Federal Lease 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 additional springs within and north of the expansion area, B362 and B261. The locations of these springs are shown on Figure IV-11 of the MRP (Groundwater and surface water monitoring locations).~~

~~Details on each of the proposed new sites are discussed in Appendix L, "Probable Hydrologic Consequences of Coal and Mining in the Summit Creek and North Mathis Tracts, Andalex Resources, Inc., Tower Mine.~~

~~The monitoring plan for the proposed expansion area is summarized in Tables a, b, and c below. Please note these tables are shown only for the new springs to be monitored for the Mathis/Summit Creek Expansion area. All ground water monitoring sites are discussed in detail in the above referenced PHC in Appendix L, and shown on Figure IV-II.~~

Groundwater monitoring includes two types of sites: underground water intercepted by a well; and springs representing surface expressions of natural groundwater discharge. Locations of these sites are depicted on Figure IV-11 (and also Figure 7-1), and they are briefly described below in Table a.

Table a Groundwater Monitoring Sites

Site ID	UTM location	Description
Well No. 1	523236.53 N 4395172.22 E	Well in Deadman Canyon, completed in Aberdeen Sandstone (first aquifer below coal seam)
S18-1	522923.25 N 4393720.43 E	Spring in Deadman Canyon below confluence with Left and Right Forks Deadman Canyon; stratigraphically below coal seam

Table a *North Mathis Tract and Summit Creek Federal Lease Groundwater Monitoring Plan		
Spring	Protocol	Comments
B362	A, 1	Flagstaff Limestone Spring in Antone Creek drainage.
B261	A, 1	Flagstaff Limestone spring in Dep Canyon (Pace Spring)

Table b Monitoring protocols for springs in the expansion 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 Groundwater operational water quality parameters	
Field Measurements	Reported as
pH	pH units
Specific Conductivity	µS/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

* See PHC in Appendix L for complete ground water monitoring plan.

~~Groundwater monitoring sites are depicted on Figure IV-11, and include Well #1, S18-1, S25-1, B351, B352 and new sites B261 and B362. (S18-1 and S25-1 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

All surface water monitoring locations are shown on Figure IV-11. These monitoring sites are listed and briefly described below in Table b. Further, four storm water or mine water discharge outfalls at the Centennial Mine are monitored as required under a UPDES Permit, administered by the Utah Division of Water Quality. They are also shown on Figure IV-11.

Table b Surface Water Monitoring Sites

Site ID	UTM location	Description
18-3	522832.11 N 4394057.30 E	Left Fork Deadman Canyon above confluence with Right Fork Deadman Canyon, ephemeral stream

18-4	522995.07 N 4394031.23 E	Right Fork Deadman Canyon below main surface facilities, ephemeral stream

~~It should be noted that there are four new surface water monitoring sites associated with the proposed expansion area.~~

~~Surface water monitoring sites are depicted on Figure IV-11 and include 7-1, 8-1, 17-1, 17-2, 18-3, 18-4, 18-2, 25-2 and 12-1 and new sites AC-1, SC-1 and B263 and Stock Pond 31-1. Proposed new sites are discussed further in Appendix L. 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.~~

Methodology and **Parameters to be Monitored**

Flow rate will be measured at all spring and stream sites using equipment and methods that are appropriate for the amount of flow. Streams will typically be measured with a current meter using the velocity/area approach, a submerged float/area method, or with a portable, calibrated flume. Springs will typically be measured volumetrically with piping, a known-volume container, and a stopwatch. Notes on flow extent will be made if appropriate. If flow rate is so reduced that it is not possible to measure (i.e. at a seasonal spring where saturated areas are present but no flow is visible), or if no flow is occurring (i.e. at an ephemeral stream site), notes will be made describing the site condition (saturation, ponding, dry but recent flows apparent, etc.) Static water level will be recorded at the monitoring well using a well sounder, and purged before samples are taken. Stock pond sites will be observed for incoming flow, outgoing flow, and approximate percentage of storage; these are reported qualitatively with no quantitative measurements made and no samples collected.

Water temperature, pH, and conductivity will be measured in the field using equipment that has been properly maintained and calibrated. Dissolved oxygen will also be measured in the field at all flowing stream sites. These field parameters will be measured at locations appropriate to the site: for streams, in mid-stream, non-stagnant water, with temperature measurements occurring in shaded areas where possible; and for springs, as near to the source as possible. The monitoring well will be purged prior to measuring field parameters.

Samples for chemical analysis follow requirements of UAC R645-301-723. The parameter list for surface waters (except stock ponds as described above) is shown in Table c, and the list for groundwater is shown in Table d. Any samples collected at the four UPDES outfalls will analyzed for the parameters required by the UPDES permit.

When feasible, field filtering is done prior to filling a bottle for dissolved metals analysis. Samples are stored in iced coolers and submitted to a contract lab using proper chain-of-custody procedures. The lab will be certified for all parameters that it analyzes.

Table c Surface Water Parameter List

Field Parameters	
pH	Water temperature
Conductivity	Dissolved oxygen
Flow rate	
Laboratory Parameters	
Bicarbonate	Alkalinity
Carbonate	TDS
Calcium (dissolved)	Hardness
Chloride	Iron (total and dissolved)
Magnesium (dissolved)	Manganese (total and dissolved)
Potassium (dissolved)	Oil & Grease
Sodium (dissolved)	TSS
Sulfate	Cation/anion balance

Table d Groundwater Parameter List

Field Parameters	
pH	Water Temperature
Conductivity	Static water level or flow rate
Laboratory Parameters	
Bicarbonate	Sulfate
Carbonate	Alkalinity
Calcium (dissolved)	TDS
Chloride	Hardness
Magnesium (dissolved)	Iron (total and dissolved)
Potassium (dissolved)	Manganese (total and dissolved)
Sodium (dissolved)	Cation/anion balance

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

Also, should there ever be a discharge at any UPDES 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
- Barium
- Cadmium
- Chromium
- Mercury
- Molybdenum
- Nickel
- Nitrogen: Ammonia
- Nitrite

~~Copper~~ ~~Phosphate~~
~~Fluoride~~
~~Lead~~ ~~Sulfide~~
~~Zinc~~

Frequency

Surface water and groundwater monitoring sites will be visited quarterly, when accessible. When flowing, field measurements will be made and samples are collected for lab analysis. When not flowing, condition will be documented and subsequently reported.

UPDES outfall sites will be on a monthly monitoring schedule, as required by the UPDES permit.

Quarterly monitoring results will be reported electronically to UDOGM's on-line database.

~~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:

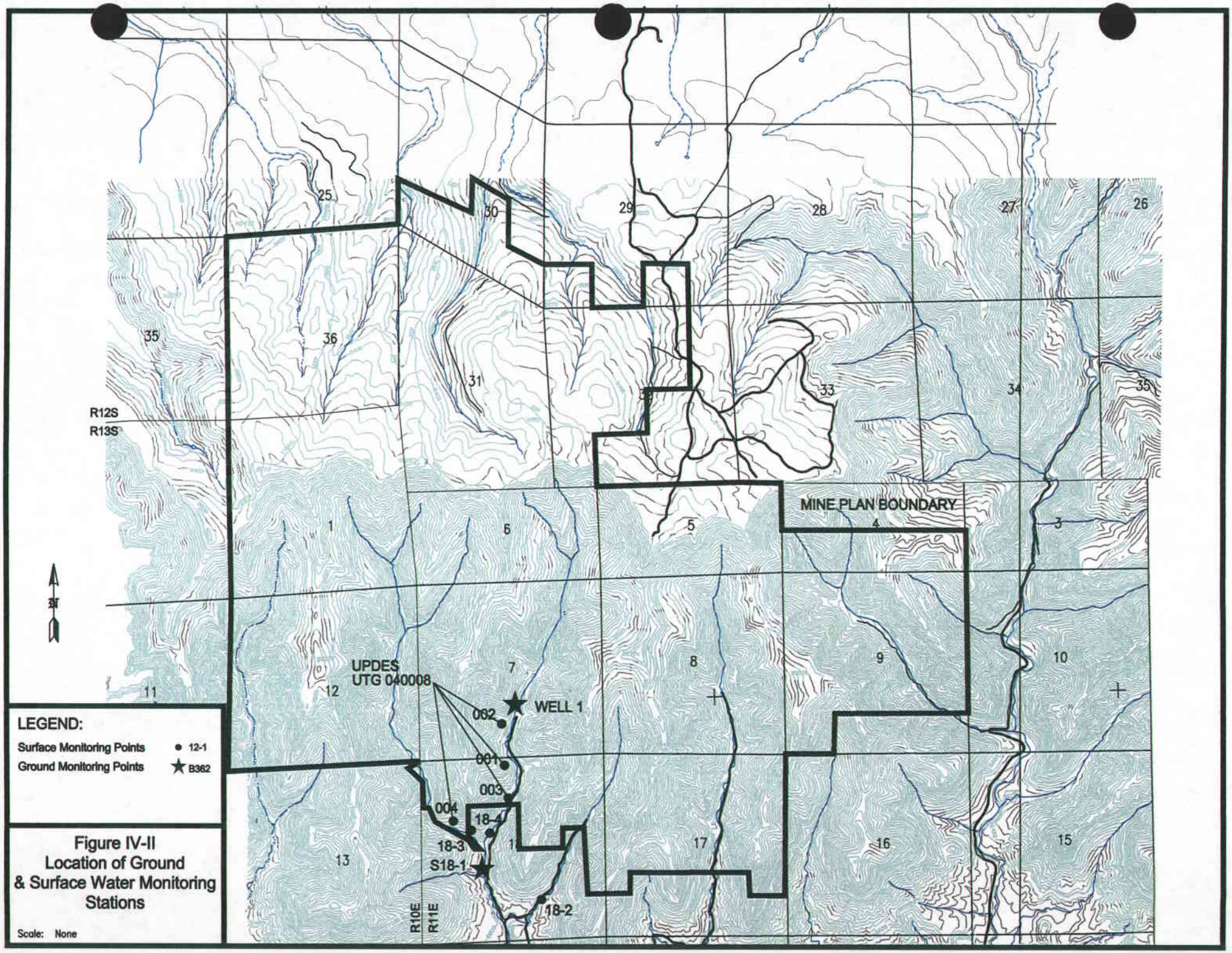
1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical 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 rEVEGATATION and water quality standards are met, Pond "E-PM" will be removed, and the area reclaimed.

Figure IV-11
Location of Ground Water &
Surface Water Monitoring Station

INSERT ORIGINAL MAP


MINE PLAN BOUNDARY
R12S
R13S
R10E
R11E
UPDES
UTG 040008
WELL 1
002
001
003
004
18-4
18-3
S18-1
18-2
LEGEND:
Surface Monitoring Points
12-1
Ground Monitoring Points
B362
Figure IV-II
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-040007 issued July, 1989 (see Appendix J). Please note this permit authorizes three discharge points; two from sedimentation ponds (001, 003) and one from the underground mine (002). See IV-11 and R645-301-711.300.

Andalex will comply with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and all other applicable water quality laws and health and safety standards.

R645-301-722.400. WATER WELLS

See R645-301-711.300.

R645-301-722.500. EXISTING LAND SURFACE CONFIGURATION

Plate 6

R645-301-723. SAMPLING AND ANALYSIS

Appendix L

R645-301-724. BASELINE INFORMATION

Appendix L

R645-301-724.100. GROUND WATER INFORMATION

Appendix L

R645-301-724.200. SURFACE WATER INFORMATION

Appendix L

R645-301-724.300. GEOLOGIC INFORMATION

Appendix L

R645-301-724.310. PROBABLE HYDROLOGIC CONSEQUENCES

Appendix L

R645-301-724.320. RECLAIMABILITY

Post Mining Hydrology

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases including the left hand fork fan installation:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

   All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

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

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

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.

PAGE 7-17 OF DOCUMENT

Figure III-4
Price Climatological Summary
Monthly Average 1936-1965

INSERT ORIGINAL GRAPH

TABLE III-4

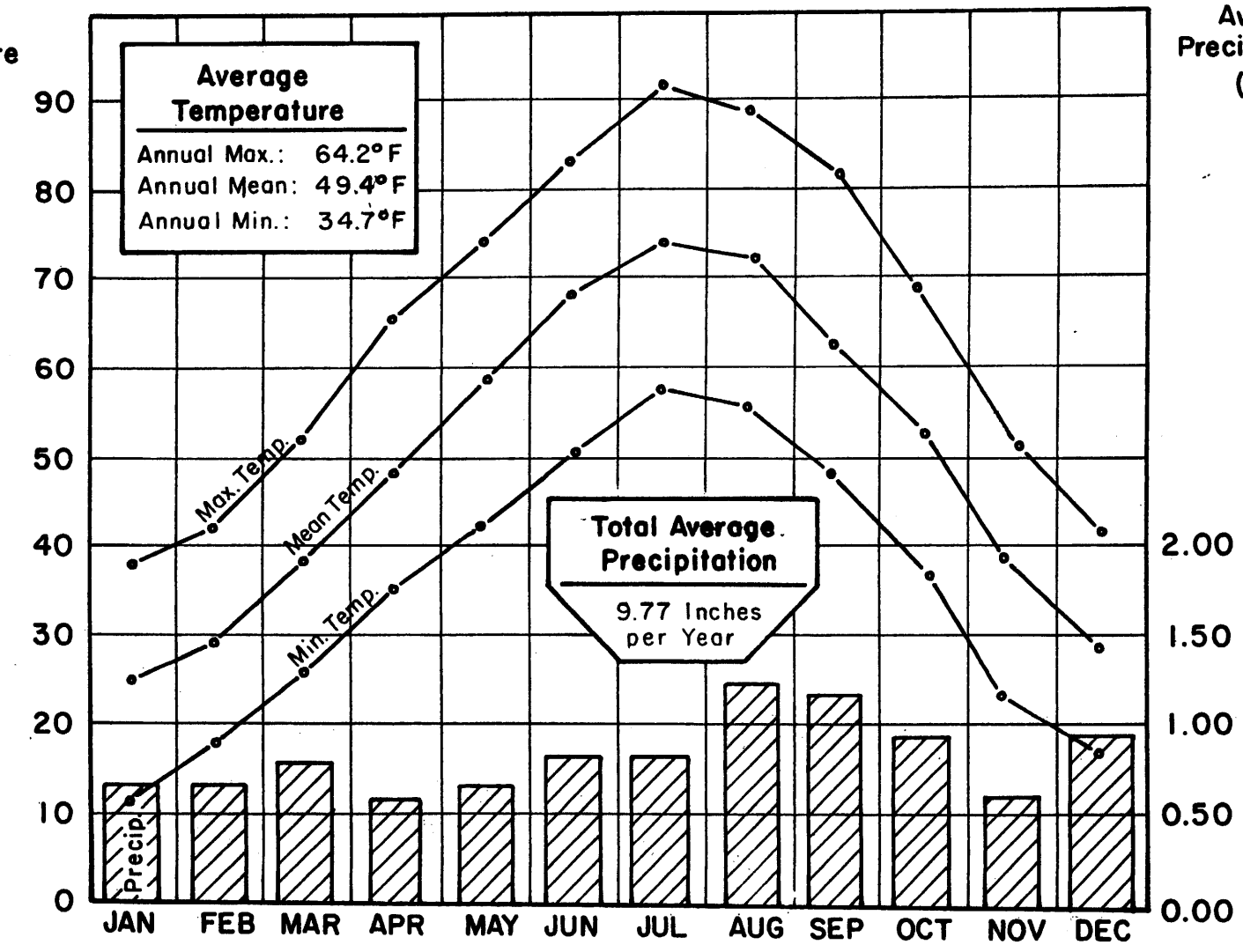
Maximum and Minimum Monthly Precipitation

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 Elevation: 5680
Latitude: 39° 37' Longitude: 110° 50'

DURATION

Years	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.08	.13	.17	.23	.29	.37	.44	.62	.78	.95
2	.12	.18	.23	.32	.40	.49	.58	.80	1.00	1.20
5	.16	.25	.32	.44	.56	.68	.79	1.07	1.32	1.58
10	.20	.31	.39	.54	.68	.81	.94	1.25	1.53	1.82
25	.24	.37	.47	.65	.82	.98	1.13	1.50	1.83	2.18
50	.28	.43	.54	.75	.95	1.12	1.29	1.71	2.08	2.47
100	.31	.49	.62	.85	1.08	1.27	1.45	1.91	2.32	2.74

Table III-6 shows the average monthly precipitation for the period 1936-1976.

INSERT ORIGINAL TABLE

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)

The climatology summary by month for period 1936-1965 is given in Table III-7.

INSERT ORIGINAL TABLE

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

Table III-9 gives the average monthly temperature for the area from 1936 - 1976.

INSERT ORIGINAL TABLE

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 (°F.)

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	----	----
1976	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, See Appendix Y

R645-301-731.111. GROUND WATER QUALITY

Appendix L

R645-301-731.112. SURFACE MINING OPERATIONS

N/A

R645-301-731.120. SURFACE WATER PROTECTIONS

Appendix L

R645-301-731.121. SURFACE WATER QUALITY

Appendix L

R645-301-731.122. SURFACE WATER QUANTITY PLAN

Appendix L

R645-301-731.200. WATER MONITORING

See R645-301-711.300.

R645-301-731.210. GROUND WATER MONITORING

See R645-301-711.300.

R645-301-731.211. GROUND WATER MONITORING PLAN

See R645-301-711.300.

R645-301-731.212. SAMPLING AND REPORTING DATA

See R645-301-711.300.

R645-301-731.213. NON-ESSENTIAL AQUIFERS

N/A

R645-301-731.214. DURATION

See R645-301-711.300.

R645-301-731.214.1 SUITABILITY

See R645-301-711.300.

R645-301-731.214.2 COMPLIANCE

See R645-301-711.300.

R645-301-731.215. EQUIPMENT, STRUCTURES AND OTHER DEVICES USED IN CONJUNCTION WITH MONITORING

Appendix L

R645-301-731.220. SURFACE WATER MONITORING

See R645-301-711.300.

R645-301-731.221. SURFACE WATER MONITORING PLAN

See R645-301-711.300.

R645-301-731.222 DESCRIPTION

See R645-301-711.300.

R645-301-731.222.1 PARAMETERS

See R645-301-711.300.

R645-301-731.222.2 POINT SOURCE DISCHARGES

See R645-301-711.300.

R645-301-731.223. SAMPLING AND REPORTING DATA

See R645-301-711.300.

R645-301-731.224. DURATION

See R645-301-711.300.

R645-301-731.224.1 SUITABILITY

See R645-301-711.300.

R645-301-731.224.2 COMPLIANCE

See R645-301-711.300.

R645-301-731.225. EQUIPMENT, STRUCTURES AND OTHER DEVICES USED IN CONJUNCTION WITH MONITORING

Appendix L

R645-301-731.300. ACID AND TOXIC FORMING MATERIALS

See R645-301-711.300.

R645-301-731.310. DRAINAGE INTO SURFACE AND GROUND WATER

Post Mining Hydrology

Upon completion of mining activities, and following removal of surface structures, the earthwork portion of the reclamation plan will begin as described. The hydrologic portion of reclamation will take place in two phases:

1. The main and side drainage channels will be restored as shown in the Sedimentation and Drainage Control Plan, and on Plate 16. Loose rock check dams will be placed at each side drainage entrance onto the reclaimed area, and at approximately 500' intervals along the restored main channel RC-1. (Typical sections of the loose rock check dams are shown in the Sedimentation and Drainage Control Plan).

All disturbed diversions and sediment ponds "B" and "C" will also be removed at this time. Sediment Pond "E" will be enlarged, and the entire drainage above will flow into Pond "E-PM" through the restored channel RC-1.

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

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

R645-301-731.311. MATERIAL ADVERSELY AFFECTING WATER QUALITY

See R645-301-731.310.

R645-301-731.312. STORING MATERIALS

See R645-301-731.310.

R645-301-731.320. DISPOSAL PROVISIONS

See R645-301-731.310.

R645-301-731.400. TRANSFER OF WELLS

No transfer of wells has taken place, nor is any transfer anticipated.

R645-301-731.500. DISCHARGES

See R645-301-711.300.

R645-301-731.510. DISCHARGES INTO AN UNDERGROUND MINE

Andalex has approval from the State Engineer, Division of Water Rights, to collect the surface runoff from the disturbed area and discharge into the mine. This water is used for dust suppression underground. Water collected is a direct result of precipitation within the disturbed area. Although MSHA has verbally acknowledged the fact that some precipitation drains into the mine, they have not specifically required any type of approval for this occurrence.

R645-301-731.511. DEMONSTRATION

N/A

R645-301-731.511.1 PREVENTION OF DAMAGE

N/A

R645-301-731.511.2 VIOLATION OF WATER QUALITY STANDARDS OR EFFLUENT LIMITATIONS

N/A

R645-301-531.511.3 COMPLIANCE REQUIREMENTS

N/A

R645-301-731.511.4 MEET WITH THE APPROVAL OF MSHA

N/A

R645-301-731.512. DISCHARGE LIMITATIONS

N/A

R645-301-731.512.1 WATER

N/A

R645-301-731.512.2 COAL PROCESSING WASTE

N/A

R645-301-731.512.3 FLY ASH

N/A

R645-301-731.512.4 SLUDGE FROM ACID MINE DRAINAGE TREATMENT

N/A

R645-301-731.512.5 FLUE-GAS DESULFURIZATION SLUDGE

N/A

R645-301-731.512.6 INERT MATERIALS USED FOR STABILIZING UNDERGROUND MINES

N/A

R645-301-731.512.7 UNDERGROUND MINE DEVELOPMENT WASTE

N/A

R645-301-731.513. DIVERTING MINE WATER INTO UNDERGROUND WORKINGS

N/A

R645-301-731.520. GRAVITY DISCHARGES FROM MINE WORKINGS

If a discharge is found to occur after sealing, the water will be sampled quarterly for compliance with effluent standards of 817.42 and treated (if necessary) during the liability period. See Figures IV-1 and IV-2 for portal sealing details.

R645-301-731.521. DISCHARGE CONTROL

See R645-301-731.520.

R645-301-731.522. PREVENTION OF DISCHARGE

N/A

R645-301-731.600. STREAM BUFFER ZONES

R645-301-731.610. BUFFER ZONE LOCATIONS

The fan installation in the left hand fork of Deadman Canyon will require that the intermittent drainage is crossed. A 42-inch culvert will divert the natural runoff underneath the pad where the fan will be located. Since this activity is within 100 feet of an intermittent stream, the Division may authorize this activity by virtue of compliance with all R645-301-731.600 regulations. It should be emphasized that the stream buffer zones will not be adversely affected due to the installation of the culvert and the alternate sediment control measures. Also, travel on the access road and at the pad area will be restricted to times of no flow.

It should be noted (R645-301-542.600) that the access road to the fan installation is already in existence; Andalex intends only to upgrade the road as needed and as described. This road will be reclaimed following cessation of mining to be consistent with the desires of the surface owners and management agencies.

The culvert will be removed upon cessation of mining. Sediment control measures downstream from this activity will be provided in the form of silt fences or straw dikes located in the drainage channel during the removal of the culvert. As there are no permanent water treatment facilities constructed for this fan installation, none need be removed. Typical designs for berms and diversions are shown on the Design Drawings. This includes the berm surrounding the topsoil pile. (See Plate "Aberdeen Mine Left Hand Fork Fan Installation, Sedimentation/Drainage Control".) These typical designs will adequately convey a two-year, ten-hour storm event. Sediment control during construction and reclamation will consist of straw bales or silt fences located downstream from the construction activity.

The same restrictions will also apply to the 48-inch culvert at the lower road / stream crossing and in places where the road will be improved within the stream buffer zone. That is, activities will be allowed only during periods of no flow. Also, and by the same token, the lower culvert will be removed upon final reclamation if is deemed appropriate by the surface land-owner or management agency.

Andalex will reclaim this road entirely if it is determined through communications with the surface owners and land management agencies that this is the appropriate action. Andalex has obtained official comments on the status of the road for post-mining landuse from the State of Utah, Gladys Artman and the Bureau of Land Management; all parties with the exception of Gladys Artman request that the road be abandoned and reclaimed. Mrs. Artman requested that the road remain status quo upon cessation of mining.

R645-301-731.611. 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.

R645-301-731.700. CROSS SECTIONS AND MAPS

Plate 6.

R645-301-731.710. WATER SUPPLY INTAKES

N/A

R645-301-731.720. WATER HANDLING AND STORAGE FACILITIES

Water is trucked from Price for culinary use and is stored in one of four 12,000-gallon tanks on the property. Each mine is equipped with a 12,000-gallon surface tank. All other mine water storage is underground.

R645-301-731.730. MONITORING LOCATIONS

Figure IV-11

R645-301-731.740. MAPS

See Volume II, R645-301-510.

R645-301-731.750. CROSS SECTIONS

See Volume II, R645-301-510.

R645-301-731.760. OTHER RELEVANT DRAWINGS

Figure IV-2 through IV-12

R645-301-731.800. WATER RIGHTS AND REPLACEMENT

Appendix L

R645-301-732. SEDIMENT CONTROL MEASURES

See R645-301-512.240.

R645-301-732.100. 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. Environmental Protection Agency set forth in 40 CFR Part 434.

R645-301-752. SEDIMENT CONTROL MEASURES

Sediment control measures must be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760.

R645-301-752.100. SILTATION STRUCTURES AND DIVERSIONS

See R645-301-512.240.

R645-301-752.200. 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.

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

   Surface water monitoring will continue during this time as described. Please see Figure IV-11.

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

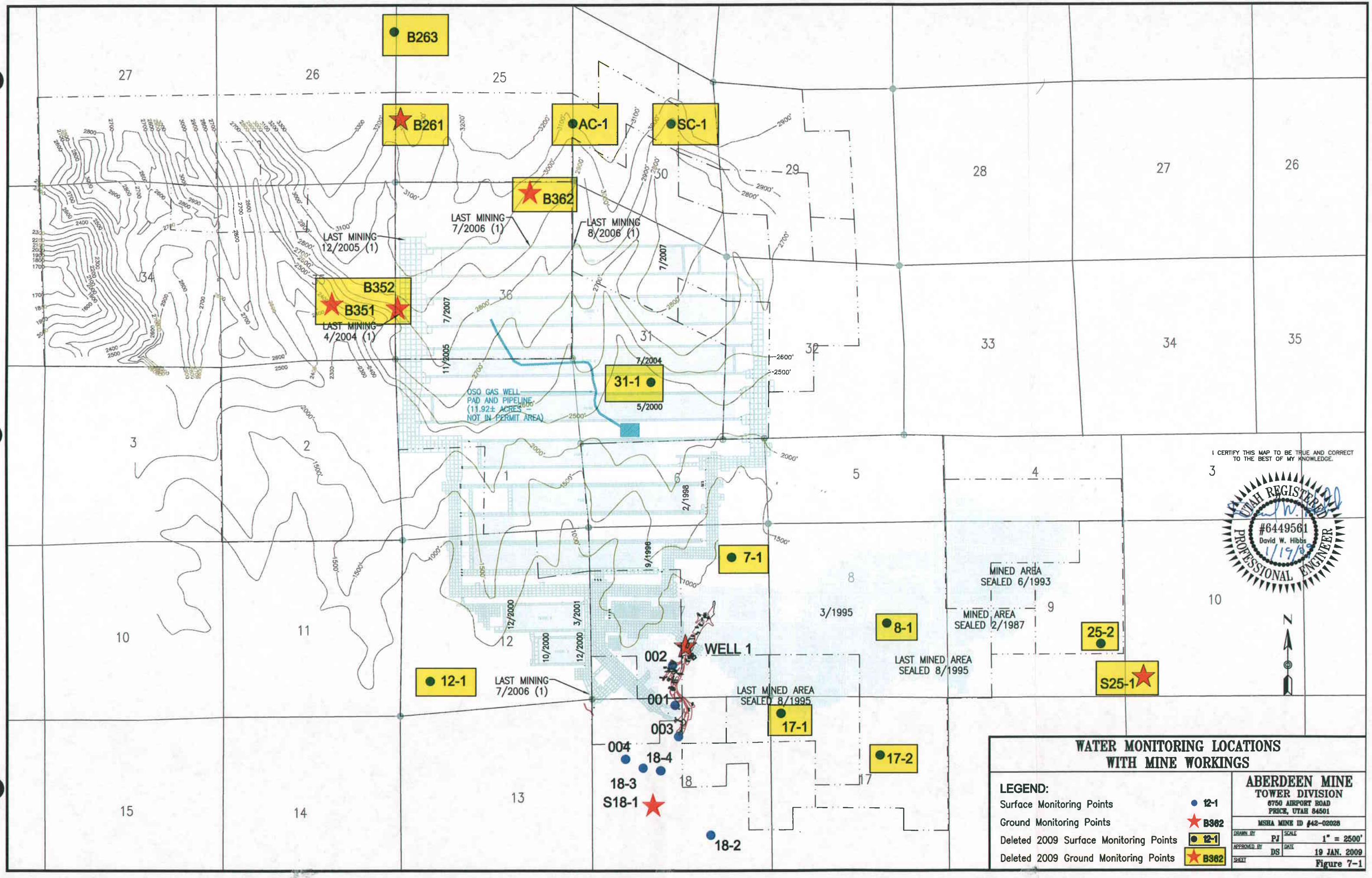
See R645-301-512.240.

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.



WATER MONITORING LOCATIONS WITH MINE WORKINGS

LEGEND:

Surface Monitoring Points	12-1
Ground Monitoring Points	B362
Deleted 2009 Surface Monitoring Points	12-1
Deleted 2009 Ground Monitoring Points	B362

ABERDEEN MINE
TOWER DIVISION
6750 AIRPORT ROAD
PRICE, UTAH 84501

MSHA MINE ID #42-02028

DRAWN BY	PJ	SCALE	1" = 2500'
APPROVED BY	DS	DATE	19 JAN. 2009
SHEET			Figure 7-1