

APPENDIX J

Probable Hydrologic Consequences
of Operations
at the
Wildcat Loadout

Prepared for:
Andalex Resources, Inc.

Prepared by:
Blackhawk Engineering Company

July, 1988

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Probable Hydrologic Consequences
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Wildcat Loadout

1.0 Introduction

The Wildcat Loadout is a coal loading/processing facility owned by Andalex Resources, Inc., and located in the Gordon Creek Area of Carbon County, Utah. Andalex Resources, Inc., is applying for a Mining and Reclamation Permit for the Wildcat Loadout in accordance with the "Utah Coal Mining and Reclamation Permanent Program" - Regulations Pertaining to Surface Effects of Underground Coal Mining Activities.

The purpose of this document is to present an assessment of the probable hydrologic consequences of the Wildcat Loadout operation. Where appropriate, references are made to sections of the Permit Application Package that have already addressed required items in detail.

This document is divided into five sections. Section 2.0 presents a discussion of groundwater in the area, along with potential impacts. Section 3.0 presents a similar discussion on surface water. Conclusions and references are listed in Sections 4.0 and 5.0 respectively.

2.0 Groundwater

2.1 Probable Impacts

2.1-1 Background Information

Information presented in Chapter III, Part C, Section 1.2 of the PAP indicate that groundwater is extremely scarce in the general area and essentially non-existent within the permit area. As indicated in this section, a series of boreholes were drilled from 45' to 60' deep for foundation analysis at the outset of construction, and none of the holes encountered water. Two of the 60' deep holes were left open and checked on a regular basis for any water accumulation - no accumulation was noted. A statement of observation is provided as Attachment 3 of this Appendix. This statement will serve as the record of checks on the boreholes and the results of those checks. The locations of the boreholes are shown on Figure 1 of Appendix C of this PAP.

The geologic location of the permit and surrounding area is discussed in detail in Chapters III and IV of this PAP. As indicated, the permit area is located in the Masuk Member of the Mancos Shale Formation. There are no springs or seeps located within the permit boundary. The nearest spring is located approximately 1/2 mile to the southwest and is shown on Figure III-2 of Chapter III as the Garley Canyon Spring. This is a small spring/seep, with flows typically less than 5 gpm and with poor quality typical of springs or seeps within the Mancos Shale. Rights to this spring are owned by Andalex Resources, Inc. A water analysis of the spring is provided in Appendix G.

There are no aquifer tests or other data available on groundwater in or near the permit area, due to the lack of groundwater. Leachate tests have been conducted on all materials stored on site. These tests were designed to show potential impact of leaching of the materials into the ground (and groundwater, if any were to exist). The tests show no potential for stored materials to impact any groundwater in the area. Results of the leachate tests are summarized in Attachment 1 of this Appendix. In addition, both the coal and coal waste material were tested for acid or toxic-forming potential. The results of these tests are shown in Attachment 2 of this Appendix. These tests also show no potential impact of the stored materials on the groundwater regime.

2.1-2 Potential Impacts

As with any operation where materials are stored on site, there is a potential for leaching of runoff or inherent moisture from the materials into the ground. Leachate and acid-toxic forming potential tests were performed on the materials, and the results indicate no adverse impacts would occur from the leaching or runoff from such materials.

The leachate data was compared to the Utah agricultural water quality standards to determine that no adverse impacts would

occur. This comparison is summarized in Attachment 4 of this PHC.

There is no aquifer or other groundwater occurrence within at least 60' of the surface within the permit area. This is confirmed by the drilling on site as described above. In fact, the nearest groundwater is likely much deeper in this area, as discussed in Chapter III, Part C, Section 1.2-2 of the PAP. The nearest occurrence of any groundwater is in the Garley Canyon Spring to the south. This is an alluvial spring/seep as discussed in Chapter III, Part C, Section 1.2-1 of the PAP, and is recharged from the higher elevation terraces to the west.

Since there is no groundwater known to exist within or near the permit area, and since the leachate tests show no potential for acid or toxic materials, it can be concluded that there will be no adverse impacts on the groundwater regime by the operation of the Wildcat Loadout.

2.2 Groundwater Monitoring Plan

Since no groundwater exists within or near the permit area, there is no groundwater monitoring plan for this operation.

3.0 Surface Water

3.1 Probable Impacts

3.1-1 Background Information

As discussed in Chapter III, Part C, Section 1.3-2.1 of the PAP, the Wildcat Loadout is located in the lower Gordon Creek Drainage. The permit and adjacent area is drained by ephemeral drainages which flow into the ephemeral Garley Canyon Drainage and eventually into the Price River to the east. The nearest spring is the Garley Canyon Spring located approximately 1/2 mile to the southwest of the permit area. This is an alluvial spring/seep and is characterized by low flows and poor quality. The spring outcrops near the railroad tracks at Garley Canyon and disappears within a short distance downstream. The nearest perennial streams

are: North Fork of Gordon Creek located approximately 1-1/2 miles to the south; and the Price River, located approximately 3-1/2 miles to the east.

3.1-2 Potential Impacts

Runoff from all disturbed areas of the operation is directed into sedimentation facilities or contained within bermed areas (Small Area Exemptions). All runoff and sediment control facilities are designed in accordance with Division regulations, and are maintained to minimize sediment concentrations from the surface facilities to the receiving drainage. Sediment ponds have NPDES Discharge Permits, which further restrict effluent standards for any discharge from the property.

Undisturbed drainage is diverted around the operation as shown on Plate 2 of the PAP. These diversions are designed and maintained to prevent undisturbed runoff from entering the disturbed area.

Existing (and proposed) facilities as described in this PAP are adequate to control runoff from the operation and will minimize sediment concentrations to the receiving drainages. Proper maintenance of the sediment control facilities will continue to minimize potential impacts of the operation on surface waters. See Chapter IV for details on sediment control facilities.

3.2 Surface Water Monitoring Plan

A surface water monitoring plan has been described in Chapter IV, Part K, Section 8 of the PAP. This plan will monitor drainages above and below the operation, as well as any sediment pond discharges.

Baseline water monitoring results are summarized in Appendix M of this PAP.

4.0 Conclusions

The following conclusions are presented, based on information included in this Appendix as well as referenced information from the Permit Application Package (PAP):

- No groundwater is known to exist within or near the permit area.
- Leachate and acid-toxic forming potential analyses indicate no adverse impacts from stored materials.
- No adverse impacts to the groundwater regime will occur as a result of this operation.
- No perennial or intermittent drainages exist within or near the permit area.
- Existing (and proposed) sediment and runoff control facilities are adequate to prevent additional sediment contributions to receiving drainages.
- With proper maintenance of surface water control facilities, no adverse impacts will occur to the surface waters of the area as a result of this operation.
- Surface waters will be monitored to detect any possible impact as a result of the operation.

5.0 References

- Cordova, R.M., 1964, "Hydrogeologic Reconnaissance of Part of Head Waters Area of the Price River, Utah", Utah Geological and Mineral Survey, Water Resources Bulletin 4, p. 26.
- Fisher, D.J., Erdmann, C.E., and Reeside, J.B., 1960. "Cretaceous and Tertiary Formation of the Book Cliffs, Carbon, Emery and Grand Counties, Utah, and Garfield and Mesa Counties, Colorado", U.S. Geological Survey, Professional Paper 332, p. 80.
- Price, D. and Arnow, T., 1974. Summary Appraisals of the Nation's Groundwater Resources - Upper Colorado Region. U.S. Geological Survey Professional Paper 813-C, 40 pp.
- Waddell, K.M., and other, 1981. Hydrologic Reconnaissance of the Wasatch Plateau, Book Cliffs Fields Areas, Utah. USGS Water Supply Paper 2068.

Attachment 1

Stored Material
Leachate Analyses

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300



Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 23, 1988

Job No.: 9233
Date Rec'd: May 11, 1988
Date Sampled: May 11, 1988
Sampled By: ANDALEX

Sample ID:
COAL
No Time Sampled
Time Rec'd 3:00 p.m. hr.

Andalex
P.O. Box 902
Price, Utah 84501

RECEIVED

MAY 26 1988

INDALLA RESOURCES, INC.

WATER ANALYSIS

Aluminum	0.18	mg/l	Fluoride	0.24	mg/l
05/16/88			05/18/88		
Alk., Bicarbonate	270	mg/l HCO ₃	Hardness, Total	320	mg/l CaCO ₃
05/12/88					
Alk., Carbonate	1<	mg/l CaCO ₃	Iron, Dissolved	0.12	mg/l
05/12/88			05/13/88		
Arsenic	0.003	mg/l	Lead	0.030	mg/l
05/17/88			05/15/88		
Anions, Total	7.74	meq/l	Magnesium	24.50	mg/l
			05/13/88		
Barium	0.09	mg/l	Manganese	0.02	mg/l
05/16/88			05/13/88		
Boron	0.13	mg/l	Mercury	0.002<	mg/l
05/17/88			05/16/88		
Cadmium	0.002	mg/l	Molybdenum	0.10<	mg/l
05/15/88			05/18/88		
Calcium	87.6	mg/l	Nickel	0.03	mg/l
05/13/88			05/15/88		
Cations, Total	8.12	meq/l	Nitrogen, Ammonia	0.10	mg/l
			05/19/88		
Chloride	37.5	mg/l	Nitrogen, Nitrate	0.10	mg/l
05/17/88			05/12/88		
Chromium	0.04	mg/l	Nitrogen, Nitrite	0.02	mg/l
05/16/88			05/12/88		
Conductivity	750	umhos/cm	Oil and Grease	4.0	mg/l
05/11/88			05/16/88		
Copper	0.010<	mg/l	Oxygen, Dissolved	5.2	mg/l
05/15/88			05/11/88		

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council
Manager, Huntington Laboratory



COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 23, 1988

Job No.: 9233
Date Rec'd: May 11, 1988
Date Sampled: May 11, 1988
Sampled By: ANDALEX

Sample ID:
COAL
No Time Sampled
Time Rec'd 3:00 p.m. hr.

Andalex
P.O. Box 902
Price, Utah 84501

RECEIVED

MAY 26 1988

ANDALEX RESOURCES, INC

WATER ANALYSIS

pH	7.60	Units	Solids, Dissolved	433.0	mg/l
05/11/88			05/13/88		
Phosphorus, Total	0.04	mg/l	Solids, Settleable	1.0<	mg/l
05/20/88			05/12/88		
Potassium	3.07	mg/l	Solids, Suspended	12.0	mg/l
05/13/88			05/13/88		
Selenium	0.004	mg/l	Sulfate	115.0	mg/l
05/19/88			05/13/88		
Sodium	38.50	mg/l	Sulfide	5.50	mg/l
05/13/88			05/19/88		

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council
Manager, Huntington Laboratory

Original Copy Watermarked
For Your Protection

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES



COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 23, 1988

Job No.: 9232a
Date Rec'd: May 11, 1988
Date Sampled: May 11, 1988
Sampled By: Andalex

Sample ID:
BONE WILDCAT
No Time Sampled
Time Rec'd 3:00 p.m. hr.

RECEIVED

MAY 26 1988

Andalex
P.O. Box 902
Price, Utah 84501

ANDALEX RESOURCES, INC.

WATER ANALYSIS

Aluminum	0.24	mg/l	Fluoride	0.32	mg/l
05/16/88			05/18/88		
Alk., Bicarbonate	296	mg/l HCO ₃	Hardness, Total	337	mg/l CaCO ₃
05/12/88					
Alk., Carbonate	1<	mg/l CaCO ₃	Iron, Dissolved	0.27	mg/l
05/12/88			05/13/88		
Arsenic	0.005	mg/l	Lead	0.040	mg/l
05/17/88			05/15/88		
Anions, Total	8.93	meq/l	Magnesium	29.90	mg/l
			05/13/88		
Barium	0.09	mg/l	Manganese	0.02	mg/l
05/16/88			05/13/88		
Boron	0.11	mg/l	Mercury	0.002<	mg/l
05/17/88			05/16/88		
Cadmium	0.002	mg/l	Molybdenum	0.10<	mg/l
05/17/88			05/18/88		
Calcium	85.6	mg/l	Nickel	0.02<	mg/l
05/13/88			05/15/88		
Cations, Total	8.54	meq/l	Nitrogen, Ammonia	0.12	mg/l
			05/19/88		
Chloride	52.5	mg/l	Nitrogen, Nitrate	0.06	mg/l
05/17/88			05/12/88		
Chromium	0.03	mg/l	Nitrogen, Nitrite	0.03	mg/l
05/16/88			05/12/88		
Conductivity	800	umhos/cm	Oil and Grease	6.0	mg/l
05/11/88			05/16/88		
Copper	0.010<	mg/l	Oxygen, Dissolved	5.4	mg/l
05/15/88			05/11/88		

ANALYST: *D. Tyson*

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council
Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300



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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 23, 1988

Job No.: 9232a
Date Rec'd: May 11, 1988
Date Sampled: May 11, 1988
Sampled By: Andalex

Sample ID:
BONE WILDCAT
No Time Sampled
Time Rec'd 3:00 p.m. hr.

Andalex
P.O. Box 902
Price, Utah 84501

RECEIVED

MAY 26 1988

ANDALEX RESOURCES, INC.

WATER ANALYSIS

pH	7.63	Units	Solids, Dissolved	416.0	mg/l
05/11/88			05/13/88		
Phosphorus, Total	0.04	mg/l	Solids, Settleable	1.0<	mg/l
05/20/88			05/12/88		
Potassium	3.92	mg/l	Solids, Suspended	26.0	mg/l
05/13/88			05/13/88		
Selenium	0.002<	mg/l	Sulfate	129.0	mg/l
05/19/88			05/13/88		
Sodium	39.70	mg/l	Sulfide	0.30	mg/l
05/13/88			05/19/88		

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

Original Copy Watermarked
For Your Protection

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

CUSTOMER

TOWER RESOURCES
PO BOX 902
PRICE, UT 84501

BRANCH CODE 43
(SEE REVERSE)
LAB NO. 51355
DATE REC. 4-8-85
DATE SAMPLED 4-8-85
SAMPLED BY SAVAGE

SAMPLE ID

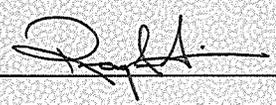
DW 285

RECEIVED
MAR 17 1986

ALEX RESOURCES, INC.

Forms of Sulfur:	<u>% Dry Basis</u>
Total	0.50
Organic	0.45
Pyritic	0.04
Sulfate	< 0.01

FOR YOUR PROTECTION THIS DOCUMENT HAS
BEEN PRINTED ON CONTROLLED PAPER STOCK

RESPECTFULLY SUBMITTED, 

CUSTOMER

TOWER RESOURCES
PO BOX 902
PRICE, UT 84501

SAMPLE ID

DW 286 287

BRANCH CODE 43
(SEE REVERSE)
LAB NO. 51356
DATE REC. 4-8-85
DATE SAMPLED 4/3 & 5/85
SAMPLED BY SAVAGE

RECEIVED

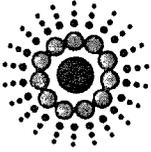
MAR 17 1986

ANDALEX RESOURCES, INC.

Forms of Sulfur:	<u>% Dry Basis</u>
Total	0.49
Organic	0.43
Pyritic	0.05
Sulfate	< 0.01

Attachment 2

Acid-Toxic Forming Potentials



ANDALEX
RESOURCES, INC.
Tower Division

P.O. BOX 902
PRICE, UTAH 84501
PHONE (801) 637-5385
TELEX 381 530 ANDALEX PRIC

July 22, 1988

Utah State University
Logan, Utah 84322-4830

Attn.: Mr. Karl Topper, Soils Plant and Water Laboratory

Dear Mr. Topper:

Enclosed please find samples taken from Andalex Resources' Coal and "Boney" Storage Piles located at the Wildcat Loadout Facility. The Division of Oil, Gas, and Mining is requiring these samples be tested for acid and toxic forming materials. The tests which they require include:

Acid-Base Potential
pH
Ec
Saturation Percent
Texture
Organic C
SAR
Selenium
Boron

The samples are labeled Coal and "Boney" and have been crushed to a top size of #8 mesh. Please advise me by telephone at 637-5385 if pre-payment for this analysis is required.

Thank you very much.

Sincerely,

Michael W. Glasson
Senior Geologist
Western Division

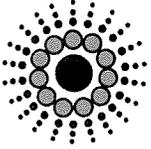
MWG/as

Enclosures

cc: File

Attachment 3

Engineers' Statement
on
Borehole Observations



ANDALEX
RESOURCES, INC.
Tower Division

P.O. BOX 902
PRICE, UTAH 84501
PHONE (801) 637-5385
TELEX 381 530 ANDALEX PRIC

July 27, 1988

Mr. John Whitehead
Permit Supervisor
State of Utah
Dept. of Natural Resources
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Whitehead:

This letter is to confirm that observation tests were made on two (2) bore holes located at the Wildcat loadout to determine the presence of ground water at this facility. (Reference; Rollins, Brown and Gunnel report regarding bore hole locations and depths). Observations were made over a two month period in the Spring of 1982 during the months of May and June. Observations were made on a weekly basis using a hand made measuring probe. At no time did any ground water appear in the bore holes. The bore holes were then sealed following this observation. The observations were performed by David Shaver, Andalex Resource's chief engineer.

Sincerely,

Michael W. Glasson
Senior Geologist
Western Operations

MWG/amr

Attachment 4

Comparison of Leachate Tests
to
Utah Agricultural Water Quality Standards

Comparison of Leachate Tests
to
Utah Agricultural Water Quality Standards

<u>Parameter</u>	<u>Leachate</u> (mg/l)	<u>Agricultural Standard</u> (mg/l max.)
Aluminum	0.18	---
Alk. (Bi-carb)	270	---
Alk. (Carb.)	<1	---
Arsenic	0.003	0.10
Anions (Total)	7.74	---
Barium	0.09	---
Boron	0.13	0.75
Cadmium	0.002	0.01
Calcium	87.6	---
Cations (Total)	8.12	---
Chloride	37.5	---
Chromium	0.04	0.10
Conductivity	750	---
Copper	<0.010	0.20
Flouride	0.24	---
Hardness, Total	320	---
Iron, Dissolved	0.12	---
Lead	0.030	0.10
Magnesium	24.50	---
Manganese	0.02	---
Mercury	<0.002	---
Molybdenum	<0.10	---
Nickel	0.03	---
Nitrogen, Ammonia	0.10	---
Nitrogen, Nitrate	0.10	---
Nitrogen, Nitrite	0.02	---
Oil and Grease	4.0	---
Oxygen, Dissolved	5.2	---
pH	7.60	6.5-9.0
Phosphorus, Total	0.04	---
Potassium	3.07	---
Selenium	0.004	0.05
Sodium	38.50	---
Solids, Dissolved	433.0	1200.0
Solids, Settleable	<1.0	---
Solids, Suspended	12.0	---
Sulfate	115.0	---
Sulfide	5.50	---
Gross Alpha (pCi/l)	N/A	15
Gross Beta (pCi/l)	N/A	50
BOD (mg/l)	N/A	5

Utah Division of Health numerical standards for water in the state.

Constituent	CLASSES											
	Domestic Source			Recreation & Aesthetics		Aquatic Wildlife			Agriculture	Industry	Special	
	1A	1B	1C	2A	2B	3A	3B	3C	3D	(4)	5	6
Bacteriological (No./100 ml)												
(30-day Geometric Mean)												
Maximum Total Coliforms	1	50	5,000	1,000	5,000	*	*	*	*	*	*	*
Maximum Fecal Coliforms	*	*	2,000	200	2,000	*	*	*	*	*	*	*
Physical												
Total Dissolved Gases	*	*	*	*	*	(b)	(b)	*	*	*	*	*
Minimum DO (mg/l) (a)	*	*	5.5	5.5	5.5	6.0	5.5	*	5.5	*	*	*
Maximum Temperature	*	*	*	*	*	20°C	27°C	*	*	*	*	*
Maximum Temp. Change	*	*	*	*	*	2°C	4°C	*	*	*	*	*
pH	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	*	6.5-9.0	6.5-9.0	*	*
Turbidity increase (c)	*	*	*	10 NTU	10 NTU	10 NTU	10 NTU	*	15 NTU	*	*	*
Chemical (Maximum mg/l)												
Arsenic, dissolved	.05	.05	.05	*	*	*	*	*	*	*	.1	*
Barium, dissolved	1	1	1	*	*	*	*	*	*	*	*	*
Cadmium, dissolved	.010	.010	.010	*	*	.0004(d)	.004(d)	*	*	*	.01	*
Chromium, dissolved	.05	.05	.05	*	*	.10	.10	*	.10	*	.10	*
Copper, dissolved	*	*	*	*	*	.01	.01	*	.01	*	.2	*
Cyanide	*	*	*	*	*	.005	.005	*	*	*	*	*
Iron, dissolved	*	*	*	*	*	1.0	1.0	*	1.0	*	*	*
Lead, dissolved	.05	.05	.05	*	*	.05	.05	*	.05	*	.1	*
Mercury, total	.002	.002	.002	*	*	.00005	.00005	*	.00005	*	*	*
Phenol	*	*	*	*	*	.01	.01	*	*	*	*	*
Selenium, dissolved	.01	.01	.01	*	*	.05	.05	*	*	*	.05	*
Silver, dissolved	.05	.05	.05	*	*	.01	.01	*	*	*	*	*
Zinc, dissolved	*	*	*	*	*	.05	.05	*	*	*	*	*
NH ₃ as N (un-ionized)	*	*	*	*	*	.02	.02	*	*	*	*	*
Chlorine	*	*	*	*	*	.002	.01	*	*	*	*	*
Fluoride, dissolved (e)	1.4-2.4	1.4-2.4	1.4-2.4	*	*	*	*	*	*	*	*	*
NO ₃ as N	10	10	10	*	*	*	*	*	*	*	*	*
Boron, dissolved	*	*	*	*	*	*	*	*	*	*	*	*
H ₂ S	*	*	*	*	*	.002	.002	*	*	*	.75	*
TDS (f)	*	*	*	*	*	*	*	*	*	1200	*	*
Radiological (Maximum pCi/l)												
Gross Alpha	15	15	15	*	*	15(g)	15(g)	*	15(g)	15(g)	*	*
Radium 226, 228 combined	5	5	5	*	*	*	*	*	*	*	*	*
Strontium 90	8	8	8	*	*	*	*	*	*	*	*	*
Tritium	20,000	20,000	20,000	*	*	*	*	*	*	*	*	*
Pesticides (Maximum ug/l)												
Endrin	.2	.2	.2	*	*	.004	.004	*	.004	*	*	*
Lindane	4	4	4	*	*	.01	.01	*	.01	*	*	*
Methoxychlor	100	100	100	*	*	.03	.03	*	.03	*	*	*
Toxaphene	5	5	5	*	*	.005	.005	*	.005	*	*	*
2, 4-D	100	100	100	*	*	*	*	*	*	*	*	*
2, 4, 5-TP	10	10	10	*	*	*	*	*	*	*	*	*
Pollution Indicators (g)												
Gross Beta (pCi/l)	50	50	50	*	*	50	50	*	50	50	*	*
BOD (mg/l)	*	*	5	5	5	5	5	*	5	5	*	*
NO ₃ as N (mg/l)	*	*	*	4	4	4	4	*	4	4	*	*
PO ₄ as P (mg/l)(h)	*	*	*	.05	.05	.05	.05	*	*	*	*	*

STANDARDS WILL BE DETERMINED ON A CASE-BY-CASE BASIS (SEE APPENDIX D)

STANDARDS WILL BE DETERMINED ON A CASE-BY-CASE BASIS

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Insufficient evidence to warrant the establishment of numerical standard. Limits assigned on case-by-case basis.

(e) Maximum concentration varies according to the daily maximum mean air temperature.

Temp. °C	mg/l
12.0 and below	2.4
12.1 to 14.6	2.2
14.7 to 17.6	2.0
17.7 to 21.4	1.8
21.5 to 26.2	1.6
26.3 to 32.5	1.4

- (a) These limits are not applicable to lower water levels in deep impoundments.
- (b) Not to exceed 110% of saturation.
- (c) For Classes 2A, 2B, 3A, and 3B at background levels of 100 NTUs or greater, a 10% increase limit will be used instead of the numeric values listed. For Class 3D at background levels of 150 NTUs or greater, a 10% increase limit will be used instead of the numeric value listed. Short term variances may be considered on a case-by-case basis.
- (d) Limit shall be increased threefold if CaCO₃ hardness in water exceeds 150 mg/l.

- (f) Total dissolved solids (TDS) limit may be adjusted on a case-by-case basis.
- (g) Investigations should be conducted to develop more information where these pollution indicator levels are exceeded.
- (h) PO₄ as P(mg/l) limit for lakes and reservoirs shall be .025.



UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

SOIL, PLANT and WATER
ANALYSIS LABORATORY
UMC 48

August 23, 1988

Andalex Resources, INC.
Michael W. Glasson
PO Box 902
Price, UT 84501

Coal samples received 8/2/88.

Non-Typical Soil: Test Results May Be Unreliable.

USU LOG#	ID	%CaCO ₃	%Sulfur	%O.M.	mg/l Boron	Saturation Percentage	SAR	pH	mmhos/cm ECe	*Texture
2447	Coal	.8	.53	96.6	0.5	64.6	.5	7.6	.7	93.9% Sand
2448	Boney	9.5	1.02	74.4	1.3	52.8	1.2	7.4	1.9	90.6% Sand

*Texture: % Retained on 300 Mesh Sieve.

V. T. ...



COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

SINCE 1908

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 853-2311

February 23, 1989

▶ ANDALEX RESOURCES, INC.
P.O. Box 902
Price, UT 84501

Sample identification
by

Andalex Resources, Inc.

Boney Coal and Coal

Kind of sample reported to us Soil
Sample taken at Wildcat
Sample taken by Andalex Resources, Inc.
Date sampled XXXXX
Date received October 11 and October 13, 1988

Analysis report no. 59-84506 and 84507

% Nitrate Nitrogen

84506	Boney Coal	.10
84507	Coal	.07

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

Original Copy Watermarked
For Your Protection

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES