0003

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
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Salt Lake City, Utah 84180-1203
801-538-5340

December 13, 1990

Mr. Peter A Rutledge, Chief
Division of Federal Programs
Western Field Operations
Office of Surface Mining
Brooks Towers
1020 15th Street
Denver, Colorado 80202

Dear ~~Mr. Rutledge~~ Pete:

Re: State Final Findings and Supporting Documentation, Graves Lease, Andalex Resources Inc., Centennial Project, ACT/007/019-90(1), Folder No. 2, Carbon County, Utah

Enclosed please find Utah's Final Findings and Supporting Documentation Package (FSD) for Andalex Resources' Graves Lease.

This document has been reviewed by the technical/supervisory staff and the Associate Director for Mining as per the Divisions' quality control review policy. It has also undergone legal review as per Division policy.

The Division is satisfied that the Mining and Reclamation Plan (MRP) submitted by Andalex Resources for the Graves Lease is adequate to receive Final Permit Approval and that the FSD is complete and accurate. Please contact me or Daron R. Haddock of my staff if there are questions.

Best regards,

Dianne

Dianne R. Nielson
Director

DRH
cc: Mike Glasson, Andalex Resources
Robert Hagen, OSM
Lowell Braxton
Dave Darby
Joe Helfrich
Daron Haddock
BT6091/1

UTAH DIVISION OF OIL, GAS AND MINING
STATE DECISION DOCUMENT

Andalex Resources, Inc.
Centennial Project
Graves Lease Addition
ACT/007/019
Carbon County, Utah

December 13, 1990

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    - Technical Review Memo, David Darby, Nov. 26, 1990
    - Bureau of Land Management
        - Coal Lease UTU-66060, September 13, 1990
    - Division of State History, October 4, 1990
    - Utah Department of Health, October 8, 1990
    - Affidavit of Publication, August 21, 1990
    - Memo from Joseph C. Helfrich -- Section 510(c) finding

ADMINISTRATIVE OVERVIEW

Andalex Resources, Inc.
Centennial Project
Graves Lease Addition
ACT/007/019
Carbon County, Utah

December 13, 1990

BACKGROUND

Andalex Resources, Inc. (ARI) has proposed a new underground lease addition to its currently approved permit area for the Centennial Project.

The Mining and Reclamation Plan (MRP) for the Centennial Project was approved by the Office of Surface Mining in November of 1981 and by the Division of Oil, Gas and Mining (DOGM) in January of 1982. The originally approved MRP consisted of 2,240 acres of private and federal coal leases. On May 20, 1986, ARI was issued a permit by DOGM for a 120-acre federal emergency lease. On March 2, 1987, a new five-year permanent program permit was issued incorporating the emergency lease, for a total permitted acreage of 2,360 acres.

In October of 1981, Federal lease numbers U-010581, SL-063058 and SL-027304 were modified by the Bureau of Land Management to include an additional 436 acres. In March of 1988, ARI requested that these three lease modifications be incorporated into the permitted area. In August of 1988, ARI requested that one additional 320 acre federal lease (U-05067) and one 240 acre fee lease be added to the permitted area. The permit was revised to include these leases on May 4, 1989, which brought the total permitted acreage to 3358 acres. This Decision Document addresses the addition of the Graves federal lease to the permitted area, which consists of 933 acres.

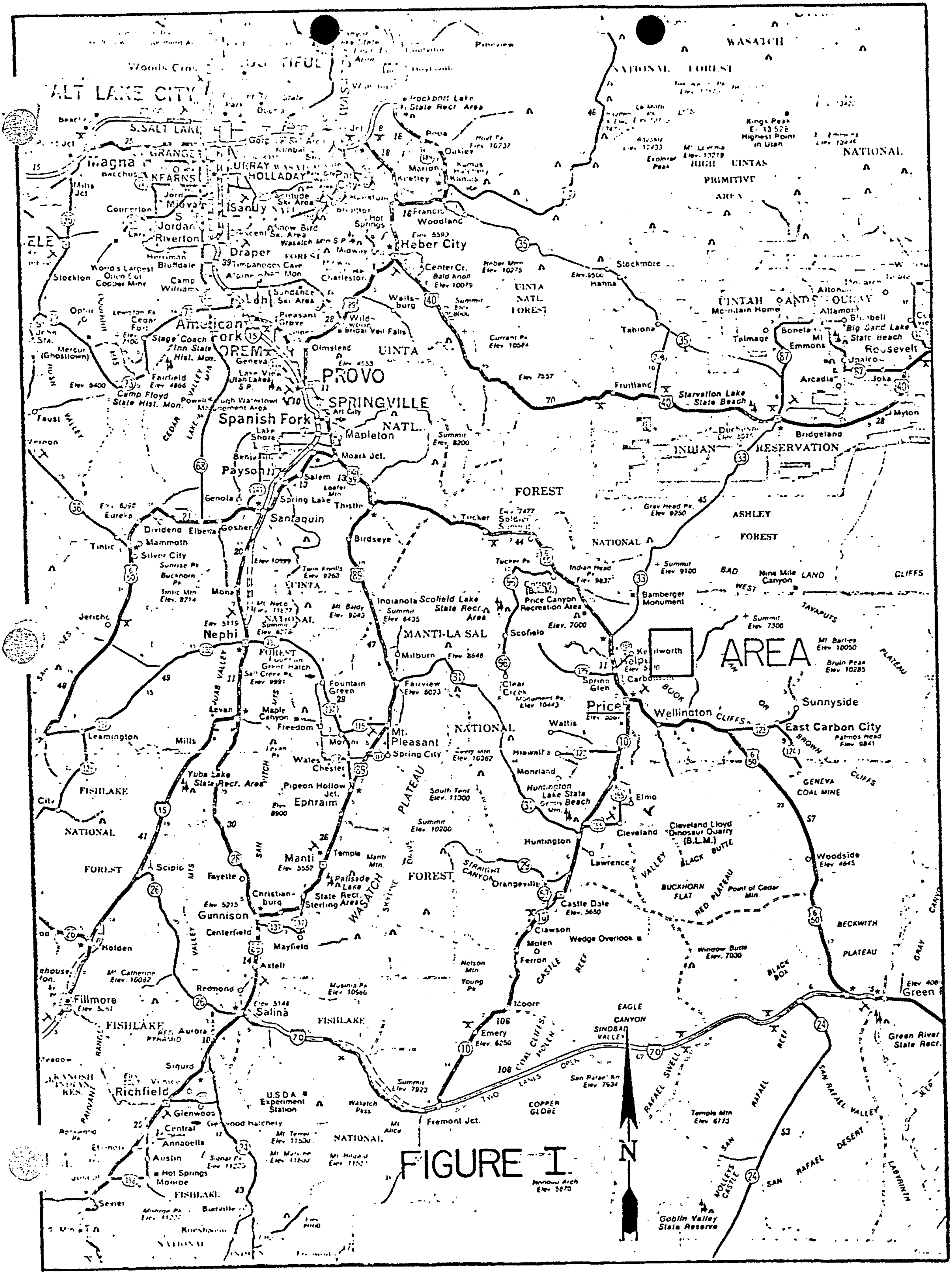
Currently ARI operates three mines, the Pinnacle, Apex and Aberdeen, in the Gilson, Lower Sunnyside and Aberdeen seams, respectively. A forth seam, the Centennial, is planned to be accessed through the Pinnacle mine by driving rockslopes from the Gilson seam. Development of much of the Centennial seam requires the addition of the Graves lease to the permit.

ANALYSIS

No additional surface disturbance is proposed in relation to the addition of this underground lease. Therefore, it is DOGM's opinion that the mining and reclamation practices and procedures which were approved in the five-year permit renewal and subsequent 1989 revision are adequate to address any effects related to the underground mining of the Graves lease. Technical compliance has been addressed in previous Technical Analysis' and will not be discussed further here.

RECOMMENDATION

ARI has demonstrated that mining of the Graves lease can be done in conformance with the Surface Mining Control and Reclamation Act, and the corresponding Utah Act and performance standards. The Bureau of Land Management has approved the new federal lease effective October 1, 1990. The only issues raised during the review process or the public comment period are being included as stipulations to the permit and are currently being addressed by the operator (see Stipulations). It is therefore recommended that approval be given for the addition of the Graves lease to the permitted area and to the currently approved five year permanent program mining permit, with the stipulations delineated in this Decision Document.



SALT LAKE CITY
S. SALT LAKE
GRANGER
Magna
KEARNS
MURRAY
HOLLADAY
Midvale
Sandy
Jordan
Riverton
Draper
Bluffdale
Camp Williams
Stockton
Lehi
American Fork
OREM
PROVO
SPRINGVILLE
Spanish Fork
Mapleton
Payson
Salem
Santaquin
Goshen
Elberta
Eureka
Mammoth
Silver City
Mona
Nephi
Levan
Leamington
Mills
Scipio
Holden
Fillmore
Richfield
Glenwood
Central
Annabella
Austin
Monroe
Sevier
Salina
Redmond
Axtell
Mayfield
Centerfield
Gunnison
Fayette
Christianburg
Manti
Ephraim
Moroni
Fountain Green
Wales
Chester
Mt. Pleasant
Spring City
Fairview
Milburn
Indianola
Birdseye
Thistle
Tucker
Soldier Summit
Scofield
Clear Creek
Helper
Kenilworth
Carbon
Spring Glen
Price
Wellington
Sunnyside
East Carbon City
Woodside
Elmo
Cleveland
Huntington
Lawrence
Orangeville
Castle Dale
Clawson
Molen
Ferron
Emery
Moore
Fremont Jct.
Green River
Heber City
Midway
Charleston
Kamas
Francis
Woodland
Park City
Hanna
Stockmore
Tabiona
Fruitland
Duchesne
Bridgeland
Myton
Roosevelt
Altamont
Talmage
Mt. Emmons
Arcadia
Starvation Lake State Beach
UINTAH AND OURAY
INDIAN RESERVATION
ASHLEY NATIONAL FOREST
UINTA NATL. FOREST
MANTI-LA SAL NATIONAL FOREST
FISHLAKE NATIONAL FOREST
WASATCH NATIONAL FOREST
HIGH UINTAS PRIMITIVE AREA
WASATCH PLATEAU
BOOK CLIFFS
AREA
SAN RAFAEL SWELL
SAN RAFAEL DESERT
Goblin Valley State Reserve
Cleveland Lloyd Dinosaur Quarry (B.L.M.)
Scofield Lake State Recr. Area
Huntington Lake State Beach
Yuba Lake State Recr. Area
Palisade Lake State Recr. Area
N

FIGURE I

PERMITTING CHRONOLOGY

Andalex Resources, Inc.
Centennial Project
Graves Lease Addition
ACT/007/019
Carbon County, Utah

11/21/89	ARI submitts plans for including the Graves Lease into the permit.
5/17/90	DOGM initial completeness review shows plans to be deficient. Additional information is requested.
7/6/90	ARI submitts additional information
7/31/90	DOGM determines that the submitted materials can be considered administratively complete.
8/2-21/90	ARI publishes notice of intent to add the Graves lease to the permit area weekly for four consecutive weeks in the Price Sun Advocate.
9/21/90	Comment period expires with no comments received.
9/24/90	DOGM forwards copies of ARI's updated Mining and Reclamation Plan which includes the Graves lease to other agencies.
12/10/90	ARI submits proof of right of entry on Lease UTU-66060
12/13/90	DOGM forwards State Decision Document to Office of Surface Mining Reclamation and Enforcement for concurrence and Secretarial signature.

MINE PLAN INFORMATION

Mine Name: Centennial Project State ID: ACT/007/019

Operator: Andalex Resources, Inc. County: Carbon

Controlled By:
Contact Person(s): Mike Glasson Position:
Telephone:: (801) 637-5385

New/Existing: Both Mining Method: Room and Pillar

New Federal Lease No(s).: UTU-66060 (Graves Lease)

Legal Description(s): T. 13S, R. 10E SLM, Utah
Section 1: lots 1-8, S1/2 N1/2 ;
Section 12, lot 1.
T. 12S., R. 11 E., SLM, Utah
Section 31, lots 3-6, and 13-22.

Current Permit Area Legal Description: T. 13S, R. 11 E. SLBM
Section 4: S1/2
Section 5: All
Section 6: All
Section 7: All
Section 8: All
Section 9: All but SE 1/4 SE 1/4
Section 17: N 1/2, NE 1/4 SE 1/4, N 1/2 NW 1/4 SE 1/4,
N 1/2 NE 1/4 SW 1/4, NE 1/4 NW 1/4 SW 1/4,
W 1/2 NW 1/4 SW 1/4
Section 18: N 1/2 N 1/2, SW 1/4 NE 1/4, NW 1/4 SE 1/4 E 1/4,
E 1/2 SE 1/4 NE 1/4, E 1/2 NE 1/4 SE 1/4

Ownership Data:

Surface Resources (acres)	Existing Permit Area	Proposed Permit Area	Total Life Of Mine Area
Federal	2928	933	3861
State			
Private	440		440
Other			
TOTAL	3368	933	4301

Coal Ownership (acres):

Federal	2918	933	3851
State			
Private	440		440
Other			
TOTAL	3358	933	4291

Coal Resource Data	Total Reserves	Total Recoverable Reserves
Federal		
State		
Private		
Other		
TOTAL	52.5 Millon Tons	33 Million Tons

Recoverable Reserve Data	Name	Thickness	Depth
Seam	Lower Sunnyside	4-6 ft.	0-1800 ft.
Seam	Centennial	5-7 ft.	800-2000 ft.
Seam	Gilson	4-8 ft.	0-2000 ft.
Seam	Aberdeen	4-13 ft.	0-2400 ft.
Seam			
Seam			

Mine Life: 28 years
Average Annual Production: 1.5 Million Percent Recovery: 68%
Date Projected Annual Rate Reached: 1990
Date Production Begins: 1980 Date Production Ends: 2008
Reserves Recoverable By: (1) Surface Mining: _____
(2)Underground Mining: X
Reserves Lost Through Management Decisions: Unknown
Coal Market: Unknown

FINDINGS

Andalex Resources, Inc.
Centennial Mines Project
Graves Lease Addition
ACT/007/019
Carbon County, Utah

December 13, 1990

1. The revised plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the approved Utah State Program (the "Act") have been complied with (R614-300-133.100).

2. No additional surface reclamation is required since the additional permit area will be mined as an underground extension of the existing mine. There will be no new surface facilities (R614-300-133.710).

3. The assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been conducted by the regulatory authority and no significant impacts were identified. The Mining and Reclamation Plan (MRP) proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area and in associated off-site areas (R614-300-133.400 and UCA 40-10-11 {2}{c}) (See Cumulative Hydrologic Impact Analysis (CHIA) following this Findings Document).

4 The proposed lands to be included within the permit area are:

a. not included within an area designated unsuitable for underground coal mining operations (R614-300-133.220) (MRP, p. 17);

b. not within an area under study for designated lands unsuitable for underground coal mining operations (R614-300-133.210) (MRP, p. 17);

c. not on any lands subject to the prohibitions or limitations of 30 CFR 761.11 {a} (national parks, etc.), 761.11 {f} (public buildings, etc.) and 761.11 {g} (cemeteries);

d. not within 100 feet of the outside right-of-way of a public road.(R614-300-133.220);

e. not within 300 feet of any occupied dwelling (R614-300-133-220).

5. The regulatory authority's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) (R614-300-133.600). See attached letter from State Historic Preservation Officer (SHPO) dated October 4, 1990.

6. The applicant has the legal right to enter and complete mining activities in the Graves lease through a federal coal lease issued by the Bureau of Land Management (See attached lease UTU-66060 effective October 1, 1990) (R614-300-133.300).

7 A 510(c) report has been run on the Applicant Violator System (AVS), which shows that: prior violations of applicable laws and regulations have been corrected; neither Andalex Resources Inc. or any affiliated company are delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations with demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (R614-300-133.730)

8. Underground mining operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in areas adjacent to the proposed permit area. The closest operating mine is the Soldier Canyon Mine.

9. The applicant has posted a surety bond for the Centennial Mines Complex in the amount of $1,080,839.00. No additional surety will be required, since there is no additional surface disturbance proposed (R614-300-134).

10. No lands designated as prime farmlands or alluvial valley floors occur on the permit area (R614-302-313.100) (R614-302-321.100).

11. The proposed postmining land-use of the permit area is the same as the pre-mining land use and has been approved by the regulatory authority and the surface land management agency

12. The regulatory authority has made all specific approvals required by the Act, the Cooperative Agreement and the Federal Lands Program.

13. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (R614-300-133.500)

14. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with (R614-300-120).

15. No existing structures will be used in conjunction with mining of the underground Right-of-Way, other than those constructed in compliance with the performance standards of R614-301 and R614-302 (R614-300-133.720).

Daron R. Haddock
Permit Supervisor

Lowell P Braxton
Associate Director, Mining

Dianne R. Nielson
Director

CUMULATIVE HYROLOGIC IMPACT ASSESSMENT
Tower Resources, Inc.
Centennial Project
ACT/007/019
Carbon County, Utah

December 4, 1990

I. Introduction

This report contains a Cumulative Hydrologic Impact Assessment (CHIA) for Tower Resources, Inc., Centennial Project located in Carbon County, Utah. The assessment encompasses the probable cumulative impacts of all anticipated coal mining on the hydrologic balance in and adjacent to Centennial's proposed and active underground mine complex, and evaluates whether the operations proposed in the application have been designed to prevent damage to the hydrologic balance outside the proposed mine plan area.

This report complies with federal legislation passed under the Surface Mining Control and Reclamation Act (SMCRA) and subsequent Utah and federal regulatory programs under R614-301-131.400 and 30 CFR 784.14(f), respectively.

This assessment incorporates the area identified by the mining company as the Graves Lease. The last revision to this CHIA took place October 28, 1988 and incorporated the Aberdeen leases.

Andalex Resources, Inc. submitted a proposal to obtain and incorporate the Graves Lease Tract (Federal Lease UTU 66066, 933 acres) (see Plate 1) into their existing mine permit on January 4, 1990. The Graves Lease is is located northeast of the existing mine permit area in Sections 1 and 12 of T. 13S., R. 10E., SLM and Section 31 of T. 13S., R. 11E., SLM. The revision outlines plans to develop and mine the Aberdeen and Centennial coal seams within the lease. These seams are currently being mined in permitted areas. Mining strategy calls for mining the Centennial seam where reserves are greater than five feet thick. No coal will be mined from either the Lower Sunnyside seam or the Gilson seam in the lease area.

The Aberdeen revision exanded the permit area by 400 acres. The following federal leases were expanded, Federal Lease U-01581, by adding 162 acres, Federal Lease SL-063058, 162 acres and Federal Lease SL-02730, 74 acres . The reserves in these three leases are mined as an extention of the Aberdeen Mine.

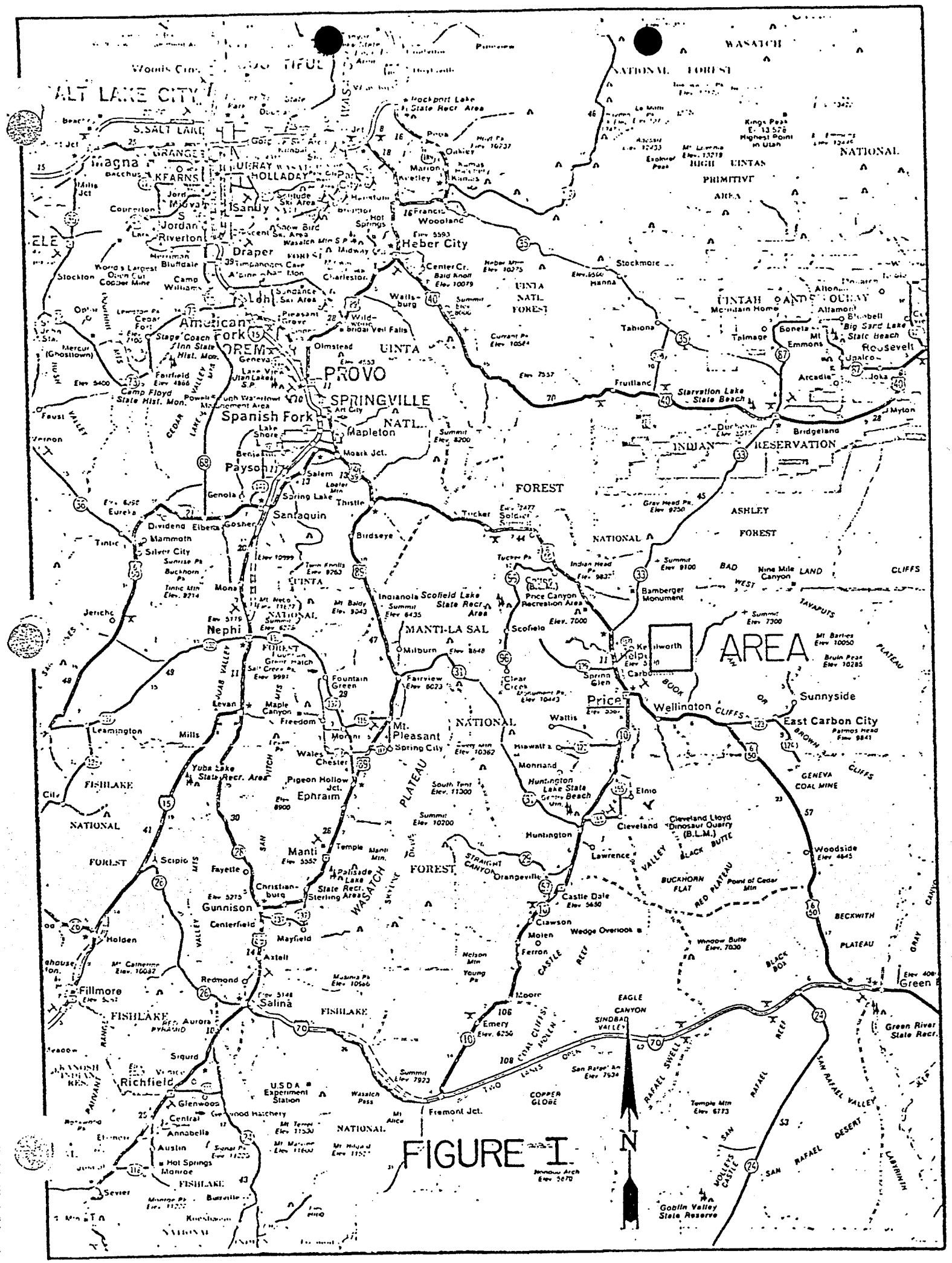
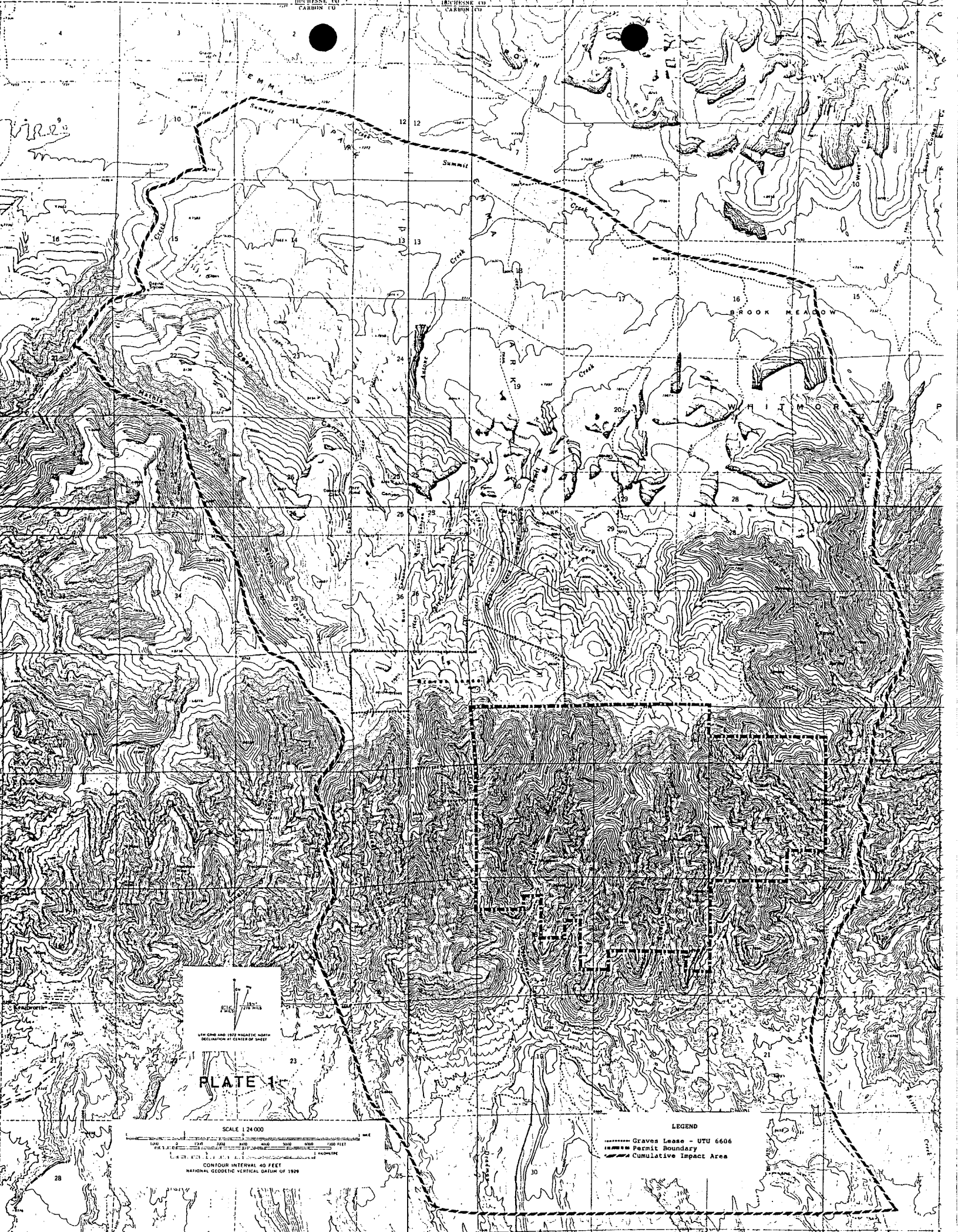

SALT LAKE CITY
S. SALT LAKE
Magna
KEARNS
MURRAY
HOLLADAY
Sandy
Riverton
Draper
Heber City
Woodland
Francis
Marion
Kamas
Oakley
Stockmore
Hanna
Tabiona
Fruitland
Starvation Lake State Beach
Bridgeland
Roosevelt
Duchesne
Myton
Arcadia
Talmage
Mountain Home
Altamont
Bluebell
Big Sand Lake State Beach
American Fork
OREM
PROVO
SPRINGVILLE
Spanish Fork
Mapleton
Payson
Salem
Spring Lake
Santaquin
Genola
Eureka
Dividend
Elberta
Goshen
Mammoth
Silver City
Tintic
Jericho
Nephi
Mona
Levan
Leamington
Mills
Fountain Green
Maple Canyon
Freedom
Mt. Pleasant
Spring City
Milburn
Fairview
Birdseye
Thistle
Tucker
Soldier Summit
Scofield
Price
Wellington
Sunnyside
East Carbon City
Kenilworth
Helper
Carbon
Spring Glen
Wattis
Hiawatha
Monroland
Huntington
Elmo
Cleveland
Lawrence
Orangeville
Castle Dale
Clawson
Molen
Ferron
Emery
Woodside
Green River
Scipio
Fayette
Christianburg
Gunnison
Centerfield
Mayfield
Axtell
Redmond
Salina
Fillmore
Holden
Sigurd
Richfield
Glenwood
Central
Annabella
Austin
Hot Springs
Monroe
Sevier
Manti
Ephraim
Temple
Pigeon Hollow Jct.
Yuba Lake State Recr. Area
Palisade Lake State Recr. Area
Sterling
Indianola
Scofield Lake State Recr. Area
Price Canyon Recreation Area
Huntington Lake State Recr. Area
Cleveland Lloyd Dinosaur Quarry (B.L.M.)
Bamberger Monument
Nine Mile Canyon
Starvation Lake State Beach
Fremont Jct.
Goblin Valley State Reserve
Green River State Recr.
WASATCH NATIONAL FOREST
HIGH UINTAS PRIMITIVE AREA
UINTA NATL. FOREST
UINTAH AND OURAY INDIAN RESERVATION
ASHLEY NATIONAL FOREST
MANTI-LA SAL NATIONAL FOREST
FISHLAKE NATIONAL FOREST
BADLAND CLIFFS
TAVAPUTS PLATEAU
BOOK CLIFFS
BROWN CLIFFS
GENEVA COAL MINE
BUCKHORN FLAT
RED PLATEAU
BECKWITH PLATEAU
BLACK BOX
CASTLE REEF
SAN RAFAEL SWELL
SAN RAFAEL DESERT
SAN RAFAEL VALLEY
MOLLES CASTLE
LABYRINTH
EAGLE CANYON
SINDBAD VALLEY
COPPER GLOBE
TWO LANES
WASATCH PLATEAU
SAN PITCH MTS
CEDAR VALLEY
SANPETE VALLEY
PARIANT RANGE
SPANISH INDIAN RES.
N

FIGURE I


DUCHESNE CO
CARBON CO
BROOK MEADOW
WHITMORE
PARK
Summit Creek
Antone
Deep
Hatch
UTM GRID AND 1972 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET
PLATE 1
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
LEGEND
Graves Lease - UTU 6606
Permit Boundary
Cumulative Impact Area

This CHIA also includes the assessment of a former lease modification submitted on August 9, 1988 to incorportates a new mine permit for 560 acres on the north-east corner of the permit area which consist of a new federal lease (U-05067, 320 acres) and a lease from SUNEDCO (240 acres of fee property). The reserves in these two leases will be mined as an extention of the Pinnacle Mine.

Tower Resources Inc., Centennial Project is located within the Book Cliffs Coal Field approximately 10 miles north-northeast of Price, Utah (Figure 1). The Book Cliffs form a rugged, southerly facing escarpment that delineates the Uintah Basin to the North from the San Rafael Swell to the south. Elevations along the Book Cliffs range from approximately 5,000 to 9,000 feet.

Outcropping rocks of the Book Cliffs range from Upper Cretaceous to Quaternary in age. The rock record reflects an overall fluctuating regressive sequence from marine (Mancos Shale) through littoral and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) and lacustrine (Flagstaff Formation) depositional environments. Oscillating depositional environments within the overall reggressive trend are represented by members of the Blackhawk Formation. The major coal bearing unit within the Book Cliffs Coal Field is the Blackhawk Formation.

Precipitation varies from 20 inches at higher elevations to 5 inches at lower elevations. The Book Cliffs area may be classified as mid latitude steppe to desert.

Vegetation varies from the sagebrush/grass community type at lower elevations to the Douglas fir/aspen community at higher elevations. Other vegetative communities include mountain brush, pinyon-juniper, pinyon-juniper/sagebrush and riparian. These communities are primarily used for wildlife habitat and livestock grazing.

Surface runoff from the Book Cliffs area flows into the Price River drainage basin of east-central Utah. The Price River originates near Scofield Reservoir and flows southeasterly into the Green River, north of the town of Green River, Utah. Water quality is good in the mountainous headwater tributaries, but deteriorates rapidly as flow traverses the Mancos Shale. The shale lithology typically has low permeability, is easily eroded and contains large quantities of soluble salts that are a major contributor to poor water quality. Depending upon the duration of contact, water quality degrades downstream to where total dissolved solids (TDS) levels of 3,000 milligrams per liter (mg/l) are common. The predominant ion leached from the Mancos Shale is sulfate (SO_4) with values over 1,000 mg/l common in the lower reaches of the Price River.

II. Cumulative Impact Area (CIA)

Plate 1 delineates the CIA for current Centennial Project operations. The CIA was expanded to the north to incorporate any potential surface and subsurface effects to the hydrologic regime. The northern boundary of the CIA has been established at the natural stream channel of Summit Creek that runs westward in Whitmore Park. The flow from Summit Creek drains into Willow Creek and then into the the Price River below Castlegate, Utah. Although this area appears extensive, it reflects the maximum area for expected effects that mining could incure on the surface and ground waters.

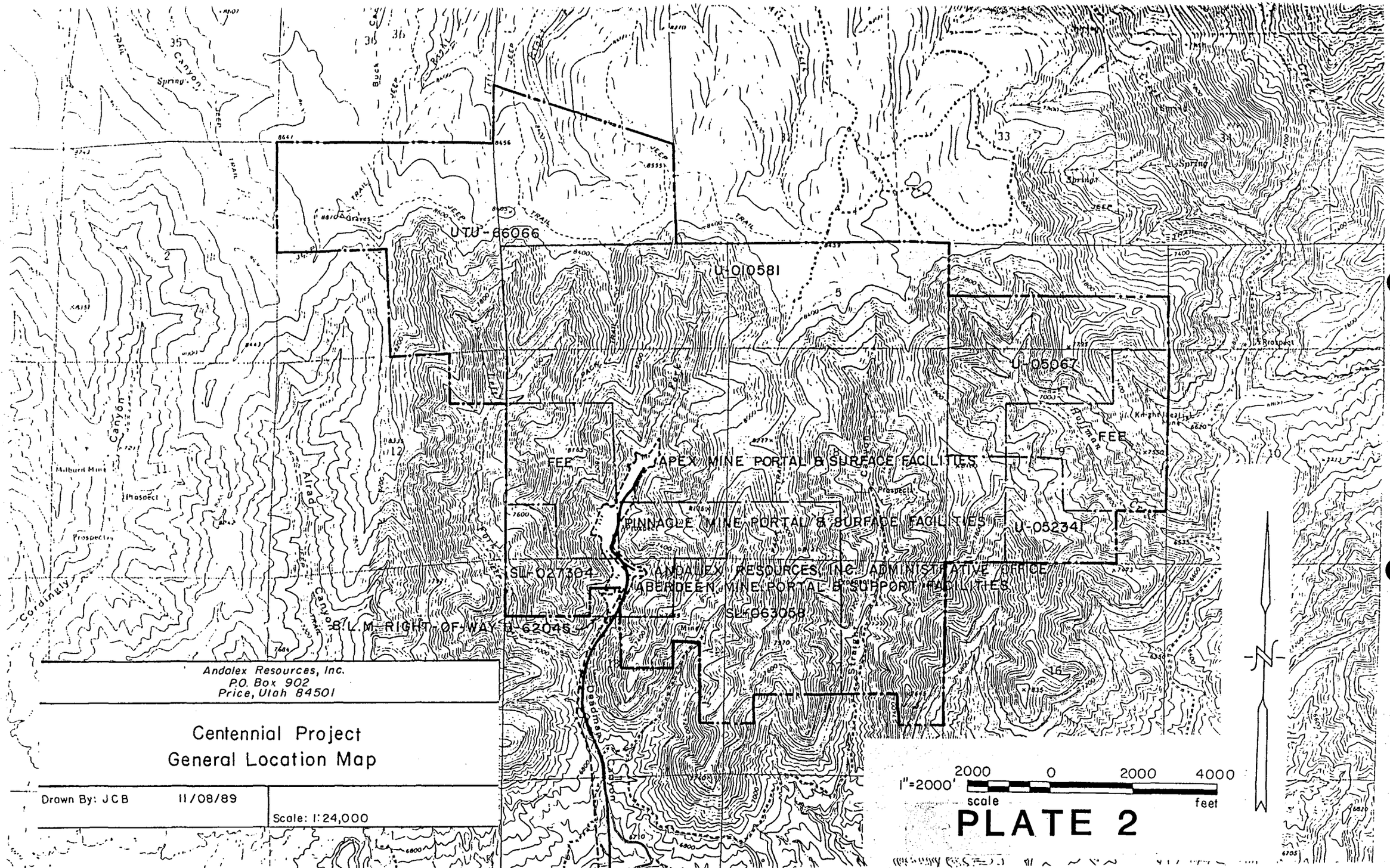
The southern and eastern portion of the CIA includes the Deadman Canyon drainage, the Straight Canyon drainage, the Hoffman Creek drainage and several other unnamed ephemeral drainages between Deadman Canyon and Hoffman Creek. Runoff from these drainages eventually unite and flow south into Deadman Creek and Coal Creek and eventually into the Price River.

The southern boundaries of the CIA are defined by the inclusion of major portions of Deadman and Coal Creeks, and arbitrarily drawn along the south parimeter to include the ephemeral dranages and pediements of the Mancos Shale.

The western extent of the CIA was drawn to include the drainages such as Alred Canyon, Mathis Canyon and Deep Canyon which are potentially within the influence of mining operations, or could be if future expansion occurs.

The surface facilities of the Centennial Project are located entirely within the watershed flowing to the south into Deadman Creek. The eastern boundary of the CIA is designated by Coal Creek, a perennial stream. Mining in the Centennial Project will not occur beneath Coal Creek and therefore the limits of the CIA do not extend to the east of Coal Creek.

Completion of the review at this level indicated that extensive hydrologic impacts do not exist within these limits. Therefore, further analysis was not conducted beyond these limits and the CIA was determined to be complete. The CIA encompasses approximately 44.8 square miles.


UTU-66066
U-010581
U-05067
U-05234
FEE
FEE
APEX MINE PORTAL & SURFACE FACILITIES
PINNACLE MINE PORTAL & SURFACE FACILITIES
SL-027304
ANDALEX RESOURCES, INC. ADMINISTRATIVE OFFICE
ABERDEEN MINE PORTAL & SUPPORT FACILITIES
SL-063058
B.L.M. RIGHT-OF-WAY U-62045
Andalex Resources, Inc.
P.O. Box 902
Price, Utah 84501
Centennial Project
General Location Map
Drawn By: JCB
11/08/89
Scale: 1:24,000
1"=2000'
2000 0 2000 4000
scale
feet
PLATE 2

III. Scope of Mining

Initial mining operations of the Centennial Project began in October, 1980 in the Pinnacle Mine on the Zions fee lease. The original Mining and Reclamation Plan was approved in January, 1982, and mining progressed onto the federal leases. In June, 1982 the Apex Mine was opened. In October, 1981 modifications to the federal leases were granted, thus adding 436 acres to the overall mine plan area.

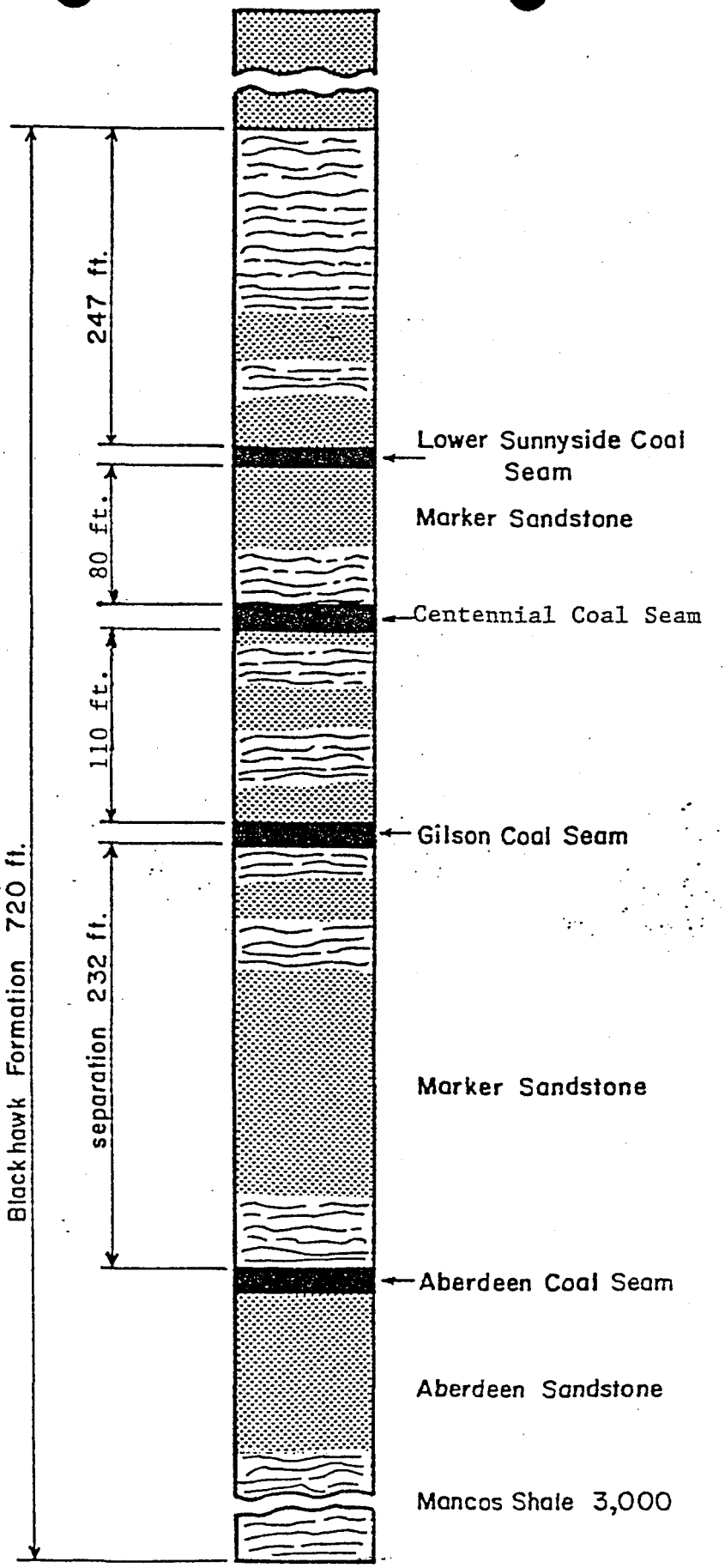
The 120 acre federal emergency lease was granted in November of 1983. The coal mined from the emergency lease will be extracted as an underground extension of the existing Pinnacle Mine operation.

With the addition of the Graves Lease tract (933 acres), the Federal holdings will total 3,851 acres and fee holdings will be 440 acres, a total of 4,291 acres. Andalex has also aquired a Right-of Way (UTU-62045) from the Bureau of Land Management consisting of ten acres below the enterance of the mine facilities. Recoverable coal reserves for the federal lease holdings are estimated at 33 million tons. To date 3.5 million tons have been mined. Although the more reserves should be included with the addition of the Graves leases, these reserves were offset by the loss of reserves from burns and decreased estimates. So the total reserves are estimated to be near the same as stated in the last CHIA (personnal communication with Mike Glasson December 5, 1990).

Surface disturbance will be contained within the Right Fork of Deadman Canyon adjacent to the mines. A total of 34.2 acres is planned for surface disturbance and reclamation.

Four seams (Figure 2) of mineable coal are located within the permit area. The approved Mining and Reclamation Plan for the Centennial Project calls for development of all four seams. Three mines, the Pinnacle Mine in the Gilson Seam and Apex Mine in the Lower Sunnyside Seam and the Aberdeen Mine in the Aberdeen seam have been developed and are currently operating. The Centennial seam will be accessessed by rockslopes from the Gilson seam (Pinnicle Mine).

Production will be from room and pillar mining methods with secondary pillaring. Mine development will occur simultaneously in all of the seams. Longwall mining could be introduced if conditions prove favorable, however the operator has not stated that one would be used. Overburden thickness ranges from approximately 0 to 2400 feet. The overburden depths for the Centennial Mine range between 1500 feet to 2000 feet. The extensive amount of overburden and paucity of surface water resources present a low risk for surface waters being adversly affected.



Measured Section of the Blackhawk Formation

FIGURE II

Deadman Canyon

No Scale

IV. Study Area

A. Geology

The Book Cliffs are basically a homocline (dip slope) dipping into the Uintah Basin with the cliff front roughly paralleling the strike of the feature. The beds are mostly uniform with dips of 3° to 8° to the north and northeast. Occasional faults cut the coal measures in the Book Cliffs but are of small displacement and have been of little consequence in mining. There are no faults known to exist within the Centennial Project. No major faults exist in the area adjacent to the mine plan area, however, Doelling (1972) shows that one minor fault may exist about one-half mile south of the portal area.

Geologic formations exposed within the mine plan area are the Blackhawk and Price River Formation of the Mesa Verde Group and the North Horn and Flagstaff members of the Wasatch Formation. The Blackhawk Formation, which directly overlies the Mancos Shale in the vicinity of the Centennial Project (Doelling, 1972) is the middle and coal bearing unit of the Mesa Verde Group. The Blackhawk consists of a basal sandstone (the Aberdeen Sandstone) overlain by massive beds of gray to buff sandstone with alternating beds of sandy shale, shale and coal (Clark, 1928). In the vicinity of the Centennial Project, the Blackhawk Formation is approximately 1000 feet thick (Doelling, 1972).

Overlying the Blackhawk Formation is the Price River Formation. The Price River Formation is composed of a massive basal sandstone (referred to as the Castlegate Sandstone) and upper beds overlying the Castlegate (Clark, 1928). The Castlegate Sandstone consists of massive, fine-grained to medium-grained sandstone beds (Doelling, 1972) which are gray to buff and composed mainly of semi-rounded quartz grains (Clark, 1928). The Castlegate Sandstone is approximately 250 feet thick near the Centennial Project (Doelling, 1972). The upper portion of the Price River Formation consists of two or more thick beds of sandstone, interbedded with thin-bedded shale and sandy shale (Clark, 1928).

The North Horn Formation, the lower most member of the Wasatch Formation, consists of a series of shale, mudstone sandstone, minor conglomerate and freshwater limestone. Near the Centennial Project, the North Horn Formation is approximately 600 feet thick.

The Flagstaff Limestone, also a member of the Wasatch Formation, consists of thin-bedded limestones, shales, and sandstones (Doelling, 1972). The Flagstaff Limestone is exposed just north of the mine plan area on the Plateau.

B. Topography and Precipitation

The southern topography of the Bookcliffs escarpment in the area is generally very steep and rugged, with elevations ranging from approximately 6400 feet to 8500 feet above sea level. Slopes vary from vertical cliffs to less than 2 percent. The south half of the CIA is characterized by a ephemeral drainage systems that originates above 8400 feet and progressively traverse nonmarine and marine Cretaceous rocks and alluvial fan deposits. The Right and Left Forks of Deadman Canyon and an unnamed ephemeral drainage drain the western portion of the CIA.

Straight Canyon, an unnamed ephemeral drainage and Hoffman Creek drain the southeastern portion of the CIA and are tributary to Coal Creek. Coal Creek and Deadman Canyon are both tributary to the Price River. The north half of the CHIA is a broad valley, Emma Park, formed between the dip slope of the Book Cliffs and the escarpment of the Roan Cliffs escarpment. The dip slope is disected by the drainages of Deep Creek, Clearwater Creek and Coal Creek which have eroded through the thick soils deep into the underlying sandstone formations.

Precipitation in the Book Cliffs Coal Field ranges from 5 inches to a maximum of 20 inches annually. For the most part along the coal outcrops, 10 to 12 inches of rain are expected (Doelling, 1972).

C. Vegetation

Mountain-Brush, Desert-Shrub, Pinyon-Juniper Woodland, Sagebrush-Grass, Conifer-Aspen and minor stream side vegetative types cover the total CIA. Most of the area is covered by the Mountain-Brush type while the Pinyon-Juniper Woodland type is predominant in the mine mouth area as well as the access routes and utility corridors.

V. Hydrologic Resources

A. Ground Water

The principle factor controlling the occurrence and availability of groundwater in any area is geology. As noted by Price and Waddell (1972), nearly all of the region in the CIA is underlain by rocks of continental and marine

origin, consisting predominantly of interbedded sandstones and shales. Although some of the sandstones in the region serve as the principle water-bearing strata, their ability to yield water for extended periods of time is largely controlled by the fact that the sandstone beds are relatively impermeable and by the existence of the impermeable interbedded shale layers, which prevent the downward movement of a significant amount of water. According to the U. S. Geological Survey (1979), groundwater in the region exists under water table, artesian and perched conditions. Water table conditions exist primarily in shallow alluvial deposits along larger perennial streams and in relatively flat lying sedimentary rocks. Artesian conditions exist at greater depths where a confining layer overlies a more permeable strata. However, pressures are generally not sufficient to produce flowing wells.

Snowmelt at higher elevations provides most of the groundwater recharge, particularly where permeable lithologies such as fractured or solution limestone are exposed at the surface. Vertical migration of groundwater occurs through permeable rock units and/or along zones of faulting and fracturing. Lateral migration initiates when ground water encounters impermeable rocks and continues until either the land surface is intersected (and spring discharge occurs) or other permeable lithologies or zones are encountered that allow further vertical flow.

The Kenilworth Member, Sunnyside Member and Upper Mudstone Member of the Blackhawk Formation, Castlegate Sandstone, Bluecastle Sandstone Member of the Price River Formation, undifferentiated North Horn/Flagstaff Formation, and Quaternary deposits are potential reservoirs or conduits for groundwater in the CIA. Reservoir lithologies are predominantly sandstone and limestone. Sandstone reservoirs occur as channel and overbank lenticular and tabular deposits, whereas limestone reservoirs have developed through solution processes and fracturing. Shale, siltstone and cemented sandstone beds act as aqualcludes to impede ground-water movement. The Mancos Shale is a regional aquaclude that delimits downward flow within the CIA. Localized aquacludes include the Aberdeen Member and Lower Mudstone Member of the Blackhawk Formation, Lower Unnamed Member of the Price River Formation and relatively thin impermeable lithologies occurring within overlying units.

Well test data from two water wells completed in the Blackhawk Formation near the portal area have been obtained from pumping tests. Well #1 is 130 feet deep and had a static water level of 58 feet below land surface prior to testing. After four hours of pumping at 50 gallons per minute, the water level had been lowered to 67 feet below land surface. In January 1981, after about three months use, this well was almost dry. These facts indicate that the aquifer may yield up to 5.5 gallons per minute per foot of drawdown but cannot produce a sustained yield over a period of time.

Well #2 was initially drilled to a depth of 155 feet and had a static water level of 57 feet below land surface. After two hours of pumping at 30 gallons per minute, the water level was lowered to 88 feet below land surface. The well was then drilled to a depth of 230 feet and pumped again. After only one hour of pumping at a rate of 30 gallons per minute the water level was lowered from 57 feet to 100 feet below land surface. After three weeks of pumping, in February of 1981, this well also almost dried up. The test results from well #2 indicate that the water bearing zone is less transmissive than well #1 but like well #1, it is very limited in areal extent.

The testing program of wells #1 and #2 was very limited and as a result the data from these tests must be regarded as such. However, estimates of transmissivity and areal extent of the aquifers in which these wells were completed indicate zones of low to moderate transmissivity of limited areal extent. In general these facts substantiate the lenticularity of the Blackhawk Formation and the fact that the water bearing zones are perched with a limited amount of recharge.

Seeps and springs were inventoried within and adjacent to the Centennial Project. Two springs occur on the southern escarpment within and adjacent to the mine permit area. One spring was identified approximately one-half mile south of the portal area and the other spring is located at the mouth of Hoffman Canyon. Both of these springs occur at or near the contact of the Blackhawk Formation and the Mancos Shale. Average flow is estimated to be less than ten gallons per minute for each spring. Some small seeps were found on the escarpment slope. Water from these seeps provide stock water and is thought to be derived from shallow unconsolidate aquifers.

In 1983 Tower Resources encountered groundwater in an area of burned coal during mining operations adjacent to the emergency lease. The water exists in the burn area between the underlying and overlying sandstones. The burn area, consisting of burned coal and rubble, acts as a reservoir with limited storage capacity. Recharge is from direct infiltration of precipitation and runoff directly into the outcrop. Due to the permeable nature of the burned outcrop, water easily percolates into the strata, flowing downgradient until the maximum available storage capacity of the burn area is achieved. Further movement downgradient is prevented by the existence of the relatively impermeable unburned coal. Tower estimates that approximately seven million gallons of water are contained in the burn area.

Very little water has been encountered in the Pinnacle Mine. Water that has been encountered has been in the form of small roof leaks that dry up within a few days or weeks after mining progresses downdrift. Mine inflow is most likely attributed to localized zones of saturation in the Blackhawk Formation.

B. Surface Water

The Centennial Project CIA is situated in the Book Cliffs near the headwaters of the Price River Basin. In general, the chemical quality of water in the headwaters of the Price River Basin is excellent, with this watershed providing most of the domestic water needs of the people below. However, this quality rapidly deteriorates downstream as the streams cross shale formations (particularly the Mancos Shale in and adjacent to Castle Valley) and receive irrigation return flows from lands situated on Mancos-derived soils (Price and Waddell, 1973). Within the Price River Basin, for example, Mundorff (1972) reports that the Price River and its tributaries generally have a dissolved solids concentration of less than 400 milligrams per liter upstream from Helper. The water in this area is of a calcium-bicarbonate type. Between this point and the confluence with Miller Creek, most of the flows originate on or tranverse Mancos shales. Much of the flow is derived from irrigation return flows. The Price River at Wellington, which is near the center of the basin, has an average dissolved solids content of about 1700 milligrams per liter and is of a mixed chemical type (calcium-magnesium-sodium-sulfate). At Woodside, which is about 22 miles upstream from the confluence of the Price River with the Green River, the weighted average dissolved solids content has generally been between 2000 and 4000 milligrams per liter, with the water type being strongly sodium-sulfate.

Sediment yield from the upper portion of the basin is probably negligible (Mundorff, 1972). According to the U. S. Soil Conservation Service (1975), erosion rates in the Price and San Rafael River basins vary from 0.1 to 3.0 acre-feet per square mile per year. The bulk of the sediment yielded each year at the mouth of the Price River comes from limited areas covered with highly erodable shales (Mundorff, 1972).

The Centennial Project area is drained by ephemeral drainages heading primarily in a southerly direction. The Right and Left Forks of Deadman Canyon and an unnamed ephemeral drainage drain the western portion of the CIA including the area of the surface facilities. Straight Canyon, Hoffman Creek, and an unnamed ephemeral drainage drain the eastern portion of the CIA and are tributary to Coal Creek, a perrenial stream. Coal Creek and Deadman Canyon are both tributary to the Price River.

Surface disturbances related to coal mining occurs only in the Right Fork of Deadman Canyon. Interaction between the surface disturbances and this ephemeral drainage are minimized due to sediment control facilities that are in place. Mining has occured beneath the Right Fork of Deadman Canyon, two unnamed ephemeral drainages, and Straight Canyon. Mining in the Emergency Lease will continue under the Hoffman Creek drainage.

The ephemeral drainages flow in response to snowmelt and rainfall events. Water quality analyses of snowmelt runoff in the ephemeral drainages generally indicate major dissolved chemical constituents of magnesium, sodium, sulfate and bicarbonate.

VI. Potential Hydrologic Impacts

A. Ground Water

Dewatering and subsidence related to mining have the greatest potential for impacting groundwater resources in the CIA.

<u>Dewatering</u>

Minor inflows of water has been encountered in the mine within until the summer of 1990. Andalex Resources (Mike Glasson, Senior Geologist) stated that interception of burnt coal areas has produced 90% of the water which flows into the mine. Other sources that are encountered have been in the form of small roof leakers that dry up

within a few days or week after mining progresses downdrift. The inflows from burnt areas produce large volumes of water which is stored in the mine and then pumped out at irregular intervals. One such encounter produced around 100,000 gallons per day for about a month. Andalex has aquired a UPDES permit (UTG-040008, site 002) for the discharge.

The probable hydrologic impacts to the ground water are distinct and independent at the Centennial Project. There appears to be no hydrologic connection between the alluvial aquifer underlying local creeks and the operations at the Centennial Project. While the mining operations occur in the Blackhawk Formation, the aquifers associated with this formation is perched and lenticular in nature. Pump test data in the Blackhawk Formation and monitoring of ground water inflow at local mines has demonstrated the absence of a regional aquifer that contributes medium or high groundwater tranmissivities. The hydrologic impacts of the Centennial Project with respect to ground water will therefore not affect or be affected extensively by the mining activities at the Centennial Project.

Subsidence.

Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of groundwater flow.

Potential changes include increased flow rates along fractures that have "opened" and diverting flow along new fractures or permeable lithologies. Subsurface flow diversions may cause the depletion of water in certain localized aquifers, whereas increased flow rates along fractures would reduce groundwater residence time and potentially improve water quality.

B. Surface Water

The main concern in terms of impact to surface water is water quality deterioration downstream from the minesite. There will be no impact to the quantity of water due to the ephemeral nature of the drainages. All drainages in the CIA flow only in response to snowmelt runoff and rainfall events. Infiltration rate and runoff volumes will not be affected by the mining operations.

The area influenced by surface disturbance is of limited areal extent and confined only to the Right Fork of Deadman Canyon. Surface sediment controls currently are in place and will continue to be in place during reclamation. The water quality impacts associated with reclamation will be minimal or nonexistent due to the fact all drainage from the disturbed area will be routed through sediment controls and treated via the use of sedimentation ponds prior to any release of disturbed area drainage.

VII. Influence of Other Mining

The Centennial Project is the only active coal mine in the CIA. The Soldier Canyon Mine is located approximately six miles to the east in Soldier Canyon and the Price River Mine Complex is located approximately nine miles to the west in the Price River Canyon. With the latest additions the eastern border of the mine plan area is 2 1/4 miles from the western border of Soldier Creek Coal Company' mine plan area.

A Cumulative Hydrologic Impact Assessment prepared in December of 1984 for the Soldier Canyon Mine has addressed the hydrologic impacts for the anticipated mining in the Soldier Creek drainage. The greatest ground water concern with respect to the Soldier Canyon Mine is the undermining of Soldier Creek and the potential for streamflow to be lost into the mine via subsidence fractures through a minimum of 150 feet of overburden material. Three springs overlying the mine could be affected by subsidence associated with mining. These effects are possible but unlikely because the springs are located in the Flagstaff Limestone and the North Horn Formation and separated from the coal seams by approximately 900 feet of overburden. Additionally, approximately 100 gallons per minute currently enters the Soldier Canyon Mine from diffuse sources, from the lenticular sandstones, shales and coal of the Blackhawk Formation.

The probable hydrologic impacts to the ground water are distinct and independent at the Centennial Project and at the Soldier Canyon Mine. There is no hydrologic connection between the alluvial aquifer underlying Soldier Creek and the operations at the Centennial Project. While both mining operations occur in the Blackhawk Formation, the aquifers associated with this formation are perched and lenticular in nature. Pump test data in the Blackhawk Formation and monitoring of ground water inflow at each of the mines has demonstrated the absence of a regional aquifer in this Formation. The hydrologic impacts of the Centennial Project with respect to ground water will therefore not affect or be affected by the mining activities at the Soldier Canyon Mine.

The Cumulative Hydrologic Impact Assessment prepared for the Soldier Canyon Mine indicates that the greatest impacts to the surface water resource are related to changes in water quality caused by discharge of mine waters with a relatively high total dissolved solids (TDS) concentration. The Soldier Creek Coal Company has committed to limiting the volume of discharge so that the discharge TDS load will be less than the NPDES limits of 1.0 tons per day.

The Centennial Project has encountered very little water in the perched aquifers associated with the Blackhawk Formation. Water out of an area of burned coal was discharged in 1983. Andalex Resources, Inc. has obtained a UPDES Permit and submited a monitoring plan in the event that any unexpected mine water is encountered and must be discharged from the mine. Hydrologic impacts resulting from any treated discharge will be minimized and will not affect or be affected by the mine water discharge at the Soldier Canyon Mine.

A Cumulative Hydrologic Impact Assessment prepared in July of 1984 for the Price River Mine Complex, west of the CHIA, has addressed the hydrologic impacts for the anticipated mining with respect to the Price River Basin. The CHIA has determined that the hydrologic effects of the Price River Coal Company (PRCC) mining operation will have no cumulative impacts with existing or proposed coal mining operations. Intercepted ground water from the Blackhawk Formation during mining operations has been determined to be approximately 0.64 to 0.96 cubic feet per second. This would reduce baseflow to springs and streams in the area by a lesser amount because water is discharged from the mine. Pump test data in the Blackhawk Formation and monitoring of ground water inflow into the mine at the PRCC Complex as well as at the Centennial Project demonstrate that there is no hydrologic connection in the Formation between the two mining operations. Therefore, the hydrologic impacts associated at the two mining operations will not affect each other.

The Cumulative Hydrologic Impact Assesssment prepared for the PRCC indicates that there will be minimal impact to the surface water quantity and quality due to mining operations. The surface water control plan in place at the PRCC Complex is sufficient to prevent additional sediment from disturbed areas from entering streams or drainages in the permit area. Mine water discharge is controlled by an NPDES Permit and is therefore not contributing to the degradation of the existing surface water quality.

The Centennial Project has and will continue to treat surface water runoff from disturbed areas and any unexpected mine water discharge. The hydrologic impacts of the Centennial Project with

respect to the surface water will therefore not affect or be affected by mining operations at the PRCC Complex.

The operational design proposed for the Centennial Project is herein determined to be consistent with preventing damage to the hydrologic balance outside the mine plan area.

WPO-79

REFERENCES

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December 10, 1990

STIPULATIONS
Andalex Resources, Inc.
Centennial Project
Graves Lease Addition
ACT/007/019
Carbon County, Utah

UDOH-(1)

Within 30 days of permit issuance ARI will provide a detailed description of the mine water system, particularly the collection of surface water for use underground which will include schematic diagrams, flow rates, volumes and etc.

UDOH-(2)

Within 30 days of permit issuance, ARI, in conjunction with the State Health Department will determine the need for upgrading the septic system.

UDOH-(3)

Within 30 days of permit issuance, ARI will provide plans for the proper disposal of waste oil generated at the mine site. References to disposal of waste oil in the county landfill will be deleted from the plan.

UDOH-(4)

Within 30 days of permit issuance, ARI will submitt for insertion to the mine plan the latest revision of all environmental permits; including Discharge (UPDES), Construction (sediment ponds), Sewage Disposal (Septic Tank), Air Quality, and Potable Water System permits or approvals.

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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November 26, 1990

To: File

From: David W. Darby, Geologist

RE: Revision, Technical Review, Graves Lease, Centennial Project, Andalex Resources, Inc., ACT/007/019, Carbon County, Utah

Synopsis

On January 4, 1990, Andalex Resources, Inc. submitted a proposal to obtain and incorporate a new federal lease tract into their existing mine permit. The Graves Lease Tract (Federal Lease UTU 66066, 870 acres) is located northeast of the existing mine permit area in Sections 1 and 12 of T. 13S., R. 10E., SLM and Section 31 of T. 13S., R. 11E., SLM. The modification outlines plans to develop and mine the Aberdeen and Centennial coal seams within the lease. These seams are currently being mined in permitted areas. Mining strategy calls for mining the Centennial seam where reserves are greater than five feet thick. No coal will be mined from either the Lower Sunnyside seam or the Gilson seam.

Analysis

Andalex incorporated new information concerning the Graves Lease in their Mining and Reclamation Plan (MRP) submitted September 10, 1989. A Probable Hydrologic Consequences (PHC) report was submitted February 15, 1990 (see Appendix L). Updated information to address deficiencies was submitted July 4, 1990.

The text and maps submitted by the applicant provides the information necessary to assess the potential environmental impacts from mining. The applicant has conducted baseline hydrologic inventories on springs and streams on and adjacent to the proposed mine area.

The existing subsidence monitoring plan has been expanded to include the Graves Lease area. Sites will be monitored to detect areas of the most likely surface disturbance from mining. Continuous miners, room and pillar method, will be used in both seams. It is anticipated that diminution to resources will not occur Overburden isopleths shown on the proposed mine maps (Map 31 and Map 41) indicate that overburden depths will be between 1500 feet to 2000 feet above the escarpments and a minimum of 1000 feet in the area of the stream channel of the Left Fork of Deadman Canyon. Mining at these depths have not disturbed surface features in Utah currently. No faulting has been mapped in the Graves Lease area. This geologic feature will provide extra continuity, strength and protection to the overlying structure after mining. This feature is also thought one of the reasons for the low inflows of groundwater into the mine.

The applicant has will carry out a surface water monitoring plan and has committed to notify the Division if any substantial amounts of groundwater are contacted during the mining process.

The applicant has sampled for acid and toxic materials in the coal, roof and floor of the current mine. A commitment was made to establish a sampling program to identify acid or toxic roof, seam and floor material over the proposed lease area. The sampling program will be designed to collect samples at selected intervals throughout the mine which reflect the lateral extent of the seam. The program will include a commitment to readily sample roof and floor material for the constituents outlined in the Division's Guidelines for Management of Soils and Overburden, Table 6.

Recommendation

This proposal is recommended for approval.

dwd/DWD

cc. Daron Haddock
B Team