FINAL CLOSURE & RECLAMATION PLAN

BLAZON No. 1 MINE

CARBON COUNTY, UTAH

NORTH AMERICAN EQUITIES, n.v. 1401 17th STREET, SUITE 1510 DENVER, COLORADO 80202

October, 1986

Prepared By
ACZ inc
Steamboat Springs, Colorado

LIST OF EXHIBITS

EXHIBIT NO.	TITLE
1	FEBRUARY 14, 1985 LETTER FROM ALAN SMITH OF NAE TO RON DANIELS OF UDOGM REGARDING PERMANENT CLOSURE OF BLAZON NO. 1 MINE
2	MAY 17, 1985 LETTER FROM WILLIAM HAYNES (REPRESENTING JACK OTANI, THE SURFACE OWNER) TO ALAN SMITH OF NAE REQUESTING ALTERNATIVE POSTMINING LAND USE
3	MAY 20, 1985 LETTER FROM ALAN SMITH OF NAE TO HAROLD MARSTON, COUNTY PLANNER FOR CARBON COUNTY, REQUESTING CARBON COUNTY APPROVAL OF ALTERNATIVE POSTMINING LAND USE
4	MARCH 26, 1985 LETTER FROM ALAN SMITH OF NAE TO RON DANIELS OF UDOGM REGARDING A MARCH 13, 1985 MEETING IN SALT LAKE CITY
5	APRIL 9, 1985 LETTER FROM LOWELL BRAXTON OF UDOGM TO ALAN SMITH REGARDING APPROVAL TO REMOVE STRUCTURES AND FACILITIES FROM SURFACE FACILITIES AREA
6	MAY 29, 1985 LETTER FROM ALAN SMITH OF NAE TO UTAH STATE ENGINEER REQUESTING TRANSFER OF WATER WELL TO JACK OTANI
7	MAY 29, 1985 LETTER FROM ALAN SMITH OF NAE TO MARY ANN WRIGHT OF UDOGM REQUESTING APPROVAL TO PLACE UNDERGROUND DEVELOPMENT WASTE IN ABANDONED STRIP PIT NORTH OF BLAZON SITE
8	GEOTECHNICAL ANALYSES OF POSTMINING SLOPES AT THE BLAZON NO. 1 MINE

LIST OF EXHIBITS (Continued)

EXHIBIT NO.	TITLE
9	MAY 29, 1985 LETTER FROM ALAN SMITH OF NAE TO EPA REGARDING DISCONTINUANCE OF NPDES PERMIT UT-002367
10	AUGUST 8, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM IN RESPONSE TO QUESTIONS CONTAINED IN BRAXTON LETTER OF JULY 25, 1985 REQUESTING ADDITIONAL INFORMATION.
11	SEPTEMBER 6, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON IN RESPONSE TO AUGUST 28, 1985 QUESTIONS FROM UTAH DIVISION OF OIL, GAS & MINING FINAL RECLAMATION OF BLAZON NO. 1 MINE
12	SEPTEMBER 25, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM IN ANSWER TO BRAXTON LETTER OF AUGUST 28, 1985, REQUESTING ADDITIONAL INFORMATION AND CALCULATIONS
13	SEPTEMBER 28, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REGARDING THE RECLAMATION OF THE TOPSOIL BORROW AREA; CONTAINING A CERTIFIED COPY OF THE SEDIMENT POND CROSS SECTION; AND THE DETERMINATION OF THE HEIGHT OF BERM A AND LOWER PAD AREA
14	OCTOBER 3, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ANSWERING VERBAL QUESTIONS REGARDING TIMING AND DENSITY OF SEEDING, DISTRIBUTION OF TOPSOIL AND SIZE OF THE DITCH ALONG THE ROAD TO THE TRANSFORMER PAD AREA

LIST OF EXHIBITS (Continued)

EXHIBIT NO.	TITLE
15	OCTOBER 17, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ENCLOSING LABORATORY RESULTS TAKEN FROM NORTH AMERICAN EQUITIES PROPERTY
16	OCTOBER 29, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REQUESTING REDUCTION OF POST-RECLAMATION BOND RELEASE PERIOD
17	IDENTIFICATION OF INTEREST, LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION
18	SIGNS AND MARKERS
19	HISTORICAL AND CULTURAL RESOURCES
20	VEGETATION INFORMATION
21	SOIL RESOURCES
22	FISH AND WILDLIFE INFORMATION
23	HYDROLOGY AND HYDRAULICS INFORMATION
24	RECLAMATION BOND ESTIMATE
25	TOPSOIL AND UNDERGROUND DEVELOPMENT WASTE CALCULATIONS

Exhibit 1

FEBRUARY 14, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO RON DANIELS OF UTAH DIVISION OF OIL, GAS, AND MINING REGARDING PERMANENT CLOSURE OF BLAZON NO. 1 MINE

NORTH
AMERICAN
EQUITIES, n.v.

February 14, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Ronald W. Daniels
Acting Administrator
Mineral Resource Development and
Reclamation Program
Division of Oil, Gas, and Mining
State of Utah
4241 State Office Building
Salt Lake City, Utah 84114

Re: Blazon #1 Mine: Permanent Closure

Dear Mr. Daniels:

As we discussed over the telephone this afternoon, North American Equities, NV has recently received and reviewed a consultant's report regarding the feasibility of reopening the Blazon #1 Mine. Unfortunately, the conclusions reached by this report are not favorable for reopening the mine in the near future. Likewise, the option of selling the property to another entity has not been successful, and no potential buyer is currently interested in the property. We also reviewed the option to maintain the property in the hope of reopening in the foreseeable future or perhaps finding an interested buyer; however, this option is not a viable one.

Based on the conclusions and recommendations of our consultant, North American Equities, NV has decided to permanently close the mine and reclaim the site. As part of the decision to close and reclaim the mine site, North American Equities, NV is hereby withdrawing its permanent program permit application for the Blazon #1 Mine. Since we do not have a permanent program permit, we plan to reclaim the site according to the Office of Surface Mining Interim Program Regulations and the reclamation plans previously approved by the Utah Division of Oil, Gas, and Mining on July 3, 1980.

We have requested that ACZ INC. of Steamboat Springs, Colorado review the previously approved reclamation plans for the Blazon #1 Mine site. This review should be completed in the near future, and we would then like the opportunity to discuss with you in your office the reclamation plans and schedule. We plan to initiate facility and structure removal shortly with actual reclamation and revegetation work to be conducted during the forthcoming summer of 1985.

We have certainly appreciated your willingness to work with us on mining and reclamation issues in the past. We know that this cooperation will continue during the permanent closure of the Blazon #1 Mine.

In conclusion, we must emphasize that the decision to close and reclaim the Blazon #1 Mine has been a difficult one for North American Equities, NV. In this light, we hope that the Utah Division of Oil, Gas, and Mining will work with us to achieve efficient and economic reclamation work according to the appropriate legal standards.

Thank you for your understanding of this most difficult situation. If you have any questions, please do not hesitate to contact me.

Sincerely,

NORTH AMERICAN EQUITIES, NV

Alan W. Smith

Exhibit 2

MAY 17, 1985 LETTER FROM WILLIAM HAYNES (REPRESENTING JACK OTANI, THE SURFACE OWNER) TO ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. REQUESTING ALTERNATIVE POSTMINING LAND USE

William H. Haynes, Jr.
Consultant, Coal Mining & Marketing
944 Essex Way, #3
Midvale, Utah 84047
Tel. (801) 561-0297

May 17, 1985

Mr. Alan Smith, President
North American Equities, Ltd.
1401 17th Street, Suite 1510
Denver, Colorado 80202

Re: Blazon Shop Building & Facilities

Dear Mr. Smith,

Confirming our prior conversation and correspondence, Jack Otani, owner of the surface estate upon which your Blazon Mine facilities near Clear Creek, Carbon County, Utah are located, is interested in acquiring the shop building and shop support facilities located at the mine site, for use in his business as a construction contractor at Clear Creek, provided such building and facilities may remain as presently located, and the site utilized for such activity.

Support facilities to be included with the shop building include access roads and drainage structures, maximum yard area for equipment storage and parking, power lines, water well and rights, water storage tanks and lines, and septic tank and leach fields.

Mr. Otani is interested in acquisition of this building and facilities only under terms and conditions generally as we have proposed, yet to be concluded by negotiation. We are prepared to proceed with such negotiation at your convenience.

Yours very truly,

W. H. Haynes, Jr.
Attorney In Fact

cc: Jack Otani
Alan Czarnowsky

RUN NUMBER	DATE	PROFIT CENTER	CATAGORY
22	5/20	01	01
FILE	INSTRUCTIONS		
1			

Exhibit 3

MAY 20, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO HAROLD MARSTON, COUNTY PLANNER FOR CARBON COUNTY, REQUESTING CARBON COUNTY APPROVAL OF ALTERNATIVE POSTMINING LAND USE

May 20, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold Marston
County Planner
Carbon County
Carbon County Court House
Price, Utah 84501

Re: Request for Carbon County Approval of
Postmining Land Use for Blazon No. 1 Mine
near Clear Creek, Utah

Dear Harold:

The Blazon No. 1 Mine is an underground coal mine located south of the town of Clear Creek on the east side of Mud Creek. Lack of adequate market caused North American Equities, N.V. to temporarily close the mine in January of 1982. At this time, North American Equities, N.V. is moving to permanently close and reclaim the Blazon No. 1 Mine. We are working with personnel from the Utah Division of Oil, Gas & Mining in this regard.

In recent conversations with the surface owner of the site, Mr. Jack Otani, it became apparent that Mr. Otani would like the use of many of the existing surface facilities at the Blazon No. 1 Mine. Specifically, Mr. Otani is interested in using the shop and office, the parking and equipment storage areas, the septic tank, the leach field, the power line, the water holding ponds, and the water lines. Mr. Otani owns and operates a small construction company out of the town of Clear Creek.

We at North American Equities, N.V. would very much like to work with Mr. Otani regarding his beneficial use of the site following closure of the Blazon No. 1 Mine. In this end, we have requested that the Utah Division of Oil, Gas & Mining classify the surface facilities area of the minesite for a postmining land use of commercial/industrial uses.

The Utah Division of Oil, Gas & Mining has requested that we contact you regarding any Carbon County input as to the ultimate use of this site. For your information, the site will merely be used for Jack Otani's construction business; no one will live on the site.

We would appreciate your written approval to our request for allowing North American Equities, N.V. to leave the surface facilities of the Blazon No. 1 Mine as commercial/industrial use. Please forward your written comments to Mr. Lowell P. Braxton, Administrator, Mineral Resource Development and Reclamation Program, Utah Division of Oil, Gas & Mining, 355 West North Temple, 3 Triad Center, Suite 350, Salt Lake City, Utah 84180-1203.

We appreciate your attention to this matter. If you have any questions or require any additional information regarding our plans, please do not hesitate to contact Alan Czarnowsky of ACZ INC. at (303) 879-6260 or me at the letterhead address.

Sincerely,

NORTH AMERICAN EQUITIES, N.V.

Alan W. Smith

AWS:sly

cc: Lowell P. Braxton
Susan Linner
Alan Czarnowsky, ACZ INC.
William Prince

CARBON COUNTY
PRICE, UTAH 84501

RECEIVED
SEP 18 1985
DIVISION OF OIL
GAS & MINING

June 20, 1985

Lowell P. Braxton, Administrator
Mineral Resource Development and Reclamation
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

RE: Blazon #1 Mine Reclamation

Dear Mr. Braxton:

Please be advised that Carbon County has been contacted by North American Equities, N.V. in regards to the reclamation program of the Blazon Mine. Carbon County would like to go on record of supporting Mr. Otani's use of the shop office, parking and equipment storage areas, including septic tank, leach field, power line, water line and water holding ponds.

Mr. Otani owns and operates a small construction company out of the town of Clear Creek. Carbon County works with Mr. Otani to solve snow removal, sewer and water and other related public needs in that area.

We feel that Mr. Otani's use of these facilities would be in the best interest of Carbon County. There are no zoning concerns pertaining to the continuance of this usage.

Sincerely,

Harold R. Marston

Harold R. Marston
Carbon County Planner

HRM:co

cc: Jack Otani
Alan W. Smith, North American Equities, N.V.
Alan Czarnowsky, ACZ, Inc.

RUN NUMBER	DATE	PROFIT CENTER	CATAGORY
44	6/24	61	01
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Exhibit 4

MARCH 26, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO RON DANIELS OF UTAH DIVISION OF OIL, GAS, & MINING REGARDING A MARCH 13, 1985 MEETING IN SALT LAKE CITY

NORTH AMERICAN EQUITIES, n.v.

March 23, 1985

Mr. Ronald W. Daniels
Acting Administrator
Mineral Resource Development & Reclamation Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Meeting with Utah Division of Oil, Gas & Mining - Wednesday, March 13, 1985 to Discuss the Permanent Closure of the Blazon No. 1 Mine

Dear Ron:

We appreciated the opportunity to meet with you and your staff on Wednesday, March 13, 1985 at your office in Salt Lake City, Utah. This letter will confirm discussions at our meeting.

As noted, North American Equities, NV ("NAE") is planning to permanently close and reclaim the Blazon No. 1 Mine. The Blazon No. 1 Mine is located south of the Town of Scofield in Carbon County, Utah.

Participating in our meeting were the following individuals:

- Ron Daniels - DOGM
- Rick Summers - DOGM
- Susan Linnear - DOGM
- David Darry - DOGM
- Randy Harden - DOGM
- Tom Suchoski - DOGM
- Lynn Kunzler - DOGM
- Lowell P. Braxton - DOGM
- Tom Portle - DOGM
- Alan W. Smith - NAE
- Claire Curlander - NAE
- Alan Czarnowsky - ACZ INC.

The purpose of our meeting was to discuss the economic considerations, the legal aspects, the reclamation logistics, the reclamation plans, and other miscellaneous reclamation items in order to minimize or, if possible, prevent unexpected or last-minute problems during the final reclamation of the Blazon No. 1 Mine. The meeting was valuable in

discussing with the Utah Division of Oil, Gas and Mining both reclamation and economic aspects of the permanent closure of the Blazon No. 1 Mine. Because our time schedule is to reclaim the Blazon No. 1 Mine during the summer of 1985, we felt our meeting was extremely beneficial in identifying areas of concern to the Utah Division of Oil, Gas and Mining.

The following were general items discussed during our meeting:

1. General Overview of Blazon No. 1 Mine
2. Decision to Permanently Close and Reclaim Blazon No. 1 Mine
3. Economic Considerations of Closure and Reclamation
4. Legal Aspects
5. Reclamation Logistics
6. General Reclamation Plan
7. Bonding
8. Reclamation Schedule
9. Water Monitoring

1. GENERAL OVERVIEW OF BLAZON NO. 1 MINE

The Blazon No. 1 Mine is located in an area that has seen extensive underground and surface mining in the past. The mine site is located south of the Town of Scofield on the east side of Mud Creek. The mining operation was initially developed by the Blazon Mining Company in conjunction with TOE Investment Company, NE. The Utah Board of Oil, Gas and Mining approved a permit under the Utah Mine Plan Reclamation Act as well as the interim program regulations of the Office of Surface Mining on July 3, 1980. The mine began producing coal in March of 1981.

Effective July of 1981, TOE Investment Company, ~~NE~~ NV changed its corporate name to North American Equities, NV ("NAE"). ~~Likewise, the Blazon Mining Company was discharged as the agent and mining contractor for NAE.~~

Lack of an adequate market caused NAE to temporarily close the mine in February of ~~1982.~~ 1984. However, during temporary closure, NAE continued permit work to obtain an approval under the permanent program regulations. Also during temporary closure, NAE was contacted by a potential buyer of the mining property and began negotiations for possible sale of the mining operation.

At the end of 1984, it became apparent that the potential buyer was no longer interested in purchasing the Blazon No. 1 Mine. At this time, NAE requested that ACZ INC., a mining engineering firm, evaluate the overall status and potential feasibility of reopening the mine. Consequently, NAE was working to obtain approval of a permanent program permit from the Utah Division of Oil, Gas and Mining.

In January of 1985, NAE requested the Utah Division of Oil, Gas and Mining to grant a temporary 90-day extension for filing additional information regarding the permanent program permit. This extension was necessary partly because NAE wanted to receive the ACZ INC. report on overall mine feasibility. In early February of 1985, NAE received and reviewed the evaluation of overall mine feasibility. Based on discussions regarding work constraints, transportation limitations, property shortfalls, operational constraints, permitting considerations, etc., ACZ INC. recommended that NAE permanently close the mine and reclaim the site.

On February 14, 1985, a letter from Mr. Alan Smith of NAE was sent to Mr. Ron Daniels of the Utah Division of Oil, Gas and Mining stating that NAE decided to permanently close and reclaim the Blazon No. 1 Mine site.

2. DECISION TO PERMANENTLY CLOSE AND RECLAIM BLAZON NO. 1 MINE

NAE reviewed several business options regarding the future of the Blazon No. 1 Mine. These options were as follows:

- Sell the Blazon No. 1 Mine
- Maintain the Blazon No. 1 Mine for future production
- Reopen the Blazon No. 1 Mine
- Permanently close and reclaim the Blazon No. 1 Mine

The first business option was to sell the Blazon No. 1 Mine. Unfortunately, the sale of the Mine has not worked out for NAE; a possible buyer withdrew its interest from the property and unfortunately, no potential buyer is currently interested in the property.

The second option was to merely maintain the Blazon No. 1 Mine status quo. Since NAE did not anticipate a buyer to purchase the property in the foreseeable future nor did the Utah coal market appear favorable to reopen the mine, the option of maintaining the mine was not a viable one.

Another option was to reopen the Blazon No. 1 Mine. This option was likewise undesirable because no market existed for the coal and the cost of reopening the existing workings proved to outweight the benefits involved with reopening the operation.

The last option for NAE was to simply permanently close and reclaim the mining operation. Since NAE could not sell the mine, was not in an attractive position to reopen the mine, and certainly did not want to maintain the property under high annual maintenance costs, the option of permanent closure and reclamation appeared to be the only viable alternative.

3. ECONOMIC CONSIDERATIONS OF CLOSURE AND RECLAMATION

It should be emphasized that the decision to close and reclaim the Blazon No. 1 Mine was a difficult one for NAE. NAE had made a substantial investment of both money and time to secure the success of the property and project. Although NAE has chosen to close and reclaim the mine, a significant financial loss will be experienced.

In this light, NAE wants to minimize or eliminate any unnecessary costs in reclaiming the site. Certainly, any extraneous costs must be avoided during the reclamation work. NAE hopes the Utah Division of Oil, Gas and Mining will work with the firm to achieve efficient and economic reclamation work according to appropriate legal standards and good, sound reclamation technology.

4. LEGAL ASPECTS

NAE purposely chose not to bring its attorney to the March 13, 1985 meeting with the Utah Division of Oil, Gas and Mining. NAE's primary goal is to reclaim the site according to good techniques and standards but to avoid any legal or regulatory entanglements that might lead to extra or extraneous costs. Hopefully, the basic reclamation plans for the site can be worked out between the Utah Division of Oil, Gas and Mining and NAE such that no legal problems surface.

NAE disagrees with the Utah Division of Oil, Gas and Mining that the permanent program performance standards apply to the Blazon No. 1 Mine. Nonetheless, NAE will work with the Utah Division of Oil, Gas and Mining to ensure appropriate reclamation standards are met for the site. Given that the area affected by mining operations is relatively small (less than seven acres), NAE believes that reclamation work can be easily and effectively completed without the need for legal interference.

The area of disagreement, specifically the applicability of certain performance standards, should hopefully be resolved once NAE submits a reclamation plan package for review by the Utah Division of Oil, Gas and Mining. Concurrence and agreement regarding a forthcoming plan should eliminate the need for any legal involvement from attorneys on either side.

5. RECLAMATION LOGISTICS

NAE plans to remove and sell the surface structures from the Blazon No. 1 Mine as soon as possible. The Utah Division of Oil, Gas and Mining felt that this aspect of reclamation could occur as soon as NAE was ready to remove the structures and facilities. This letter will serve as notification that such removal will begin in the near future.

NAE plans to organize a reclamation bid package for use by a contractor in reclamation work. This package will be submitted for review and approval by the Utah Division of Oil, Gas and Mining. Prior to completing this bid package, NAE will plan to survey sections through the property on 50 foot intervals. These sections will be used to determine a mass balance for material placement to achieve an appropriate postmining topography.

Following completion of the reclamation plan, representatives of NAE and the Utah Division of Oil, Gas and Mining will meet either in Salt Lake City or at the mine site to resolve any concerns so the plan can be approved.

After approval by the Utah Division of Oil, Gas and Mining, NAE will select a contractor such that reclamation and revegetation work can be conducted during the summer and fall of 1985.

6. GENERAL RECLAMATION PLAN

NAE will undertake reclamation work at the site in the following sequence:

- Removal of structures
- Sealing of underground openings
- Covering of coal seams
- Backfilling and grading
- Scarification
- Topsoil replacement
- Revegetation work

In addition, NAE will work with the surface owner of the property to ensure that any reclamation work fits the postmining needs of the surface owner. In addition, NAE will develop a "self-sustaining" drainage and sediment control plan for the site. NAE will also ~~with~~ discuss revegetation success criteria with the Utah Division of Oil, Gas and Mining.

NAE will provide the Utah Division of Oil, Gas and Mining with a complete and comprehensive reclamation bid package for review. This package will include all the details discussed in the March 13, 1985 meeting along with specifics necessary for a contractor to reclaim the site.

7. BONDING

NAE totally disagrees with the Utah Division of Oil, Gas and Mining that any additional bond will be necessary for the site. NAE believes that any increase in bond over the present amount will be an

unacceptable financial burden on the corporation. Rather, NAE plans to demonstrate through good faith compliance during 1985 that the company will work diligently and quickly to reclaim and revegetate the mining site. In addition, NAE would like to emphasize that the Utah Division of Oil, Gas and Mining should keep the whole reclamation scenario in perspective; that is, there are only approximately seven (7) acres of area that need to be reclaimed.

Rather than any bond increase, NAE would rather work closely with the Utah Division of Oil, Gas and Mining to ensure satisfaction with the reclamation of the site. The security that the Utah Division of Oil, Gas and Mining needs will simply be an acceptable reclamation plan along with knowledge that NAE has hired a competent contractor to perform the work.

Subsequent to the work in 1985, NAE would like a partial release of its current bond at attainment of certain performance standards. For instance, after the site has been regraded and backfilled, NAE believes that a certain amount of the existing bond can be released. Subsequently, after revegetation work, NAE believes that the majority of the additional bond can be released with only a minor amount remaining should revegetation prove unsuccessful and reseeding have to be conducted by the Utah Division of Oil, Gas and Mining at some future date.

NAE will work with the Utah Division of Oil, Gas and Mining with regard to partial release of the existing bond when certain performance standards are met, along with establishing final bond release criteria.

8. RECLAMATION SCHEDULE

NAE would like to propose the following basic schedule to the Utah Division of Oil, Gas and Mining. The timetable established as follows sets forth the basic timing for reclamation/revegetation work on the site:

- March, 1985
  - NAE is allowed to begin removal of all structures and facilities
- April, 1985
  - NAE begins work on a comprehensive reclamation bid package
- May, 1985
  - NAE hires surveyor to obtain sections through the site on 50-foot intervals
  - the reclamation plan is finalized

- NAE submits the reclamation plan to the Utah Division of Oil, Gas and Mining

- June, 1985
  - Utah Division of Oil, Gas and Mining approves reclamation bid package at a joint meeting

  - NAE obtains contractor for reclamation work

- July, August, and September, 1985
  - General reclamation work (sealing of underground openings, covering of coal seams, backfilling and grading, scarification, topsoil replacement, drainage and sediment control, etc.)

- September, October, 1985
  - Reseeding and revegetation work

The above represents a general schedule under which NAE will approach the permanent closure and reclamation work of the Blazon No. 1 Mine.

9. WATER MONITORING

Because of the decision to permanently close and reclaim the Blazon No. 1 mine site, NAE would like to discontinue its "baseline" water monitoring program. Recently, NAE received a notice of violation from the Utah Division of Oil, Gas and Mining with regard to the "baseline" monitoring program. Through some misunderstanding, Mr. Tom Wright, a reclamation inspector, was informed that water monitoring had previously been discontinued. However, this was certainly a misunderstanding, as NAE has not been able to gain access to the water monitoring sites since the late fall of 1984 due to excessive snow in the area. As a result of the recent decision, now NAE would like to discontinue this "baseline" monitoring since spring snowmelt will allow access into the area in the very near future.

Hopefully, this confusion with regard to the alleged violation is resolved now that NAE plans for permanent closure and reclamation work at the site. NAE would therefore like to request that the alleged violation be withdrawn and/or abated.

With the exception of the basic disagreement regarding the appropriate legal standards of reclamation along with the requirement for a bond increase, there appeared to be general concurrence by the Utah Division of Oil, Gas and Mining during the meeting that NAE reclamation concepts should be adequate for the site. We recognize that the concurrence on the planned reclamation concepts discussed in the meeting does not represent an approval of the final plan. However, our discussions do represent very important steps in defining Utah Division of Oil, Gas and Mining requirements for the forthcoming permanent closure and reclamation of the Blazon No. 1 Mine.

Ron, we appreciate meeting with you and your staff. We would also appreciate any written response or comments on our meeting and your opinions on our planned work. Unless we hear otherwise from you, we will assume that we have correctly understood your concerns and requirements. If we have misunderstood, please let us know within two weeks of your receipt of this letter.

We all recognize the unfortunate necessity to reclaim the Blazon No. 1 site and the need to maintain open lines of communication with you. I invite you or any of your staff to contact me with any questions or requests. Thank you again for your time and understanding of our most difficult situation.

Sincerely,

NORTH AMERICAN EQUITIES, NV

Alan W. Smith

cc: Alan W. Czarnowsky - ACZ INC.
William Prince

Exhibit 5

APRIL 9, 1985 LETTER FROM LOWELL BRAXTON OF UTAH DIVISION OF OIL, GAS, & MINING REGARDING APPROVAL TO REMOVE STRUCTURES AND FACILITIES FROM SURFACE FACILITIES AREA

Exhibit 6

MAY 29, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO UTAH STATE ENGINEER REQUESTING TRANSFER OF WATER WELL TO JACK OTANI

May 29, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Robert Morgan, State Engineer
Utah Division of Natural Resources
Division of Water Rights
1636 W. No. Temple
Salt Lake City, Utah 84116

Re: Transfer of Water Well Rights and Ownership
from T.O.E. Investment Company to Jack Otani

Dear Sir:

North American Equities, N.V. (formerly T.O.E. Investment Company), 1401 17th Street, Suite 1510, Denver, Colorado 80202 would like to formally transfer all rights and ownership of a water well to Mr. Jack Otani of Clear Creek, Utah. The subject four-inch well is located in Carbon County at a point South 2640 feet and East 1056 feet from the NW corner of Section 4, T14S, R7E, SLB&M. A maximum of 3.0 acre-feet of water can be taken annually from the well.

The well was originally used for the operation of a coal mine, but the mine has been closed. Mr. Jack Otani plans to use the site as an operational base for his construction company and can therefore utilize the well on a continuing basis.

Please notify me if there are any formal proceedings or forms to be filed with your office. Thank you for your attention to this matter, and we look forward to a snooth and prompt transfer.

Sincerely,

NORTH AMERICAN EQUITIES, N.V.

Alan W. Smith

September 18, 1985

Utah Division of Oil, Gas and Mining
4241 State Office Building
Salt Lake City, Utah

RECEIVED
SEP 23 1985
DIVISION OF OIL
GAS & MINING

attention: Mr. Ken May

Dear Sir

This is to address obligation that I will assume with respect to the transfer of the well located on Blagon Mine site from North American Equities.

This is to confirm leabilities that I will assume for damage to person or property from well; that I will plug the well when necessary but in no case later than abandonment of well.

I will assume responsibility for compliance with sections U. M. C. 817.13-817.15 to respect to the well.

Thank you

Yours truly

Jack Stani

STAR ROUTE
CLEAR CREEK BOX 555
HELPER UTAH 84526

NORTH
AMERICAN
EQUITIES, Ltd.

RECEIVED
SEP 18 1985
DIVISION OF OIL
GAS & MINING

State of Utah Natural Resources
Oil, Gas & Mining
355 W. North Temple
3 Triad Center Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: Blazon #1 Mine Reclamation Permit

In accordance with UMC 817.53 - Hydrologic Balance: Transfer of Wells, North American Equities hereby acknowledges that they shall be secondarily liable for Jack Otani's obligation under Subparagraphs (b)(2) and (b)(3) of this Section in regards to the water well located on the Blazon #1 site. This water well will be transfered to Mr. Otani in accordance with State water laws and regulations.

Best regards,

Alan W. Smith
President

Suite 1600 1401 17th Street Denver, Colorado 80202 (303) 296-9441 TELEX 450094

Exhibit 7

MAY 29, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO MARY ANN WRIGHT OF UTAH DIVISION OF OIL, GAS, & MINING REQUESTING APPROVAL TO PLACE UNDERGROUND DEVELOPMENT WASTE IN ABANDONED STRIP PIT NORTH OF BLAZON SITE

May 29, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Mary Ann Wright
Abandoned Mine Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Request to Place Underground Development Waste at the Blazon No. 1 Mine into the Abandoned Clear Creek Strip Pit - Carbon County, Utah

Dear Mary Ann:

I appreciated your taking the time to visit with Alan Czarnowsky of ACZ INC. on May 28, 1985 regarding placement of underground development waste from the Blazon No. 1 Mine into the abandoned Clear Creek strip mine near the Town of Clear Creek in Carbon County, Utah. This letter will follow up on your discussions with Mr. Czarnowsky.

As you know, the Blazon No. 1 Mine was temporarily closed in January of 1982 and has remained idle since that time. Presently, due to numerous operational considerations and market constraints, North American Equities, N.V. ("NAE") has decided to permanently close and reclaim the site. Formal notice was given to the Utah Division of Oil, Gas & Mining ("UDOGM") in February of 1985. A closure and reclamation plan for the site will be submitted to UDOGM under separate cover in the near future.

It is our understanding that UDOGM, under the Abandoned Mine Program, is conducting engineering studies and will, in the near future, complete reclamation of the abandoned Clear Creek strip pit. We would like to provide you, at our expense, fill material in the form of underground development waste for placement in the bottom of the strip pit.

NAE is facing severe constraints with regard to having sufficient room to permanently place the underground development waste on site. Of the estimated 4,000 cubic yards, we can only effectively utilize approximately 1,000 cubic yards in our final backfilling work. It was hoped that we could haul and place the remaining 3,000 cubic yards in the abandoned strip mine realizing that UDOGM will need fill material and that this old strip pit will itself be shortly reclaimed.

Because the Blazon No. 1 Mine will be permanently closed in 1985, our request is but a one-time event and would certainly assist our final reclamation efforts. In addition, we believe that placement of the underground development waste in the abandoned strip pit would be both technically feasible and environmentally advantageous to both NAE and UDOGM. In fact, it makes just plain good common sense.

Attached for your review and information is the Reclamation Plan Map prepared for the Blazon Mine No. 1. The location of the underground development waste is shown on this map. You can see that NAE must remove this material from its present location in an ephemeral drainage to a more long-term stable and environmentally acceptable site.

We appreciate your assistance in approving our request. We likewise recognize your legal and regulatory constraints but trust the common sense approach can be allowed in this particular case.

If you have any questions or need any additional information, please do not hesitate to contact me.

Sincerely,

NORTH AMERICAN EQUITIES, N.V.

Alan V. Smith

Exhibit 8

GEOTECHNICAL ANALYSES OF POSTMINING SLOPES AT THE BLAZON NO. 1 MINE

SUMMARY

The geotechnical stability determination for the partially backfilled portal face-up area and the outslope beneath the portal bench showed static safety factors of 1.86 and 2.04, respectively. The final slopes at the Blazon Mine No. 1 should be extremely stable as the calculated factors of safety are much greater than 1.3.

The assumptions and calculations are included within this exhibit.

GEOTECHNICAL STABILITY DETERMINATION
PARTIALLY BACKFILLED PORTAL FACE-UP AREA
BLAZON NO. 1 MINE

A projected factor of safety for the partially backfilled face-up slope at the Blazon No. 1 Mine owned by North American Equities, N.V. was made to determine the estimated stability of this slope. For calculation purposes, the following conservative assumptions were made:

- The material forming the slope is assumed to be a silty sandstone and fairly homogeneous throughout
- The shear strength of the material is estimated to have a cohesion of (c) of 500 lb/ft^2 and a friction angle ( ) of 33 degrees
- Failure is assumed to occur on a circular failure surface which passes through the toe of the slope
- The slope is dry; this assumption is verified from actual observations in the field

The factor of safety of the slope is defined as:

$$F = \frac{\text{Shear strength available to resist sliding}}{\text{Shear stress mobilized along failure surface}}$$

or

$$\tau_{mb} = \frac{c}{F} + \frac{\phi \, \text{Tan}\phi}{F}$$

where τ_{mb} - shear stress mobilized along the failure surface

Step 1: The subject partially backfilled face-up slope is fully drained. Attached as Figure 1 is the circular failure chart utilized in the calculations.

Step 2: The following factors for the slope are made:

Slope height	$H = 30$ ft
Slope angle	$\psi = 38°$
Material density	$\gamma = 157$ lb/ft^3
Friction angle	$\phi = 33°$
Cohesion	$c = 500$ lb/ft^2

Step 3: The value of the following dimensionless ratio was calculated based on the factors in Step 2:

$$\frac{c}{\gamma H \operatorname{Tan} \phi} = 0.16$$

Step 4: Utilizing the Figure 1, Circular Failure Chart, with the calculated dimensionless ratio of 0.16 and a slope angle of 38°, the following $\frac{\operatorname{Tan} \phi}{F}$ is determined:

$$\frac{\operatorname{Tan} \phi}{F} = 0.35$$

Conclusion: The factor of safety of the partially backfilled portal face-up area slopes is calculated to be 1.86, which indicates long-term stability

$$F = \frac{\operatorname{Tan} \phi}{0.35} = 1.86$$

GEOTECHNICAL STABILITY DETERMINATION
OUTSLOPE BENEATH PORTAL BENCH
BLAZON NO. 1 MINE

A projected factor of safety for the outslope beneath the portal bench at the Blazon No. 1 Mine owned by North American Equities, N.V. was made to determine the estimated stability of these slopes. For calculation purposes, the following conservative assumptions were made:

- The material forming the slope is assumed to be a sandstone and generally homogeneous throughout
- The shear strength of the material is estimated to have a cohesion (c) of 400 lb/ft^2 and a friction angle (ϕ) of 27 degrees
- Failure is assumed to occur on a circular failure surface which passes through the toe of the slope
- The slope is dry; this assumption is verified from actual observations in the field

The factor of safety of the slope is defined as:

$$F = \frac{\text{Shear strength available to resist sliding}}{\text{Shear stress mobilized along failure surface}}$$

or

$$\tau_{mb} = \frac{c}{F} + \frac{\phi \text{Tan}\phi}{F}$$

where τ_{mb} = shear stress mobilized along the failure surface

The following steps were used to determine the factor of safety for the outslope beneath the portal bench at the Blazon No. 1 Mine.

Step 1: The subject outslope beneath the portal bench is fully drained. Attached as Figure 1 is the circular failure chart utilized in the calculations.

Step 2: The following factors for the slope are made:

Slope height	$H = 37$ ft
Slope angle	$\Psi = 31°$
Material density	$\gamma = 130$ lb/ft^3
Friction angle	$\phi = 27°$
Cohesion	$c = 400$ lb/ft^2

Step 3: The value of the following dimensionless ratio was calculated based on the factors in Step 2:

$$\frac{c}{\gamma H \, \text{Tan}\,\phi} = 0.16$$

Step 4: Utilizing the Figure 1, Circular Failure Chart, with the calculated dimensionless ratio of 0.16 and a slope angle of 31°, the following $\frac{\text{Tan}\,\phi}{F}$ is determined:

$$\frac{\text{Tan}\,\phi}{F} = 0.25$$

Conclusion: The factor of safety of the outslopes beneath the portal bench is calculated to be 2.04, which indicates long-term stability

$$F = \frac{\text{Tan}\,\phi}{0.25} = 2.04$$

Figure 1

CIRCULAR FAILURE CHART

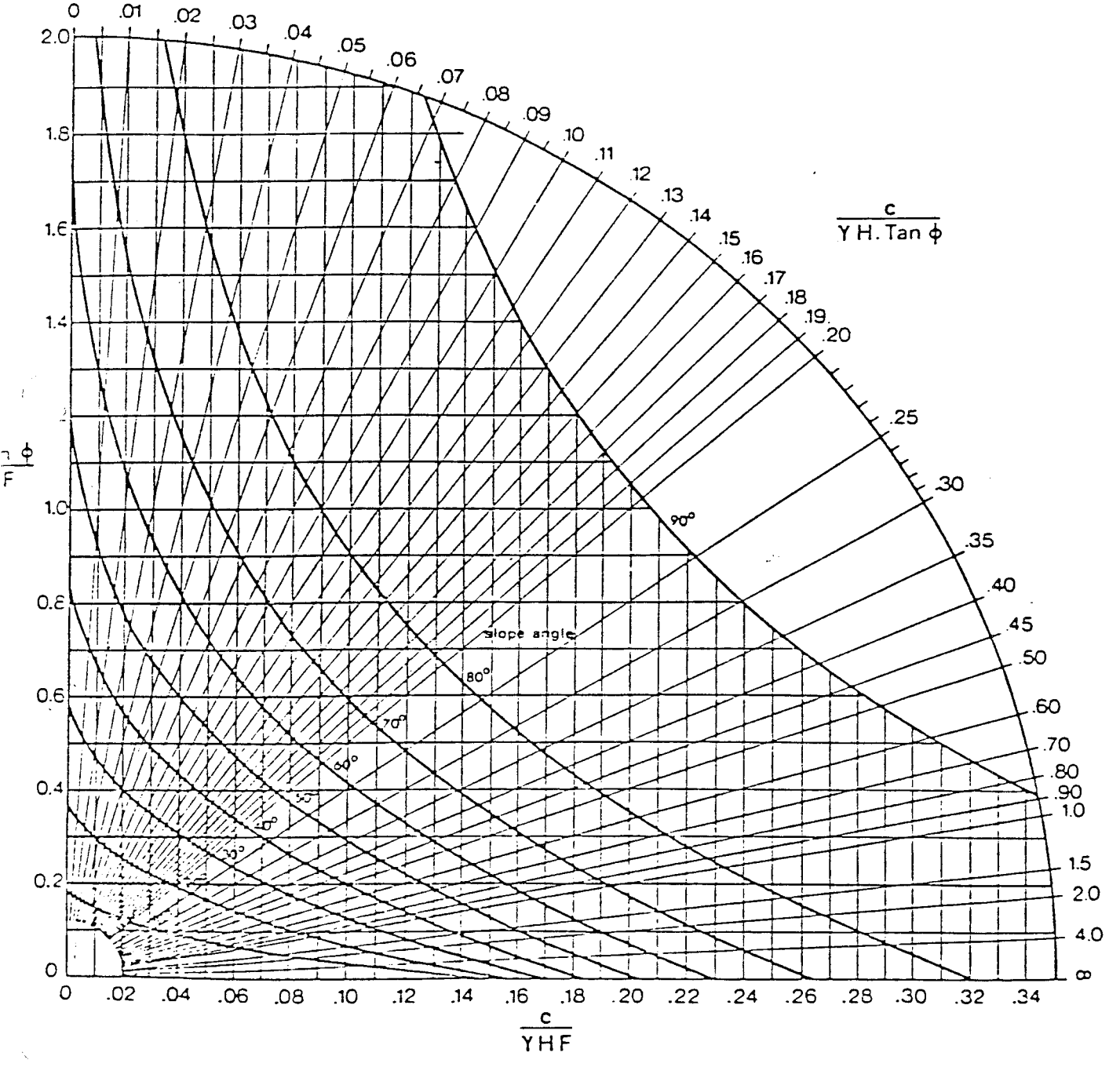


Exhibit 9

MAY 29, 1985 LETTER FROM ALAN SMITH OF NORTH AMERICAN EQUITIES, N.V. TO EPA REGARDING DISCONTINUANCE OF NPDES PERMIT UT-0023647

May 29, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

U.S. Environmental Protection Agency
Region VIII, Suite 103
1860 Lincoln Street
Denver, Colorado 80295

Attn: Regional Administrator

Re: Request for Discontinuance of NPDES Permit UT-0023647
Carbon County, Utah

Dear Sir or Madam:

North American Equities, N.V. ("NAE") is in the process of permanently closing and reclaiming the Blazon No. 1 Mine, a small underground coal operation located in Carbon County, Utah. As of the end of 1985, the site will be reclaimed.

NAE hereby requests that the EPA withdraw and discontinue the NPDES Permit UT-0023647. This discharge point is located in Section 4, T14S, R7E. Mud Creek, a tributary to the Price River, is the receiving water. With the mine closure, NPDES Permit UT-0023647 will serve no future use.

Thank you for your attention to our request. If you have any questions, please do not hesitate to contact me at the letterhead address.

Sincerely,

NORTH AMERICAN EQUITIES, N.V.

Alan W. Smith

EXHIBIT 10

AUGUST 8, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM IN RESPONSE TO QUESTIONS CONTAINED IN BRAXTON LETTER OF JULY 25, 1985 REQUESTING ADDITIONAL INFORMATION.

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH
AMERICAN
EQUITIES, n.v.

August 8, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Lowell P. Braxton, Administrator
Mineral Resource Development and
Reclamation Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Response to July 25, 1985 Technical Review Questions
Final Reclamation of Blazon No. 1 Mine

Dear Mr. Braxton:

We are in receipt of your letter of July 25, 1985. We have worked diligently over the past week to respond to all of your questions and concerns.

It is hoped that the responses included with this letter will resolve any unanswered questions or deficiencies that your staff has identified. We also hope that you and your staff will move with great diligence to approve our plan for reclamation as the field season of 1985 is drawing to an end. Without your immediate attention to this letter and prompt approval of our reclamation plan, we may not be in a position to complete reclamation work this season. North American Equities ("NAE") would be disappointed and frustrated if we are unable to proceed with reclamation of the five (5) acres involved with the Blazon No. 1 Mine by the end of this field season.

In order to expedite your review of our response, we have included questions from your July 25, 1985 letter prior to our responses. Our responses are attached.

Thank you for your attention to this matter. If you have any questions, please contact me.

Sincerely,

NORTH AMERICAN EQUITIES

Alan W. Smith jg

Alan W. Smith
President

UMC 784.13 Reclamation Plan: General Requirements - RH, DC/RS

(b)(1) The applicant has not provided a schedule for the reclamation of the lands within the proposed permit area. The reclamation plan requires a detailed timetable of each major step in the reclamation plan. This can be accomplished by providing a bar chart on a weekly schedule for the reclamation construction. Timing can be accomplished by notifying the Division within 30 days of commencement of the reclamation construction work.

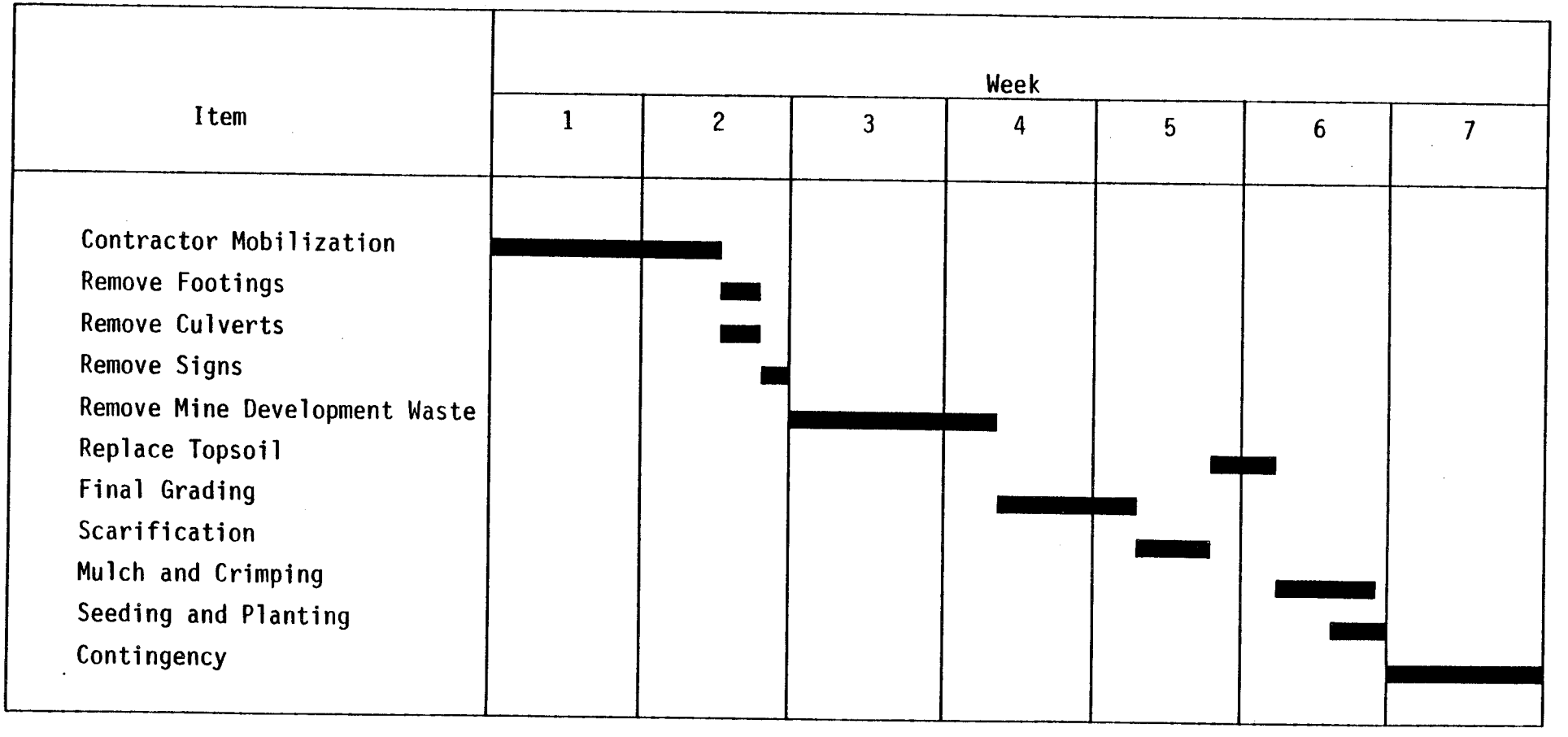
Response: North American Equities ("NAE") had previously submitted a reclamation schedule to the Utah Division of Oil, Gas and Mining ("UDOGM") in Exhibit 4 and on page 32 of the previously submitted Reclamation Plan dated May 29, 1985. Exhibit 4 is March 23, 1985 letter from Alan Smith of NAE to Ron Daniels of UDOGM regarding permanent closure of the Blazon No. 1 Mine.

In order to further clarify the reclamation schedule, NAE has attached Figure 1, Reclamation Schedule, to provide UDOGM with a more specific schedule. We have hesitated to put exact dates on the schedule as we are unsure as to the timing of approval by UDOGM; however, we have blocked out reclamation activities by week. In addition, we plan to begin immediate reclamation work upon approval by UDOGM.

Given the shortness of the remaining 1985 field season, we do not feel that the 30 day notice to UDOGM of the commencement of reclamation construction work is appropriate. Reclamation work should begin immediately after approval by UDOGM and, hopefully, within the next few weeks.

Figure 1

RECLAMATION SCHEDULE



(b)(2) The applicant has not provided a detailed estimate of the cost of the reclamation of the operations. A detailed cost estimate of the reclamation of the operations is required with supporting calculations for the estimates. Supporting calculations shall include estimated quantities required for demolition and cleanup, coal spoils regrading and removal, general earthwork and grading, and revegetation. Productivity estimates shall be used to determine the size of the equipment and the number of hours required in order to perform the various tasks. Cost estimates should be derived from the Blue Book Rental Rate book and the Means Cost Data book as needed. These references are used as the standard by the Division in determining reclamation costs.

Response: NAE has completed a detailed cost of reclamation for the Blazon No. 1 Mine to the post-mining land use for future commercial and industrial activities, as set forth in the reclamation plan submitted to UDOGM on May 29, 1985. A total reclamation cost of approximately $14,995.26 has been estimated, and the detailed backup calculations and assumptions are attached with this letter.

(b)(3) The applicant has provided a plan for backfilling and grading with contour maps and sections that show the anticipated final surface configuration of the permit area. However, the applicant shall address the following concerns in order to comply:

~~Response: NAE has responded to all the concerns of UDOGM in the responses below.~~

UMC 784.13 Reclamation Plan: General Requirements - LK

(b)(5)(i) Page 13 does not indicate that Mr. Otani wants the sediment ponds left. A reclamation plan of these structures or a demonstration that the requirements of UMC 817.49 are met must be supplied.

Response: Mr. Jack Otani indicated on page 13 of his desire for the sediment ponds; however, he also stated that leaving the sediment ponds would be left up to NAE. NAE does not particularly have a preference as to whether the ponds should be left or reclaimed; however, based on possible long-term concerns by UDOGM, NAE will plan to remove the ponds by leveling and grading. Topsoil will be placed over the ponds and the area will be seeded and mulched.

If UDOGM would like the ponds to remain for some reason, then UDOGM should notify NAE in writing of such a request.

(b)(5)(ii) Seed mix needs to be revised. In addition to low seeding rate, the mix includes several introduced species that the applicant has not provided justification for their use (see UMC 817.112).

Attached, I have noted on the proposed seed mix several changes which would make it acceptable (grasses and forbs only). The proposed woody plant seeding rates are extremely low and are not expected to provide the 2677 woody plants per acre (reference area stocking) and will need to be increased greatly. This could be done by adding additional species, supplementing the seeding with transplants, or greatly increasing the seeding rate.

Response: NAE has no problem with the revised seed mixture as proposed by UDOGM. We have revised Table 1, Proposed Seeding Mixture, of the Mining and Reclamation Plan submitted to UDOGM on May 29, 1985. The revised table is included.

Because the area is to be returned for future commercial and industrial uses, NAE believes that the purpose of revegetation is for erosion control as set forth in UMC 817.116(b)(3)(ii). Because of this alteration in the

post-mining land use, there is no necessity for woody plants, and the comparison with the reference area is, therefore, no longer valid.

The purpose of revegetation at the Blazon No. 1 Mine is for erosion control. In addition, the area to be seeded is extremely small, only 1.5 acres, and would provide no practical value for wildlife.

(b)(5)(iii) On page 28, it states "chisel plowing or disking the area along the contour if possible". Does the "if possible" refer to doing these tasks, or to doing them on the contour. Please clarify.

Response: The "if possible" refers to safety constraints. As safety dictates, the operator will not perform chisel plowing on the contour if he might be confronted with a rollover situation.

On steeper areas, no erosion problem is expected since the areas will be mulched and protected from erosion by netting.

Page 29 refers to broadcast seeding after mulch is applied and anchored. This is not acceptable. For best results, broadcast seeding should take place prior to mulching.

Response: NAE has no problems broadcast seeding prior to mulching. Therefore, please accept broadcast seeding prior to mulching as a change in the planned reclamation activities.

(b)(5)(iv) The use of jute netting to anchor mulch on steep slopes (as proposed on page 32) does not provide favorable results. Mulch should either be anchored using a chemical tackifier or a nylon netting.

Response: It is the opinion of UDOGM that jute netting does not provide favorable results in anchoring mulch on steep slopes; therefore, NAE will plan to use nylon netting on the steeper slopes (Area E as shown on Map 2 of the Reclamation Plan, submitted May 29, 1985).

(b)(5)(vi) The measures proposed to determine success of revegetation are not acceptable. While the applicant has apparently quoted UMC 817.116(b)(3)(ii), this standard would apply only to the 3.5 acres proposed to by used by Mr. Otani. The remaining 1.5 acres to be reseeded must meet the appropriate standards for fish and wildlife habitat (i.e., comparison with reference area or other approved standard at the appropriate statistical confidence levels).

The applicant must provide a detailed monitoring plan to monitor reclaimed areas throughout the 10 year liability period. This plan should include the various parameters to be monitored, sampling methodology and timing (year(s) and season).

If the area that is proposed for Mr. Otani's use is not used immediately, it should be seeded with a cover crop (i.e., yellow sweetclover and barley or wildrye) this fall.

Response: NAE believes that the UDOGM request for monitoring is excessive. The entire site is being returned for future industrial and commercial uses. Common sense dictates that the 1.5 acres being seeded will have no practical value as fish and wildlife habitat given the planned post-mining use of the area by Mr. Jack Otani. Besides, Section 817.116 (b)(3)(ii) allows revegetation activities on areas for future commercial and industrial uses to be established for erosion control.

784.14 Reclamation Plan: Protection of Hydrologic Balance - DC/RS

(a)(1)/(3) The applicant needs to submit a plan of the measures (primarily interim sediment control) to be taken to ensure the quality and quantity of surface and groundwater during reclamation activities. These measures may include (but not limited to), silt fences, straw bales, proximity to stream, timing of reclamation activities.

Response: NAE will undertake reclamation as soon as this plan is approved by UDOGM and, hopefully, during the late summer and/or early fall of 1985. This time of the year is generally a dry period, so any reclamation construction activities will occur during a dry time. Subsequently, straw mulch will be used on many areas to be reseeded around the site. NAE does not believe that any exotic measures such as silt fences or straw bales are necessary given the extremely small size of the site. However, if problems are encountered during reclamation, NAE will contact UDOGM to ensure that no excessive siltation or sedimentation problems occur.

UMC 784.14 Reclamation Plan: Protection of Hydrologic Balance and UMC 817.52 Hydrologic Balance: Surface and Groundwater Monitoring - DC/RS

(b)(3) The applicant must submit a monitoring plan (including collection, recording, and reporting of water quality and quantity data) for the reclamation phase and post-mining phase in accordance with the UDOGM water monitoring guidelines (enclosed). The applicant must sample Mud Creek at stations upstream and downstream from all construction activities. The applicant must sample on a weekly basis for Settleable Solids (SS) and Total Suspended Solids (TSS) and submit monthly to the Division all data.

Response: NAE believes that there is no need for future monitoring and the request of UDOGM is excessive given the planned post-mining use and the small acreages involves (less than five (5) acres).

NAE plans to undertake reclamation activity during the dry part of the year, presumably the late summer or early fall of 1985, if UDOGM approves the plan. Consequently, no siltation or sedimentation will be expected during reclamation activities.

The area is to be returned for industrial and commercial use. Immediately following reseeding, the areas is to be turned over to Mr. Jack Otani for his specific uses and purposes. NAE does not feel it should be responsible for any of Mr. Otani's uses of the site once reseeding has occurred.

Over the past several years, NAE has spent thousands of dollars conducting water quality monitoring above and below the site. Throughout all this monitoring, no water quality problems have ever been encountered. It is only common sense that the natural spring runoff of the general area will contain high settleable solids and TSS. Any possible sediment contributions from the reclaimed site will be minor when compared to the overall watershed of Mud Creek. Therefore, UDOGM should expect that water quality in Mud Creek will conform with all previous analyses, that is, high TSS during springtime flows. No sampling program needs to be undertaken to know what seasonal variations may be in this area given the enormous amount of data available from previous sampling. With proper reclamation, no adverse impacts will occur to the water of Mud Creek.

UMC 784.15 Reclamation Plan: Post-mining Land Use - RH

In general, the existing location of facilities used for mining operations are suitable for the proposed post-mining land use. However, the Division recommends that the following changes be made or considered as part of the reclamation plan. Item numbers are referenced to Map 2, Reclamation Plan.

1. Item 30) - Main transformer pole. It is recommended that the transformer pole be moved to the lower bench area adjacent to the building. This would provide for a more aesthetic appearance of the site and ease in maintenance of the utility in comparison with its present location on the hillside above the lower pad. No services or equipment remain which would require power above the lower pad.

Response: Mr. Otani has seen no problem with the present location of the main transformer pole. Conversely, placing the main transformer pole on the lower bench would require substantial guide-wiring given the fill material in this area. In addition, NAE still requires access above the portal bench because of the location of the water supply tanks. Likewise, NAE does not believe that the aesthetics are a question to the surface owner or Mr. Otani. Therefore, NAE does not plan to change the location of the main transformer pole as it would be an unnecessary expense to achieve the same end results.

2. Item 7) - Substation access road. With the power pole transformer moved to the lower bench, no future use of the substation access road is apparent and it should be reclaimed

Response: For reasons mentioned in Item 30 above, NAE will not remove the substation access road. This road is less

than 100 feet long and is a direct connection to an access road to the water storage tanks that will remain in place. This road has been previously seeded and natural vegetation invasion is occurring on the road. NAE does not plan to disturb this road other than removing the substation found at the site. Mr. Otani will use this road when maintenance is required on the main transformer pole.

3. Item 34) - Water main. Problems with the water main may occur during re-establishment of the drainage channel. Contingencies should be made for the relocation of the water main in the event that the line is disturbed or damaged during construction. The reclamation plan should also address what measures will be taken to protect the water line from exposure by erosion of the drainage channel.

Response: The water main was buried beneath the surface prior to any deposition of underground development waste in the drainage channel. Therefore, it is anticipated that no problems will occur during the reclamation work to the water main.

In the unlikely event that damage should occur to the water main during reclamation, then the damaged pipe will be removed and a new pipe spliced in its place.

4. Item 14) - Culvert D - 24" diameter CMP. Removal of the upper half of the culvert will require design of a headwall facility to carry the water under the lower pad. In the event that the culvert cannot be designed to handle the 100-year, 24-hour event, it is recommended that the culvert be completely removed and that open channel flow be established. Consideration during design of the headwall for the culvert should also taken into consideration the tendency for mud and debris flows in the ephemeral channel. The reclamation plan should consider what maintenance

requirements will have to be met by the landowner in order to prevent a blocked culvert from such an event. UMC 817.133(c)(6) requires that the proposed use will neither present an actual or probable hazard to public health or safety.

Response: As shown in Exhibit 8 of the Blazon No. 1 Mine Permit Application Package, Culvert D must contain peak flow from a 100-year, 24-hour event of 4.05 cfs. From the corrugated metal pipe nomograph completed by the U.S. Bureau of Public Roads, Figure B-9 of"Design of Small Dams", the 24" CMP will pass approximately 11 cfs without overtopping the culvert. Therefore, NAE does not propose removal of the culvert but plans to install riprap material at the inlet and outlet to minimize erosion of the headwall and discharge area during high peak flows. In addition, any maintenance required after reclamation, including unplugging and cleaning, can easily be performed by the land owner.

5. Item 12) - Culvert B - 84" diameter CMP. The pre-existing mine plan indicates that the culverts in Mud Creek were designed for the 50-year, 24-hour event. In the event that the culvert is not adequately sized for the 100-year, 24-hour event or cannot be designed to meet the peak flow, NAE should consider removal of this culvert. Removal would allow for re-establishment of open channel flow from the ephemeral channel currently diverted by culvert "D". Additionally, the possibility of relocating culvert "B" next to culvert "C" which in tandem may provide the required discharge capacity should be investigated.

Response: NAE does not propose removal of Culvert B. As shown in Exhibit 8 of the Blazon No. 1 Mine Permit Application Package, Culvert B has been designed to pass the peak flow from a 100-year, 24-hour event. The peak flow was estimated at 64 cfs. Without overtopping the culvert, the

capacity of a 84 inch diameter CMP is 260 cfs as shown on the culvert nomograph Figure B-9 "Design of Small Dams". Due to the capacity of Culvert B, is is not necessary to include Culvert C in tandem to pass the peak flow from a 100-year, 24-hour event.

UMC 817.13 Casing and Sealing of Exposed Underground Openings - DD

North American Equities shall discuss the current status of all exploration boreholes, whether permanently sealed or not. A time table shall be submitted outlining a schedule for each exploration borehole to be sealed.

Unless transfer of water well under UMC 817.53 is approved, North American Equities shall submit a schedule for sealing the existing well.

North American Equities will be required to seal the fan portal entry in accordance with UMC 817.50.

Response: All exploration bore holes in the area have been previously, permanently sealed.

NAE plans to transfer the water well to Mr. Jack Otani. A letter sent to the Utah State Engineer to obtain such transfer is attached.

No water has ever been discharged from the fan portal entry of the Blazon No. 1 Mine. As explained in the May 29, 1985 reclamation plan submittal to UDOGM, NAE plans to remove the fan and associated equipment and backfill over the fan portal entry. No future drainage problems from this portal are anticipated or expected.

UMC 817.24 Topsoil Redistribution - RH

The applicant needs to detail how topsoil will be placed uniformly and in a manner so as to prevent slippage on slopes steeper than equipment used will allow. Chisel plowing or disking along the contour is impractical for slopes exceeding 2:1.

Response: As explained on page 27 of the May 29, 1985 Reclamation Plan, NAE plans to scarify all graded areas to provide a good bonding surface for replacement of topsoil. In addition, as explained on page 27, those areas too steep for scarification will be left in a roughened condition to promote bonding of the topsoil material.

NAE plans to redistribute topsoil utilizing a bulldozer. The topsoil will be hauled to the appropriate replacement area by trucks (after being loaded by front-end loaders) and spread over the re-graded scarified or roughened area using the bulldozer.

NAE anticipates no problem with slippage on slopes. Uniform distribution can be achieved using a qualified bulldozer operator.

UMC 817.43 Hydrologic Balance: Diversion and Conveyance of Overland Flow, Shallow Groundwater Flow, and Ephemeral Streams DC/RS

(b) The applicant needs to provide calculations that show the disturbed drainage diversions (items #19 and #20 on Map 2 of the Reclamation Plan) are capable of passing the 10-year, 24-hour precipitation event.

Response: As shown in Exhibit 8 of the Blazon No. 1 Mine Permit Application Package, Ditches A and B have been designed to pass the peak flow from a 100-year, 24-hour event. Ditch A has a freeboard of 1.0 feet while Ditch B

has a freeboard of 1.65 feet. These designs exceed the size to pass the flow from the 10-year, 24-hour event.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions - DC/RS

(b)(2) The applicant needs to provide calculations and designs which demonstrate all permanent diversions (items #12, #13, #14 and the Mud Creek channel on Map 2 of the Reclamation Plan) are capable of passing the 100-year, 24-hour precipitation event. The applicant must submit plans demonstrating channel stability at this flow.

Response: As shown in Exhibit 8 of the Blazon No. 1 Mine Permit Application Package, Culverts A, B, and C have been designed to pass the peak flow from a 100-year, 24-hour precipitation event.

Mud Creek drainage channel is not a permanent diversion. NAE, during its operations, has not reconstructed or directed the stream channel. Rather, NAE placed culverts at three (3) locations to facilitate access. Therefore, NAE does not plan to alter the configuration of Mud Creek during reclamation. The channel will remain in its original state.

(c) The applicant must submit plans for the removal of culvert A (item #11 on Map 2 of the Reclamation Plan). Stream channel diversions shall be removed when no longer needed to achieve the purpose for which they are authorized.

Response: When Culvert A is no longer needed following topsoil and reseeding of the portal bench area, this culvert will be removed using a combination of a bulldozer and a front-end loader. The bulldozer will uncover material on either side of the culvert. The culvert will either be pushed to the front-end loader or pulled by the bulldozer. The culvert will be smashed and hauled from the property.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds - DC/RS

(u) In order for the Division to approve the retention of the upper and lower sediment pond cells (items #17 and #18 on Map 2 of the Reclamation Plan) the applicant must address all the requirements for permanent impoundments of Section UMC 817.49 and 817.56. If the sediment ponds are to be reclaimed, the applicant must submit plans demonstrating that the ponds shall not be removed until:

1. The disturbed area has been restored;

2. The revegetation requirements of Sections UMC 817.117 are met, and

3. The drainage entering the pond has met the applicable state and federal water quality requirements for the receiving stream.

Response: Given the concerns of UDOGM regarding the two (2) small sediment pond cells found at the site (items #17 and #18 on Map 2 of the Reclamation Plan), NAE will plan to remove these ponds as part of reclamation work. Given the small size of the area, these ponds will be removed and the sites reclaimed as part of the 1985 field work. Once the area has been topsoiled, seeded and mulched, there should be no problem with drainage entering Mud Creek. Given the small size of the area (less than five (5) acres), in comparison with the total watershed of Mud Creek, no water quality problems should be anticipated from the site following reclamation.

Reclamation of the pond system at some point in the future would not really gain any overall effective water quality control, conversely, increased silt loads could be expected if reclamation is performed on the site in several years.

UMC 817.53 Transfer of Wells - DD

Transfer of the water well for now is contingent upon the State's acceptance of the application. Upon transfer, Jack Otani shall provide a letter that indicates he will assume liability for damages to persons or property from the well, and plug the well when necessary or prior to abandonment.

North American Equities shall submit a letter accepting secondary liability for the transferee's obligations.

Response: As stated earlier, NAE has filed for a transfer of the water well to Mr. Jack Otani. No damage to persons or property is expected from the well whether or not it is plugged, however, if the State Engineer will not transfer the water well, then NAE will work with UDOGM to develop an acceptable plan for plugging the well.

UMC 817.71 Disposal of Excess Spoil and Underground Development Waste - LK

The applicant must provide a reclamation plan and demonstrate that reclamation is feasible for the disposal area (Old Clear Creek Strip Pit).

Response: As stated on page 24 of the May 29, 1985 Reclamation Plan, NAE plans to remove 3,000 cubic yards of underground development waste to the abandoned strip pit located north of the Blazon No. 1 Mine. It is the understanding of NAE that this abandoned strip pit will undergo reclamation activities in the future funded by the Abandoned Mine Land Reclamation Program. NAE is not familiar with the reclamation plans for this site, but it appears from observation that one of the largest constraints with reclamation of the site is backfill material. Therefore, NAE simply believes that it will be helping the

Abandoned Mine Land Reclamation Program by providing some additional fill material. Given that NAE does not fully understand the reclamation plans for the Old Clear Creek strip pit, NAE is not in a position to determine feasibility of reclamation for the disposal area.

UMC 817.97 Protection of Fish, Wildlife, and Related Environmental Values - LK

(d)(4) The applicant has not provided plans to restore the critical wildlife habitat which was disturbed by the operation.

(5) Plans to restore the riparian areas must be submitted, including the removal of unnecessary culverts.

(11) Since the applicant is proposing to change the pre-mine land use of wildlife habitat to industrial, plans to establish greenbelts or shelter belts through the "proposed industrial area" must be provided.

Response: NAE does not plan to restore the critical wildlife habitat; rather, as stated in the May 29, 1985 Reclamation Plan, NAE plans to return the area to a future land use for commercial and industrial activities.

Only Culvert A will be removed from Mud Creek. Culverts B and C will remain as part of the post-mining land use. Culvert A is less than 30 feet in length so no major portion of Mud Creek will be disturbed during reclamation. Conversely, the area where Culvert A is now located will be riprapped, seeded, and mulched.

Because of the extremely small size of the site, less than five (5) acres, NAE believes that it is excessive to require establishment of greenbelts or other shelter belts in the area. Common sense dictates that the 1.5 acres to be reseeded will provide no practical wildlife habitat.

UMC 817.101 Backfilling and Grading - RH

(b)(1) The applicant has addressed the stability requirements under this section dealing with the mass stability of the area. The applicant should note that the long-term static factor of safety is 1.5 rather than 1.3 as stated in the reclamation plan on page 27. Calculations in Exhibit 8 indicate that the slopes are stable for circular failure with a static factor of safety greater than 1.5. However, these calculations do not consider the possibility of surface failure not the increased likelihood for rill and gully erosion of the slopes prior to establishment of vegetative cover. Investigation into the sections provided by Blazon indicate that the slope can be reduced to as low as 2:1 in most areas without increasing the projection of the downslope. The original surface is at a slope of 1.6"1. It is maintained by the Division that the maximum slope that should be maintained on the fill of the slopes be 1.6:1. Where possible, the slopes should be reduced to 2:1 in order to minimize the potential for rill and gully erosion and enhance the chance for vegetation success.

Response: Based on information set forth in Exhibit 8 of the May 29, 1985 Reclamation Plan, NAE believes that the slope in question will be stable on a long-term basis. NAE does not believe that the slope needs to be reduced.

In addition, because the slope will be seeded, mulched, and covered with a nylon netting, the possibility of surface failure or the likelihood of rill and gully erosion on the slopes, will be minimized or prevented. Once vegetation is established on the slope, there should be no likelihood of surface failure or rill and gully erosion.

UMC 817.133 Post-Mining Land Uses - LK

The legal owner of record is Calvin K. and Milton E. Jacob - not Jack Otani. In order to approve the land use change, the landowner of record must request such in writing and demonstrate that the criteria of UMC 817.133(c) are met.

~~Response: NAE will respond to this question under separate cover.~~

FINAL CLOSURE AND RECLAMATION PLAN
BLAZON NO. 1 MINE, CARBON COUNTY, UTAH
LIST OF EXHIBITS
VOLUME 2

EXHIBIT NO.	TITLE
10	AUGUST 8, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM IN RESPONSE TO QUESTIONS CONTAINED IN BRAXTON LETTER OF JULY 25, 1985 REQUESTING ADDITIONAL INFORMATION.
11	SEPTEMBER 6, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON IN RESPONSE TO AUGUST 28, 1985 QUESTIONS FROM UTAH DIVISION OF OIL, GAS & MINING FINAL RECLAMATION OF BLAZON NO. 1 MINE
12	SEPTEMBER 28, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REGARDING THE RECLAMATION OF THE TOPSOIL BORROW AREA; CONTAINING A CERTIFIED COPY OF THE SEDIMENT POND CROSS SECTION; AND THE DETERMINATION OF THE HEIGHT OF BERM A AND LOWER PAD AREA
14	OCTOBER 3, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ANSWERING VERBAL QUESTIONS REGARDING TIMINING AND DENSITY OF SEEDING, DISTRIBUTION OF TOPSOIL AND SIZE OF THE DITCH ALONG THE ROAD TO THE TRANSFORMER PAD AREA
15	OCTOBER 17, 1985 FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ENCLOSING LABORATORY RESULTS TAKEN FROM NORTH AMERICAN EQUITIES PROPERTY
16	OCTOBER 29, 1985 FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REQUESTING REDUCTION OF POST-RECLAMATION BOND RELEASE PERIOD

FINAL CLOSURE AND RECLAMATION PLAN
BLAZON NO. 1 MINE, CARBON COUNTY, UTAH
LIST OF MAPS
VOLUME 2

MAP NO.	TITLE
1	BLAZON NO. 1 MINE SURFACE OWNERSHIP, 10/3/83
2	BLAZON NO. 1 MINE COAL OWNERSHIP, DATED 9/83
3	BLAZON NO. 1 MINE PREMINING & POSTMINING LAND USE, DATED 9/83
4	BLAZON NO. 1 MINE VEGETATION, DATED 2/84
6	BLAZON NO. 1 PREMINING TOPOGRAPHY, DATED 10/5/83
16	SECONDARY ROAD DESIGN, DATED 2/84
17	BLAZON NO. 1 MINE SOILS, DATED 2/84

EXHIBIT 11

SEPTEMBER 6, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON IN RESPONSE TO AUGUST 28, 1985 QUESTIONS FROM UTAH DIVISION OF OIL, GAS & MINING FINAL RECLAMATION OF BLAZON NO. 1 MINE

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH
AMERICAN
EQUITIES, n.v.

September 6, 1985

HAND DELIVERED

Mr. Lowell P. Braxton
Administrator
Mineral Resource Development
and Reclamation Program
Utah Division of Oil, Gas & Mining
355 W. North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Re: Response to August 28, 1985 Questions From
Utah Division of Oil, Gas & Mining
Final Reclamation of Blazon No. 1 Mine

Dear Mr. Braxton:

We are in receipt of your letter of August 28, 1985. Because of the importance attached to the reclamation of the Blazon No. 1 site, we have worked diligently over the past week to respond to all your questions and concerns.

Because of our concerns regarding reclaiming the site prior to the end of the field season (which could be any time after the end of September), we have decided to come directly to your office in Salt Lake City on Tuesday, September 10, 1985 to resolve all questions and concerns of UDOGM with regard to the plan. It is our intent at this meeting to resolve all concerns such that you and your staff can approve the plan. We are anxious to begin reclamation of the site during the week of September 15, thus allowing us sufficient time to adequately perform reclamation work at the site.

We are extremely concerned regarding the long-term monitoring requirements for the site. It is essential that the Division of Oil, Gas & Mining ("UDOGM") and North American Equities ("NAE") have certain workable legal and technical standards by which to monitor the reclamation work for eventual bond release. Therefore, it is in the best interest of both parties that some concurrence be made on actual monitoring requirements. However, we are hopeful that a final

agreement regarding monitoring between your staff and us will not hold up the actual reclamation work. Therefore, we would like to request that UDOGM approve the reclamation plan, if necessary, without the final approval of monitoring. If there are still questions regarding monitoring, we would like to have it stipulated as part of your approval that we work out the exact monitoring requirements within the next sixty (60) to ninety (90) days.

With regard to the questions regarding the underground development waste, we hope that the Office of Surface Mining ("OSM") will render an approval by September 10, 1985. We have contacted Bob Hagen of OSM in Albuquerque, New Mexico, and he has assured us that an opinion and decision will be granted by that date. If no decision is granted or if OSM does not allow placement of the underground development waste in the Old Clear Creek Strip Pit, NAE will plan to utilize as much of the underground development waste material as possible on the portal bench and commit to haul the remaining waste off site for use as fill material.

Lastly, we must re-emphasize the importance attached to reclamation of the Blazon No. 1 site during this field season. We hope that our good faith effort in responding rapidly to your questions and concerns has been noted by your agency. It is also hoped that any unanswered questions or deficiencies that your staff has with regard to our actual reclamation plan can be resolved at a meeting on Tuesday, September 10, 1985.

Thank you for your attention to our responses. We look forward to resolving all remaining concerns.

Sincerely,

NORTH AMERICAN EQUITIES NV

Alan W. Smith
President

RESPONSES TO AUGUST 28, 1985 QUESTIONS FROM
UTAH DIVISION OF OIL, GAS & MINING

NORTH AMERICAN EQUITIES, LTD
BLAZON NO. ! MINE
CARBON COUNTY, UTAH

September 10, 1985

UMC 784.13 Reclamation Plan: General Requirements
Refer to comments under UMC 817.101

RESPONSE: See response under UMC 817.101.

UMC 784.13(b)(5), 817.97(d), 817.111, 817.116-.117 Revegetation

1. A shrub planting plan to establish a minimum of 2410 shrubs per acre (90% of 2677 reference area stocking). This may be done by direct seeding, using transplants, or a combination of both. This plan must identify the species and the amounts of seeds and/or seedlings per acre to be used, a schedule for seeding and/or planting and an estimated cost for bonding.

RESPONSE:
(Addendum to Text on Page 29 of the Reclamation Plan)

NAE will plan to plant shrubs and woody plants as shown on Table 1, Proposed Woody Plant Seed Mixture. Seeding of the woody plant species will occur in ~~late September or October~~. springtime.

2. A commitment to use the established reference area as the standard for determination of reclamation success (as per UMC 817.116) for cover, production and woody plant density.

RESPONSE:
(Addendum to Text on Page 29 of the Reclamation Plan)

NAE is concerned that the previously established reference area does not adequately portray the conditions found in the steep areas to be reclaimed in the forthcoming 1985 reclamation work. As you know, the reclamation plans submitted under the withdrawn permanent program permit application called for complete reclamation work at the site. Presently, NAE plans to restore the site for commercial/industrial uses and will only seed certain steeper slopes. Nonetheless, NAE will attempt to utilize the reference area previously established as a means for determination of reclamation success.

Given the above potential conflicts in reference area conditions versus reseeded steep slope areas, NAE would like the flexibility in the future to work with UDOGM with regard to reclamation success. This might include a slight variance from the conditions found in the reference area.

UMC 784.13 Reclamation Plan - General Requirements

The applicant states that approximately 1410 cubic yards of topsoil are available for redistribution and that 10 to 15 inches of topsoil will be placed on the reclamation areas. The applicant then states in the Postmining Topography Revegetation map that area D will receive six inches of topsoil and eludes that area E was not to receive any topsoil. The applicant now states that the topsoil will be placed over the sediment ponds. A detailed volume of soils redistributed to the reclaimed area must be developed. The volume of any substitute materials must be included in the soil mass volume tabulation. If the soil depth is not uniform in the distribution depth, please discuss the rational. What will be the minimum soil depth?

RESPONSE:
(Addendum to Text on Page 28 of the Reclamation Plan)

NAE will not immediately reclaim the sedimentation ponds, thus no topsoil will be necessary for these sites. The plan for the sediment ponds is to leave them until certain water quality standards are met and then simply convert them to catchment basins for use by Jack Otani in the future. Therefore, no soil will be needed upon removal of the ponds, and the approved seed mixture will be applied to the site at that time.

Included in the reclamation plan, 1410 cubic yards of soil are available for redistribution. This means that approximately 10 to 15 inches of topsoil can be placed throughout the area. The minimum soil depth, where soil is replaced, will be 10 inches. Because of the steepness of the outslope found in area E, no soil will be placed on this slope. However, area E will be left in a roughened condition, fertilized, and netting placed over the top. Likewise, in area D only about half of the site will receive topsoil. The remaining area is too steep and will involve the face-up area at the site. Thus, approximately 13 inches or (10 to 15 inches) will be placed on the flatter slopes of area D. The following indicates the amount of topsoil to be replaced in the various areas as shown on the Postmining Topography Reclamation Map (Map 3):

Area A 3.15 acres - no topsoil

Area B 0.05 acres - 100 cubic yards topsoil at approximately 15 inches

Area C 0.25 acres - 500 cubic yards topsoil at approximately 15 inches

Area D 0.45 acres with only .23 acres receiving topsoil - 400 cubic yards topsoil at approximately 13 inches

Area E 0.5 acres - no topsoil, area is too steep

784.14 Reclamation Plan: Protection of Hydrologic Balance

The applicant must submit a plan of the sediment control measures to be taken to insure the quality and quantity of the surface and groundwater during reclamation activities. The Division requires a plan of control measures to be used in the event that siltation or sedimentation problems occur. A plan must be submitted detailing the methods to be used to prevent any sedimentation impacts to the existing water resources.

RESPONSE:
(Addendum to Text on Page 17 of the Reclamation Plan)

All runoff during reclamation work from Areas B, C, D and E and the existing pad area (surface facilities area) will be routed into existing sedimentation ponds (#17 & # 18 on Map #3).

Straw bale dikes will be used in Area F to control erosion. These straw bales will be placed prior to construction along the downslope (outslope) side of the road to culvert A's location and beyond as shown on Map #3. These straw bales will be maintained until requirements of UMC 817.111-117 are met or until the Division determines that the potential for erosion is minimized and grants approval that sediment control is no longer necessary.

Area F 0.25 acres - 410 cubic yards topsoil at approximately 12 inches

NAE will attempt to spread topsoil in a uniform fashion with topsoil varying in thickness from approximately 10 to 15 inches. It is not the intent of NAE to replace topsoil in an uneven fashion. NAE simply plans to utilize the available topsoil and spread it in an even fashion across those areas designated to receive topsoil which will amount to approximately 10 to 15 inches of topsoil being placed on those areas where topsoil replacement is planned.

UMC 817.22 Topsoil Removal

(e)(1)(i) The applicant states that a soil substitute medium will be taken from the upper outslope of area E. The substituted material should be equal to or more suitable for sustaining vegetation than is the available topsoil. This determination will be based on the analysis of pH, organic matter (%), cation exchange capacity, saturation percentage, alkalinity, total nitrogen, available phosphorus, sodium absorption ratio, potassium, calcium, magnesium, electrical conductivity, and texture class.

RESPONSE:

(Addendum to Text on Page 27 of the Reclamation Plan)

Existing material found on the outslope of the portal bench will be utilized during reclamation, as this slope is too steep to adequately spread topsoil on. Once grading work is complete on the portal bench area, including the outslope from the portal bench (area E), two soil samples will be taken and analyzed for the above parameters. Based on this analysis and the analyses for certain fertility parameters, NAE will contact UDOGM with regard to fertilization, type and quantity.

(e)(1)(ii)(b) The applicant must submit laboratory data that substantiates that the substitute material is the best available medium for reclamation. The applicant must state the volume of substitute material that will be used.

RESPONSE:

Planned work on the portal cut-slope area is the only available medium for reclamation. As stated above, NAE does not plan to obtain a separate source of meterial for use in the portal face-up. Simply the material found on the outslope area will be used as "substitute" material.

(e)(1)(ii)(c) The laboratory must use standard methods of analysis. The methods of analysis must be indicated.

UMC 817.101 Backfilling and Grading

The applicant has not adequately responded to the comments concerning backfilling and grading. Postmining contours of the area are virtually unchanged from those seen currently on the site at present. The portal bench area will be highly visible and will not meet the requirements for Approximate Original Contours. The applicant shall submit a new contour map showing a more suitable relief of the area with slopes not exceeding those found on the site during premining conditions. Where possible, the slopes shall be reduced to a minimum to enhance vegetation growth and to reduce erosion during establishment of vegetative cover.

RESPONSE:
(Addendum to Text on Page 25 of the Reclamation Plan)

Procedures for Backfilling & Grading of Portal Bench & Above

1. Utilize underground development waste to cover the portals with a minimum of four feet above the coal seam. Place in lifts of one to two feet and compact as much as possible. A dozer and/or a frontend loader will be utilized. (Place or mark the four foot line above the coal seam with orange paint or other visible means.)

2. Use backhoe to reach downslope of portal bench and pull back material as far as possible. The backhoe will place material on the underground development waste and a dozer will spread the material in one to two foot lifts and will work the slope to an approximate two foot (horizontal) to one foot (vertical) slope.
   With inclinometer, NAE will visually site a line on the portal face-up area to establish crest of the 2:1 slope.
   NAE will make sure that this material is placed on cut material from the original portal development work.
   It should be noted that the complete backfilling or total elimination of the portal face-up area is not possible.

3. In those areas where some failure has occurred above the portal entries, NAE will try to maintain a 2:1 slope to completely cover the collapsed area. In "brow" or open area beneath the competent sandstone above the entry, NAE will cover and dress the area with a backhoe or dozer to eliminate voids even if subject slope slightly exceeds 2:1.

4. Topsoil will be spread on the 2:1 slope.

5. Appropriate revegetation measures will be performed (see Page 17 of the Reclamation Plan).

Area E

6. The upper portion of the portal outslope will be pulled back by backhoe and left in roughened condition at approximately 1.6 (horizontal) to

1 (vertical) slope. The crest and toe of this area will blend into the overall slope. Some topsoil will be allowed to drift downward on the slope, as possible.

7. The middle part of the portal outslope will be left as it is now existing. Necessary reclamation functions will be performed, e.g. fertilizing, seeding, mulching and netting.

8. On the lower portion of the portal outslope where it has been oversteepened by cutting, these areas will be dressed and graded with a dozer to a 1.6 (horizontal) to 1 (vertical) slope. This will eliminate or minimize the potential for toe erosion. This area will be revegetated as set forth in the Reclamation Plan for Area E.

Area F

~~9. This area will be ripped or scarified and topsoil will be replaced. Re-vegetation will be undertaken as per the Reclamation Plan for Area F.~~

UMC 817.106 Regrading or Stabilizing Rills and Gullies

The applicant must commit in writing to regrade and seed areas of rills and gullies that are deeper than nine inches.

RESPONSE:
(Addendum to Text on Page 25 of the Reclamation Plan)

On the reseeded areas, NAE will work with UDOGM to stabilize and seed any areas where rills and gullies deeper than nine inches form.

UMC 817.133 Post Mining Land Uses

The legal owner of record is Calvin K. and Milton E. Jacob - not Jack Otani. In order to approve the land use change the landowner of record must request such in writing and demonstrate that the criteria of UMC 817.133(c) are met.

RESPONSE:

~~On September 10, 1985, the UDOGM was able to verify with the Carbon County Clerk and Recorder that Jack Otani is indeed the owner of record of the mine site.~~

UMC 817.11 Signs and Markers

NAE will retain and maintain all signs and markers until after the release of all bonds for the permit area. These signs shall include identification signs displayed at each point of access, perimeter markers of the disturbed areas and stream buffer zone markers in areas where reclamation is within 100 feet of Mudd Creek.

UMC 817.95 Air Resourses Protection

NAE will plan and employ fugitive dust control measures during reclamation work including, where necessary:

1. Periodic watering of roads

2. Prompt revegetation of regraded lands

UMC 817.99 Slides and Other Damage

NAE will notify the Division by the fastest available means of any slides in the reclaimed area which may have a potential adverse effect on public property, health, safety or the environment.

UMC 784.13(b)(5), 817.97(d), 817.111, 817.116-.117 Revegetation (continued)

3. A detailed monitoring plan to monitor reclaimed areas throughout the 10-year liability period. This plan is to include the various parameters to be monitored, sampling methodology ad timing (uear(s) ad seaon [this should include sampling for bond release the last 2 years of the liability period]).

RESPONSE:

NAE will plan to monitor the reseeded area as follows:

1st year - NAE will perform a reconnaisance survey on the reseeded site.

2nd year - NAE will monitor the reseeded area for cover and density.

3rd year - Same as 2nd year

5th year - Same as 3rd year

9th year - NAE will monitor the reference area and the reseeded area for density, cover and productivity.

10th year - Same as 9th year.

Transects will be randomly located within the reference area and the reseeded area. Sample size will be dependent upon the number needed to attain statistical adequacy using at least minimum sample size as presented in UDOGM guidelines. This revegetation monitoring will provide valuable site specific informaion, especially in the event it becomes apparent that some future modification to the success criteria will be required.

EXHIBIT 12

SEPTEMBER 25, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM IN ANSWER TO BRAXTON LETTER OF AUGUST 28, 1985, REQUESTING ADDITIONAL INFORMATION AND CALCULATIONS

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH
AMERICAN
EQUITIES, n.v.

September 25, 1985

Mr. Lowell P. Braxton
Administrator
Mineral Resource Development & Reclamation Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Final Response to August 28, 1985 Question From
Utah Division of Oil, Gas & Mining

Dear Mr. Braxton:

In reply to your letter of August 28, 1985, North American Equities, NV ("NAE") is submitting the enclosed responses and calculations concerning the reclamation for the Blazon No. 1 mine surface area.

These responses and calculations have been completed to the best of NAE's ability with close communication between NAE, ACZ INC., and Division of Oil, Gas & Mining personnel. In view of the fact that the construction season in the Blazon No. 1 area is rapidly drawing to a close for this year, NAE is becoming particularly concerned that an approval be issued for reclamation of the Blazon No. 1 Mine as soon as possible.

In addition to the responses and calculations attached to this letter, copies of Map 2, Reclamation Plan, and Map 3, Postmining Topography/Revegetation are included. These maps have been revised to reflect the necessary changes in the Blazon No. 1 Mine Reclamation Plan to answer the the Division of Oil, Gas & Mining questions.

Also included are maps previously requested by the Division of Oil, Gas & Mining. The additional maps enclosed with this letter are:

Map 1 - Blazon No. 1 Mine Surface Ownership, Dated 10/3/83
Map 2 - Blazon No. 1 Mine Coal Ownership, Dated 9/83
Map 3 - Blazon No. 1 Mine Premining & Postmining Land Use, Dated 9/83
Map 4 - Blazon No. 1 Mine Vegetation, Dated 2/84
Map 6 - Blazon No. 1 Premining Topography, Dated 10/5/83
Map 16 - Secondary Road Design, Dated 2/84
Map 17 - Blazon No. 1 Mine Soils, Dated 2/84

We have included copies of two overburden analysis reports dated October 5, 1983 and February 25, 1984 from Bookcliffs Commercial Laboratories. These analyses were verbally requested by Ms. Susan Linner and Mr. Jim Leatherwood of your office.

North American Equities believes that the enclosed responses, maps, calculations, and analyses answers all the questions submitted by the Division of Oil, Gas & Mining. If you have any questions concerning the enclosed material, please contact Mr. Conrad Parrish of ACZ INC. at (303) 879-6260 for clarification. North American Equities appreciates your expeditious handling of this matter to allow us to complete reclamation this season.

Sincerely,

NORTH AMERICAN EQUITIES, NV

Conrad Parrish for Alan W. Smith

Alan W. Smith
President

Enclosures

RESPONSES TO AUGUST 28, 1985 QUESTIONS FROM
UTAH DIVISION OF OIL, GAS & MINING

NORTH AMERICAN EQUITIES NV
BLAZON NO. 1 MINE
CARBON COUNTY, UTAH

September 17, 1985

UMC 784.13 Reclamation Plan: General Requirements
Refer to comments under UMC 817.101

RESPONSE: See response under UMC 817.101.

UMC 784.13(b)(5), 817.97(d), 817.111, 817.116-.117 Revegetation

1. A shrub planting plan to establish a minimum of 2410 shrubs per acre (90% of 2677 reference area stocking). This may be done by direct seeding, using transplants, or a combination of both. This plan must identify the species and the amounts of seeds and/or seedlings per acre to be used, a schedule for seeding and/or planting and an estimated cost for bonding.

RESPONSE: NAE will plan to plant shrubs and woody plants as shown on Table 1, Proposed Woody Plant Seed Mixture. Seeding of woody plants will occur in springtime.

The establishment of 2410 shrubs per acre seems to be excessive. Revegetation rates for woody plant species are planned to adequately support the use of the area following reclamation by wildlife. Therefore, NAE proposes a revegetation standard of 1000 woody plant stems per acre based upon research addressing wildlife forage requirements on reclaimed lands (Mathews, 1983). While this standard represents a variance from the 90% stocking level referred to by UDOGM, it adequately addresses the regulatory intent of equivalent and productive postmining land use. Likewise, it is our understanding that

Table 1

PROPOSED WOODY PLANT SEED MIXTURE

Species	Pounds Pure Live Seed/Acre
Shrubs and Trees:	
Acer glabrum (Rocky Mountain Maple)	3.0
Amelanchier almifolia (Serviceberry)	2.5
Artemisia tridentata ssp raseyana (Mountain Big Sagebrush)	0.1
Mahonia repens (Oregon grape)	2.0
Pseudotsuga menziesii (Douglas fir)	1.0
Ribes cereum (Wax currant)	1.0
Rosa woodsii (Woods rose)	1.5
Sambucus cerulea (Blue Elderberry)	1.0
Symphoricarpos oreophilus (Snowberry)	2.0
	14.1
Transplants along stream:	
Salix spp. (Willow)	150 cuttings
Cornus stolanifera (Red-oisier dogwood)	50 plants
Prunus virginiana (Chokecherry)	50 plants
Populus tremuloides (Aspen)	150 seedlings

Susan Linnear of UDOGM reviewed this concept in September of 1983 and indicated that a stocking density of 1,000 woody stems per acre would be acceptable given the limited areal disturbance. It should be noted that even less acreage will be reseeded at this time than what was previously planned.

Seeding of the woody plant species will occur in late September or October. Additional details regarding seeding have been discussed in detail in the previously submitted reclamation plan. The cost for the woody plant seeds is estimated at $820.00 per acre.

2. A commitment to use the established reference area as the standard for determination of reclamation success (as per UMC 817.116) for cover, production and woody plant density.

RESPONSE: NAE is concerned that the previously established reference area does not adequately portray the conditions found in the steep areas to be reclaimed in the forthcoming 1985 reclamation work. As you know, the reclamation plans submitted under the withdrawn permanent program permit application called for complete reclamation work at the site. Presently, NAE plans to restore the site for commercial/industrial uses and will only seed certain steeper slopes. Nonetheless, NAE will attempt to utilize the reference area previously established as a means for determination of reclamation success.

Given the above potential conflicts in reference area conditions versus reseeded steep slope areas, NAE would like the flexibility in the future to work with UDOGM with regard to reclamation success. This might include a slight variance from the conditions found in the reference area.

3. A detailed monitoring plan to monitor reclaimed areas throughout the 10-year liability period. This plan is to include the various parameters to be monitored, sampling methodology and timing (year(s) and season [this should include sampling for bond release the last 2 years of the liability period]).

RESPONSE: NAE will plan to monitor the reseeded area as follows:
1st year - NAE will perform a reconnaissance survey on the reseeded site.
2nd year - NAE will monitor the reseeded area for cover and density.
3rd year - Same as 2nd year.
5th year - Same as 3rd year.
9th year - NAE will monitor the reference area and the reseeded area for density, cover and productivity.
10th year - Same as 9th year.

Transects will be randomly located within the reference area and the reseeded area. Sample size will be dependent upon the number needed to attain statistical adequacy using at least minimum sample size as presented in UDOGM guidelines. This revegetation monitoring will provide valuable site specific information, especially in the event it becomes apparent that some future modification to the success criteria will be required.

~~NAE reserves the right to review the available data on rainfall in the area. If rainfall data indicates that the proper liability period is 5 years, NAE will revise this monitoring plan to be consistent with the liability period.~~

UMC 784.13 Reclamation Plan - General Requirements

The applicant states that approximately 1410 cubic yards of topsoil are available for redistribution and that 10 to 15 inches of topsoil will be placed on the reclamation areas. The applicant then states in the Postmining Topography Revegetation map that area D will receive six inches of topsoil and eludes that area E was not to receive any topsoil. The applicant now states that the topsoil will be placed over the sediment ponds. A detailed volume of soils redistributed to the reclaimed area must be developed. The volume of any substitute materials must be included in the soil mass volume tabulation. If the soil depth is not uniform in the distribution depth, please discuss the rational. What will be the minimum soil depth?

RESPONSE: NAE will not immediately reclaim the sedimentation ponds, thus no topsoil will be necessary for these sites. The plan for the sediment ponds is to leave them until certain water quality standards are met and then simply convert them to catchment basins for use by Jack Otani in the future. Therefore, no soil will be needed upon removal of the ponds and the approved seed mixture will be applied to the site at that time.

Included in the reclamation plan, 290 cubic yards of soil are available for redistribution. This means that approximately 6 inches of topsoil can be placed throughout the area. Placing of 6 inches of topsoil will require borrowing 280 cubic yards. The minimum soil depth, where soil is replaced, will be 6 inches. Because of the steepness of the outslope found in area E, no soil will be placed on this slope. However, area E will be left in a roughened condition, fertilized, and netting placed over the top. Likewise, in area D, only about half of the site will receive topsoil. The remaining area is too steep and will involve the face-up area at the site. Thus, approximately 6 inches will be placed on the flatter slopes of area D. The following indicates the amount of topsoil to be replaced in the various areas as shown on the Postmining Topography Reclamation Map (Map 3):

Area A 3.15 acres - no topsoil

Area B 0.05 acres - No topsoil will be placed in this area. The area will be rounded, scarified and revegetated

Area C 0.25 acres - 200 cubic yards topsoil at approximately 6 inches

Area D 0.45 acres with only regraded portions receiving topsoil - 360 cubic yards topsoil at approximately 6 inches

Area E 0.5 acres - no topsoil, area is too steep

~~Area F 0.25 acres - No topsoil. The area will be rounded, scarified and revegetated.~~

~~NAE will attempt to spread topsoil in a uniform fashion. It is not the intent of NAE to replace topsoil in an uneven fashion.~~

784.14 Reclamation Plan: Protection of Hydrologic Balance

The applicant must submit a plan of the sediment control measures to be taken to insure the quality and quantity of the surface and groundwater during reclamation activities. The Division requires a plan of control measures to be used in the event that siltation or sedimentation problems occur. A plan must be submitted detailing the methods to be used to prevent any sedimentation impacts to the existing water resources.

RESPONSE: (Addendum to text on page 17 of the Reclamation Plan)

All runoff during reclamation work from Areas B, C, D, and E and the existing pad area (surface facilities area) will be routed into existing sedimentation ponds (#17 and #18 on Map 3).

Straw bale dikes will be used in Area F to control erosion. These straw bales will be placed prior to construction along the downslope (outslope) side of the road to culvert A's location and beyond as shown on Map 3. Sediment fences will be used in area F and area D as shown on Map No. 2. These straw bales and sediment fences will be maintained until requirements of UMC 817.111-117 are met or until the Division determines that the potential for erosion is minimized and grants approval that sediment control is no longer necessary, whichever comes first.

The applicant must submit a monitoring plan for the reclamation phase and post-mining phase in accordance with the DOGM water monitoring guidelines. Continued evaluation of the water monitoring data by the Division will determine the duration of the monitoring program. The

Division may approve termination of the monitoring program prior to bond release upon demonstration that mining activities have not or will not impact the existing water resources in the area.

RESPONSE: NAE will continue water monitoring at the site during June and September of each year for the duration of the bonding period. However, NAE would like to revise its existing monitoring program to include only a site above and below the mine. The proposed monitoring sites are sites B1 and B3. In addition, NAE will monitor any discharge from the sedimentation ponds found at the site per the requirements of the NPDES permit in force.

NAE proposes to reduce the parameters to be tested. Table 2, Proposed Water Quality Parameter List, indicates the parameters that NAE proposes to test for the duration of the bond period. The UDOGM should accept this request as a formal request to modify the existing monitoring program presently undertaken by NAE.

In order to demonstrate the requirements of 817.464, NAE will install and maintain a single stage sampler at the location shown on Map 3. Samples will be collected monthly during the snow-free months for the last 12 months prior to bond release. The sampler will be installed to delineate between the 10-year, 24-hour event and larger event. All water quality monitoring data will be submitted to DOGM on a monthly basis.

NAE proposes to take one (1) water sample weekly during the reclamation period. The sample will be taken in Mudd Creek, downstream of the reclamation activity. Parameters tested will be Total Suspended Solids and Settleable Solids. Reclamation water sample data will be submitted to DOGM on a monthly basis.

UMC 784.15 Reclamation Plan: Postmining Land Use

The calculations presented in Exhibit 8 for the requested peak flow values are incorrect. The Division has calculated the values for drainage area A and C as follows:

Table 2

PROPOSED WATER QUALITY PARAMETER LIST

Field Measurements:

- Water Levels or Flow
- pH
- Specific Conductivity (umhos/cm)
- Temperature (°C)

Laboratory Measurements: (mg/l)

- Total Dissolved Solids
- Total Hardness (as $CaCO_3$)
- Carbonate (CO_3^{-2})
- Bicarbonate (HCO_3^{-})
- Calcium (Ca)
- Chloride (CL^{-})
- Dissolved Iron (Fe)
- Magnesium (Mg)
- Manganese (Mn)
- Potassium (K)
- Sodium (Na)
- Sulfate (SO_4^{-2})

Drainage area A:

100 yr-24 hr peak flow: 1063.9 cfs

Drainage area C:

100 yr-24 hr peak flow: 137.7 cfs

These values differ significantly from the values presented by NAE. It appears that incorrect values for the rainfall intensity (i) and the correction coefficient (c) were used in the calculation using the rational formula. The requirements of 817.44 require permanent diversions to be designed for the 100 yr-24 hr precipitation event. The Division will require that plans be submitted demonstrating the capacity of culverts A (if to be left), B, C, and D to pass this event or plans to be submitted for their removal. NAE may contact the Division for details of the above calculations for submittal or submit modified calculations for the 100 yr-24 hr event.

RESPONSE: NAE has calculated the peak flows per the attached calculations. The design event has been determined to be the 50-year, 24-hour precipitation event based on the fact that no channel diversion exists. Culverts B and C are capable of passing the design event as demonstrated in the attached calculations. Culverts B and C will be left in place. The existing culvert D will be supplemented by the installation of a parallel culvert identified as Culvert D'. Culvert D' will be a 42" diameter corrugated metal pipe. Design calculations for Culvert D' can be found Figure 1, Culvert D' Calculations.

The calculations for Culvert D indicate that a 42" culvert with headwall will carry the required 36 cfs remaining after the 24" diameter culvert discharges the 26 cfs.

The discharge from Culvert D will require that extra care be taken in the channel of Mudd Creek to ensure that excess erosion does not take place due to the culvert discharge. Calculations for discharge velocity from Culvert D indicate that riprap reinforcement in the area of the culvert discharge will be adequate if riprap with a D_{50} of 24" is

installed in this area. Figure 2, Culvert D' Outlet Details shows the configuration of the riprap to be installed in the Mudd Creek channel at the outlet of the 42" diameter culvert.

In order to comply with 817.44, the development waste stockpile (area 24 on Map 2) will be removed to the original ground surface. The area will be regraded with the channel equivalent to the undisturbed channel above the disturbed area. The area will be reseeded per the revegetation plan. Straw bales will be installed through the length of the restored channel area as needed to provide temporary sediment control.

Culvert A

Culvert A will be removed. The channel configuration in the area of the removed Culvert A will be as shown on the Figure 3, Culvert A Channel Restoration. The channel configuration determined for the restored channel in the vicinity of Culvert A was determined from Figure 4, Culvert A Channel Calculations.

Figure 1
CULVERT D' CALCULATIONS

Hydrologic input parameters

Area = 135 ac
CN = 64 (Ref CN for Mudd Creek)
T_c = .2923 hrs
Hydrologic length = 4700'
Avg slope = 69.5
50-yr, 24-hr event = 3.29 in
Storm = SCS Type 2
AMC Condition II

Existing 24" culvert with H/D = 2
= 26 cfs from culvert nomograph

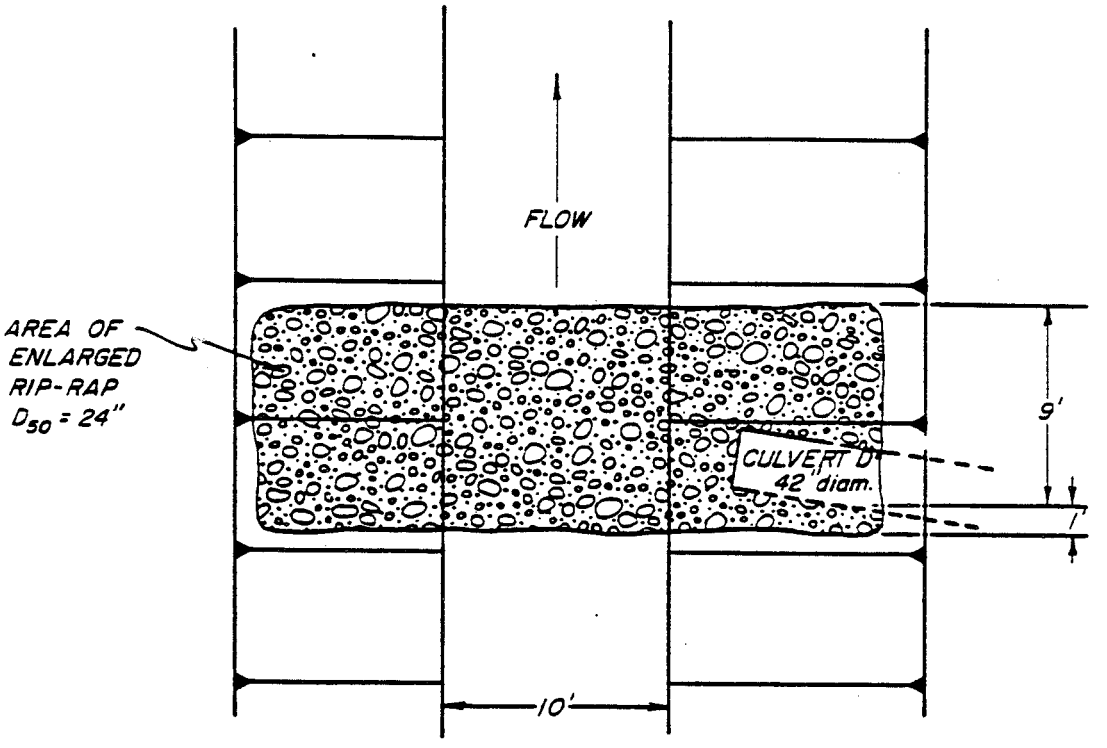
Required flow = 129-26 = 123 cfs

Use H/D = 2
42" culvert next to 24" culvert will carry required flow, from culvert nomograph

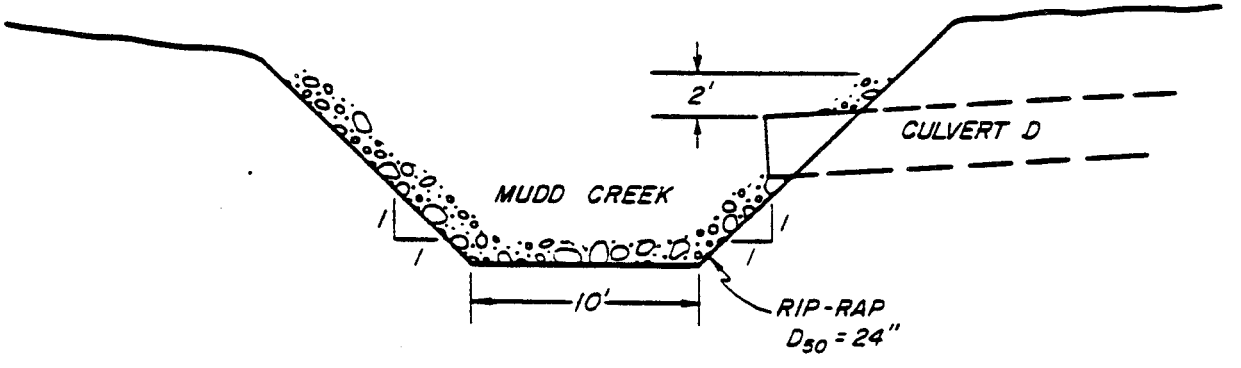
Discharge Velocity, 42" culvert

V = Q/A = 126/9.62 = 13.0 ft/sec

Riprap D_{50} = 24" for small area around culvert discharge



PLAN VIEW
NO SCALE



CROSS SECTION
NO SCALE

CULVERT D' OUTLET DETAILS

FIGURE 2

Figure 3

Culvert A Channel Calculations

Channel Slope = 0.035 = 3.5%

$n = .035$
$Q = 480$ cfs

$D = (Qn/K\,S^{1/2})^{.375}$

Use $K = 11.1$

$D = 2.25$ ft

Velocity check

$V = (1.49/n)\,R^{.667}\,S^{.5}$

$R = \frac{a}{wp} = \frac{41.3}{23.1} = 1.78$

$V = 11.7$ ft/sec

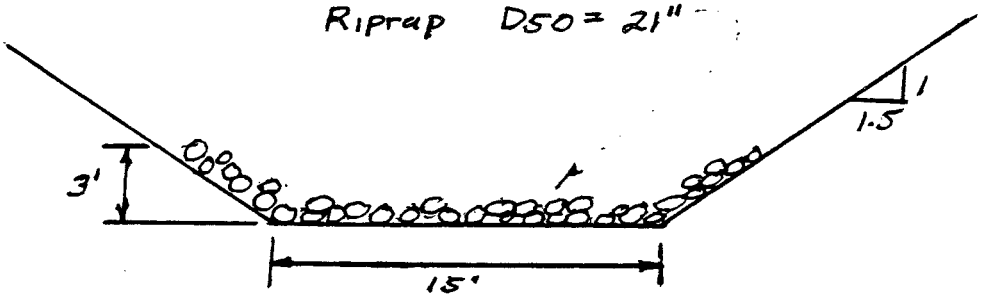
Riprap Sizing

With $V = 11.7$

Riprap $D_{50} = 21''$

Figure 4

Culvert A Channel Restoration



Channel Section

Channel Slope = 3.5%

(e)(1)(i) The applicant states that a soil substitute medium will be taken from the upper outslope of area E. The substituted material should be equal to or more suitable for sustaining vegetation than is the available topsoil. This determination will be based on the analysis of pH, organic matter (%), cation exchange capacity, saturation percentage, alkalinity, total nitrogen, available phosphorus, sodium absorption ratio, potassium, calcium, magnesium, electrical conductivity, and texture class.

RESPONSE: Existing material found on the outslope of the portal bench will be utilized during reclamation, as this slope is too steep to adequately spread topsoil on. Once grading work is complete on the portal bench area, including the outslope from the portal bench (area E), two soil samples will be taken and analyzed for the above parameters. Based on this analysis and the analyses for certain fertility parameters, NAE will contact UDOGM with regard to fertilization, type, and quantity.

(e)(1)(ii)(b)

The applicant must submit laboratory data that substantiates that the substitute material is the best available medium for reclamation. The applicant must state the volume of substitute material that will be used.

RESPONSE: Planned work on the portal cut-slope area is the only available medium for reclamation. As stated above, NAE does not plan to obtain a separate source of material for use in the portal face-up. Simply the material found on the outslope area will used as "substitute" material.

(e)(1)(ii)(b)

The applicant must submit laboratory data that substantiate that the substitute material is the best available medium for

reclamation. The applicant must state the volume of substitute material that will be used.

RESPONSE: As mentioned above, the material on the outslope will be used as "substitute" material, as it the only available medium for reclamation on this area. The area itself is quite small; therefore, the amount of material is relatively small.

The planned reclamation calls for utilizing a backhoe to pull back as much material as possible from beneath the portal bench. This material will be used to cover development waste placed on the portal which will conversely be covered with topsoil. In performing this operating, the outslope from the portal bench will be left in somewhat roughened condition with slope changes for erosion control.

(e)(1)(ii)(c)

The laboratory must use standard methods of analysis. The methods of analysis must be indicated.

RESPONSE: NAE plans to use Bookcliffs Commercial Laboratories in Steamboat Springs, Colorado, for analytical work. This laboratory uses standard methods of analysis on all samples. All analyses performed by this lab are according to EPA, USGS, OSM, or other approved analytical standards. Attached as Table 3, Soil Analysis is the methods of analyses for the above parameters.

UMC 817.25 Topsoil: Nutrients and Soil Amendments

The applicant states that the soil will be tested for nitrate - nitrogen and phosphorus. The test must be for total nitrogen and available phosphorus. Other analysis must include pH, calcium, magnesium, sodium, sodium adsorption ratio, electrical conductivity, texture and saturation percentage. These tests must be done by a Division approved laboratory. The laboratory must use standard methods of analysis. The methods of analysis along with nutrient recommendations must be indicated.

Table 3

SOIL ANALYSIS

Parameter	Method	Reference
Saturation %	Method 27a Saturation Percentage from Oven Drying	1
pH	Method 21a pH Reading of Saturated Soil Paste	1
EC	Method 4b Direct Indicating Bridge	1
Calcium	Method 3a Saturation Extract Analysis by ICP	1
Magnesium	Method 3a Saturation Extract Analysis by ICP	1
Sodium	Method 3a Saturation Extract Analysis by ICP	1
SAR	Calculation	
Texture	Method 43-S Hydrometer Method of Particle-Size Analysis	2
Nitrogen, Total	Method 83-3 Regular Macro-Kjeldhal Method	2
Phosphorus, Available	NH_4HCO_3-DTPA Extraction Procedure-Analysis by Automated Colorimetric	3
Potassium, available	NH_4HCO_3-DTPA Extraction Procedure-Analysis by Automated Colorimetric	3
Organic Matter	Method 24 Organic Matter	1
Cation Exchange Capacity	Method 19 Cation Exchange Capacity	1
Alkalinity - Lime %	Method 23c Alkaline-Earth Carbonates from Acid Neutralization	1

1 USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils" 1969

2 ASA Monograph No. 9 Methods of Soil Analysis, 1965

3 Soltanpour, P.M. "Soil Test Methods Used at Colorado State University" 1981

RESPONSE: NAE will test topsoil for total nitrogen and available phosphorus, rather than nitrate-nitrogen and phosphorus. NAE will also conduct tests for pH, calcium, magnesium, sodium, sodium adsorption ratio, electrical conductivity, texture, and saturation percentage. These tests will be completed by Bookcliffs Commercial Laboratories in Steamboat Springs, Colorado; this laboratory is a division-approved laboratory. Bookcliffs Commercial Laboratories will use standard methods of analyses as shown in Table 3, Soil Analysis.

As explained on page 28 and 29 of the Reclamation Plan submitted to the Division on May 29, 1985, following grading activities, a sample program will be initiated. Based on the results of this sampling program, NAE will submitted recommended fertilizer application rates to UDOGM.

UMC 817.43 Hydrologic Balance: Diversion and Conveyance of Overland Flow, Shallow Ground Water Flow, and Ephemeral Streams

Review could not be completed for Ditches A and B. The drainage area for ditch B has not been delineated on map 11, and subsequently the Division can not determine a time of concentration value or the watershed area draining to this ditch. Exhibit 8 depicts ditch A (map 11) to be the mud creek channel and the supporting calculations for the peak flow value in that exhibit appear to be for that drainage area (area A). The application must depict clearly the area draining to these diversions and their exact locations before review can proceed. It is probable that the peak flow calculations presented in exhibit 8 for these diversions are incorrect. Refer to above 785.14 comments.

RESPONSE: Peak flow calculations indicate that Ditch B will be required to pass 5.2 cfs during the 10 year, 24 hour precipitation event. Based on this 5.2 cfs, Ditch B has been designed per Figure 5, Ditch B Design Calculations. The drainage area for Ditch B is shown on the following page.

Design calculations on this ditch have resulted in a ditch design as shown on Figure 6, Ditch B Design. The design of Ditch B requires that

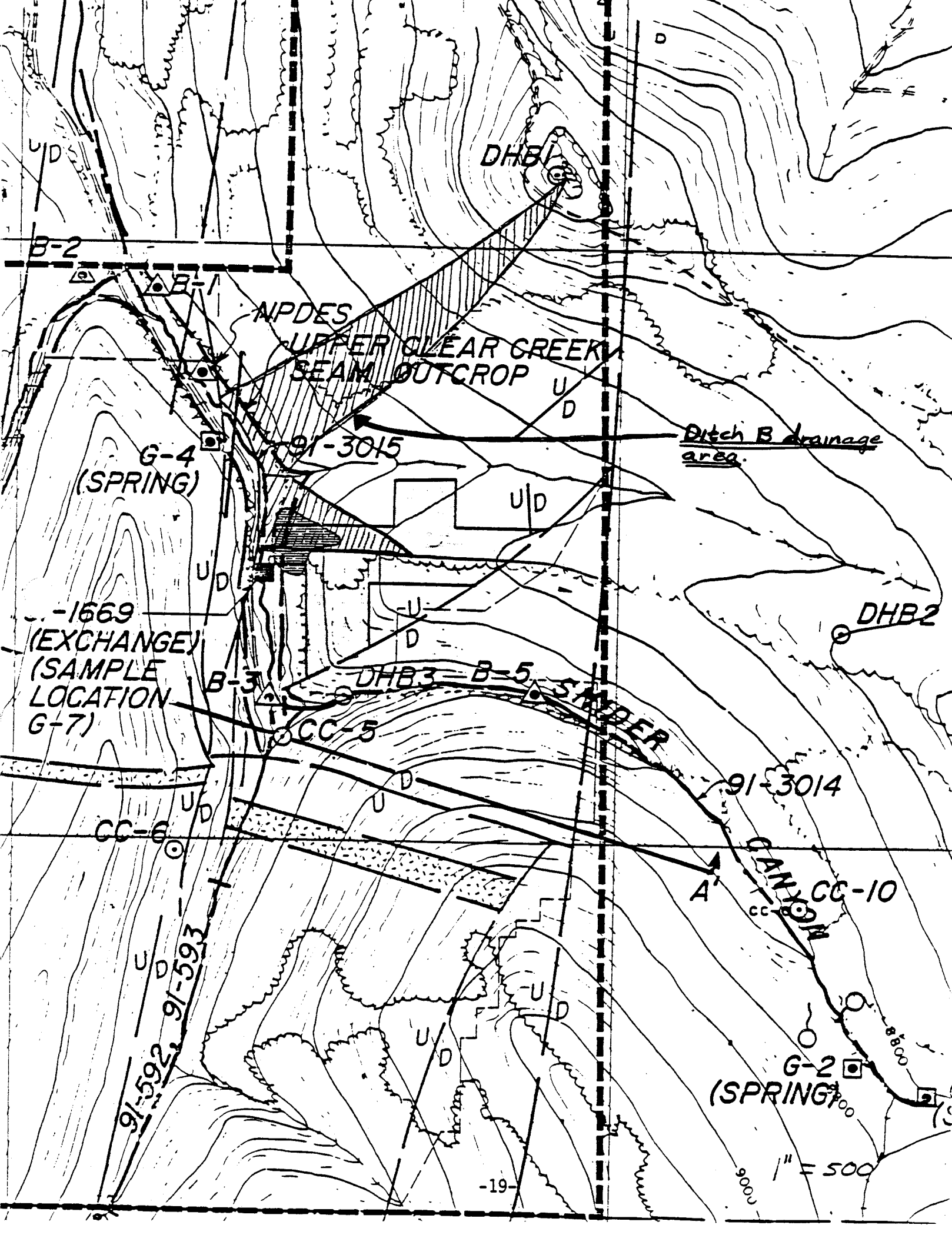

DHB1
B-2
B-1
NPDES
UPPER CLEAR CREEK
SEAM OUTCROP
Ditch B drainage area
91-3015
G-4
(SPRING)
-1669
(EXCHANGE)
(SAMPLE
LOCATION
G-7)
DHB2
B-3
DHB3
B-5
SNIDER
CC-5
91-3014
CC-6
A
A'
CANYON
CC-10
91-593
91-592
G-2
(SPRING)
8800
9000
1" = 500'

Figure 5

DITCH B DESIGN CALCULATIONS

Slope - Upper 20/170 = 0.118

Lower 10/530 = 0.019

Ditch sizing - minimum slope section, 2' bottom width, 2H:1V side slopes

$D = (Qn/KS^{\frac{1}{2}})^{0.375}$

Q = 5.2 cfs

n = 0.022

K = 8.50

S = 0.019

D = 0.42 ft

Velocity check, maximum slope section

D = 0.24'

$V = (1.49/n)R^{0.667}\ S^{0.5}$

where

n = 0.022

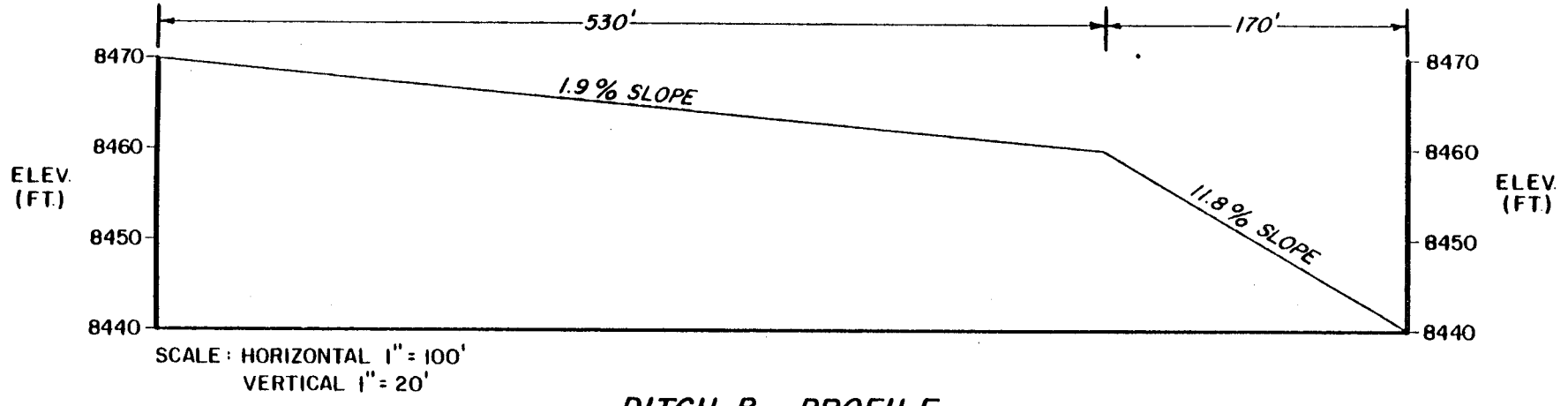
R = 0.201

S = 0.118

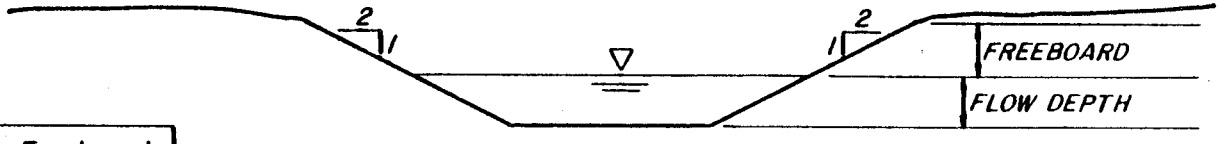
V = 8.0 ft/sec

P/r = 17

Riprap d_{50} = 8"



DITCH B - PROFILE



Slope	Flow Depth	Freeboard
1.9%	0.42 ft.	0.58 ft.
11.8 %	0.24 ft.	0.76 ft.

DITCH B - CROSS SECTION

NO SCALE

DITCH B DESIGN

FIGURE 6

riprap with a d_{50} of 8" be installed in the last 170 feet of this ditch.

The applicant needs to provide calculations demonstrating that the Mud Creek channel and flood plain is capable of passing the 100 yr-24 hour precipitation event. Additionally, the applicant must address UMC 817.44(d)(1-3) under stream channel diversions or present evidence that Mud Creek has not been altered. The Division files contain inspection memos dated September 18, 1980 and October 20, 1980 that indicate the channel was diverted and rip rapped by Blazon Company. Please clarify.

RESPONSE: NAE does not believe there will be a problem in the Mud Creek channel and floodplain and its ability to pass the 100 year, 24 hour precipitation event. The valley in the area of the Blazon operation is quite wide and should have not problem handling a 100 year, 24 hour precipitation event.

NAE does not believe that the Mud Creek channel has been altered. Three culverts (A, B, and C) have been placed in the Mudd Creek channel to facilitate access to the actual mining site; however, NAE does not believe that the stream channel was altered in any substantial way.

NAE has completed calculations to demonstrate that the Mudd Creek channel, as it currently exists, is capable of passing the 50-year, 24-hour precipitation event. Please see the attached calculations for Mudd Creek.

The applicant must include plans for the reclamation of the channel bank after the removal of the culvert. These plans must include recontouring of the bank and design for rip rap protection. The applicant must also state when the culvert will be removed. Figure 1 in the August 8, 1985 correspondence from NAE indicates the culvert will be removed prior to any grading or seeding. The response to UMC 817.44(c) on page 14 indicates that the culvert will be removed following topsoil and reseeding of the portal bench area. The applicant must also include what time of year the culvert will be removed.

RESPONSE: NAE plans to remove Culvert A as shown on the Reclamation Plan Map (Map 2). This culvert is approximately 25 feet in length. NAE plans to gain access across culvert A to the portal for reclamation work. After reclamation work is completed on the portal area, NAE plans to remove culvert A. Thus, culvert A will be removed during the late fall of 1985 following topsoiling and reseeding of the portal bench area. Culvert A channel reclamation is shown on Figure 4, Culvert A Channel Restoration.

UMC 827.46 Hydrologic Balance: Sedimentation Ponds

UMC 817.46(u) and 817.42(a)(2) both require that sedimentation ponds shall be left onsite until the above requirements are met. The applicant must submit plans and a commitment to meet the requirements of these two regulations before approval can be granted.

RESPONSE: At the request of UDOGM, NAE will plan to leave the sediment ponds onsite until above water quality and revegetation standards are met. After release of bond, the culvert spillways will be removed from the ponds. The spillway excavations will be regraded and revegetated following removal of the culverts. Calculations and designs for the sediment ponds are attached.

UMC 817.71 Disposal of Excess Spoil and Underground Development Waste

The Division has requested a variance from OSM which would allow this action (use of a portion of underground development for disposal in the Old Clear Creek Strip Pit). As of today, OSM has not responded to this request. Therefore, this issue will be resolved at a later date.

RESPONSE: It is apparent that approval from OSM to dispose of the underground development waste in the old Clear Creek strip will not be forthcoming. The following alternate plan has been developed for the disposal of the underground development waste.

As much underground development waste as possible will be disposed of on the portal bench. Calculations indicate that all of the waste can be disposed of on the portal bench. Disposal of the waste material on the portal bench will be in accordance with Figure 7, Typical Section Reclaimed Mine Bench. Care will be taken during the placement of underground development waste material on the mine bench to ensure that waste material is placed only on the cut portion of the mine bench and no waste material will be placed on the fill portion of the mine bench.

Underground development waste material which cannot be disposed of on the mine bench will be hauled to the alternate waste disposal location shown on Map 2. Disposal of underground development waste material at the alternate waste disposal location will be in accordance with the pile geometry shown on Figure 7, Typical Section Reclaimed Mine Bench. The primary constraints on this section are that slopes of the final contoured surface will not exceed 2H:1V. The area will be covered with a total of 4 feet combined topsoil and cover material. Following placement of the topsoil and cover material, the area will be contoured and revegetated.

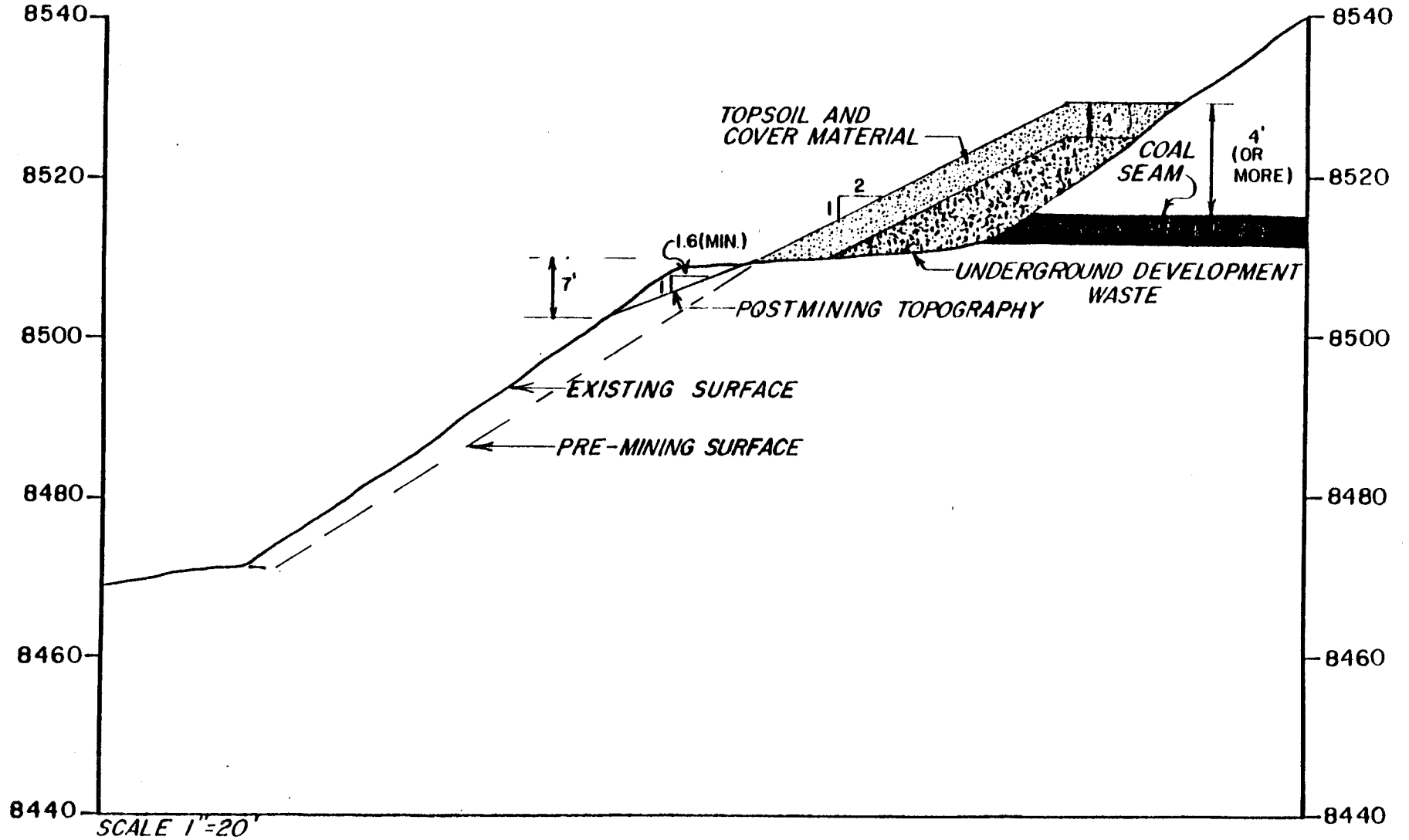
UMC 817.101 Backfilling and Grading

The applicant has not adequately responded to the comments concerning backfilling and grading. Postmining contours of the area are virtually unchanged from those seen currently on the site at present. The portal bench area will be highly visible and will not meet the requirements for Approximate Original Contours. The applicant shall submit a new contour map showing a more suitable relief of the area with slopes not exceeding those found on the site during premining conditions. Where possible, the slopes shall be reduced to a minimum to enhance vegetation growth and to reduce erosion during establishment of vegetative cover.

RESPONSE: (Addendum to text on page 25 of the Reclamation Plan)

Procedures for Backfilling and Grading of Portal Bench and Above

1. Utilize underground development waste to cover the portals with a minimum of four feet (4') above the coal seam as shown on Figure 7, Typical Section Reclaimed Mine Bench. Place in lifts of one (1) to



TYPICAL SECTION RECLAIMED MINE BENCH

FIGURE 7

two (2) feet and compact as much as possible. A dozer and/or a front-end loader will be utilized.

2. Use backhoe to reach downslope of portal bench and pull back material as far as possible. The backhoe will place material on the underground development waste and a dozer will spread the material in one (1) to two (2) foot lifts and will work the slope to an approximate two foot (2') (horizontal) to one foot (1') (vertical) slope.

   With inclinometer, NAE will visually site a line on the portal face-up area to establish crest of the 2:1 slope. NAE will make sure that this material is placed on cut material from the original portal development work. It should be noted that the complete backfilling or total elimination of the portal face-up area is not possible.

3. In those areas where some failure has occurred above the portal entries, NAE will try to maintain a 2:1 slope to completely cover the collapsed area. In "brow" or open area beneath the competent sandstone above the entry, NAE will cover and dress the area with a backhoe or dozer to eliminate voids even if subject slope slightly exceeds 2:1.

4. Topsoil will be spread on the 2:1 slope.

5. Appropriate revegetation measures will be performed (see page 17 of the Reclamation Plan).

Area E

6. The upper portion of the portal outslope will be pulled back by backhoe and left in roughened condition at approximately 1.6 (horizontal) to 1 (vertical) slope. The crest and toe of this area will blend into the overall slope. Approximately 6 inches of topsoil will be placed on this area, if possible.

7. The middle part of the portal outslope will be left as it is now existing. Necessary reclamation functions will be performed, e.g. fertilizing, seeding, mulching, and netting.

8. On the lower portion of the portal outslope where it has been oversteepened by cutting, these areas will be dressed and graded with a dozer to a 1.6 (horizontal) to 1 (vertical) slope as shown on Figure 9, Typical Section Lower Bench Toe Stabilization.

Area F

9. This area will be regraded and ripped or scarified. Revegetation will be undertaken as per the Reclamation Plan for Area F.

UMC 817.106 Regrading or Stabilizing Rills and Gullies

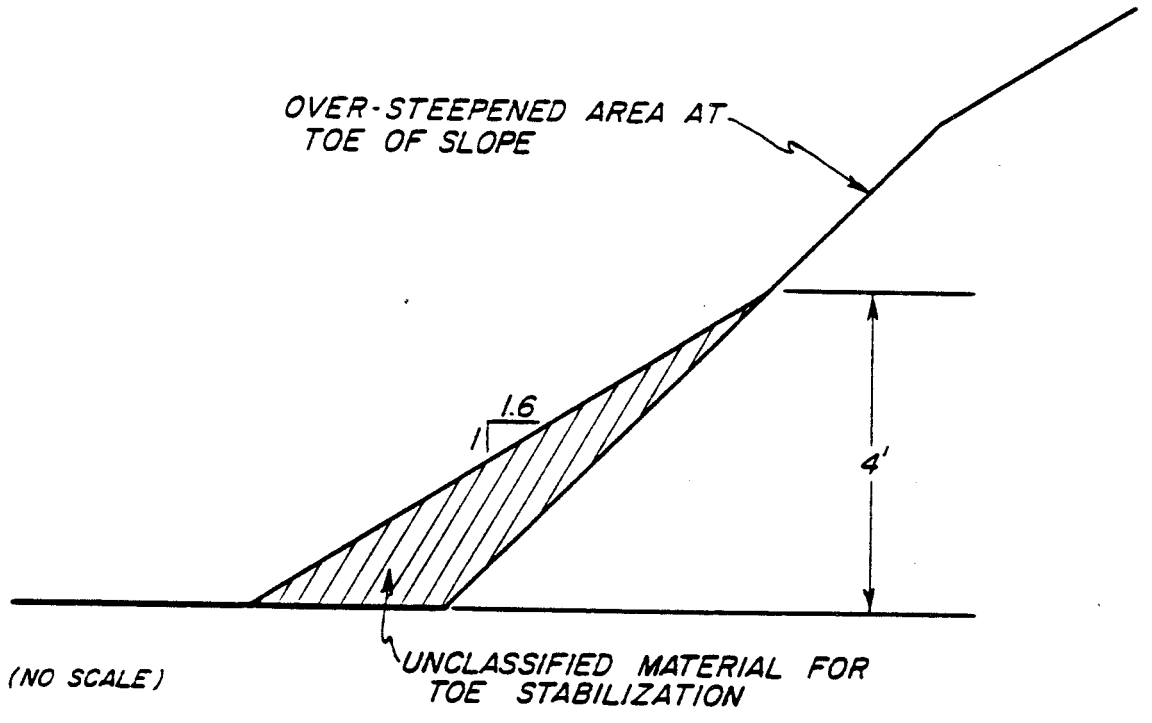
The applicant must commit in writing to regrade and seed areas of rills and gullies that are deeper than nine inches.

RESPONSE: On the reseeded areas, NAE will work with UDOGM to stabilize and seed any areas where rills and gullies deeper than nine (9) inches form.

UMC 817.133 Post Mining Land Uses

The legal owner of record is Calvin K. and Milton E. Jacob - not Jack Otani. In order to approve the land use change the landowner of record must request such in writing and demonstrate that the criteria of UMC 817.133(c) are met.

RESPONSE: If Jack Otani has not completed his land title registration by the time the Division reviews this application, NAE requests that the Division authorize reclamation of the reclaimed area to proceed. Approval of the alternate postmining land use would be withheld until the transfer of title to Jack Otani is complete.



TYPICAL SECTION
LOWER BENCH TOE STABILIZATION

FIGURE 9

UMC 817.11 Signs and Markers

NAE will retain and maintain all signs and markers until after the release of all bonds for the permit area. These signs shall include identification signs displayed at each point of access, perimeter markers of the disturbed areas, and stream buffer zone markers in areas where reclamation is within 100 feet of Mudd Creek. (FROM PG. 30 EXHIBIT 12)

UMC 817.95 Air Resources Protection

NAE will plan and employ fugitive dust control measures during reclamation work including, where necessary:

1. Periodic watering of roads
2. Prompt revegetation of regraded lands

UMC 817.99 Slides and Other Damage

NAE will notify the Division by the fastest available means of any slides in the reclaimed area which may have a potential adverse effect on public property, health, safety or the environment.

EXHIBIT 13

SEPTEMBER 28, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REGARDING THE RECLAMATION OF THE TOPSOIL BORROW AREA; CONTAINING A CERTIFIED COPY OF THE SEDIMENT POND CROSS SECTION; AND THE DETERMINATION OF THE HEIGHT OF BERM A AND LOWER PAD AREA

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH AMERICAN EQUITIES, n.v.

September 28, 1985

Mr. Lowell P. Braxton
Administrator
Mineral Resource Development & Reclamation Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Reclamation of the Blazon No. 1 Mine

Dear Lowell:

This letter was prepared in response to a telephone conversation between Susan Linner of your office and Conrad Parrish of ACZ INC. During that conversation, Ms. Linner detailed some minor points which need to be addressed before DOGM grants permission to reclaim the Blazon No. 1 Mine. This letter is to clarify those points.

~~The topsoil borrow area outlined on Map 2, Reclamation Plan, and Map, Mining Topography/Revegetation (enclosed) will be recontoured and revegetated following borrow activities. It should be noted by the Division that this entire borrow area will probably not be disturbed during reclamation. The borrow area shown on the maps is the maximum extent of the borrow area. Only enough of the area will be disturbed to allow the borrowing of sufficient topsoil to complete reclamation activities at the Blazon No. 1 Mine.~~

~~The topsoil borrow area comprises 0.28 acres. This raises the total acres to be seeded to 1.78 acres. The topsoil borrow area will be seeded with the seed mixture of grass and forbs only. No woody plant species will be planted in the topsoil borrow area. The borrow area is on a relatively flat area of ground which presently contains no woody plant species; therefore, none will be replaced.~~

Any non-coal solid waste generated as a result of reclamation activities at the Blazon No. 1 Mine will be hauled to an approved landfill.

Enclosed with this letter are copies of revised Map 2, Reclamation Plan, Map 3, Postmining Topography/Revegetation, ~~revised sketch of the topsoil stockpile and borrow area,~~ a certified copy of the sediment pond cross sections, and a brief write-up of the logic used in determining the height of berm A and lower pad area.

It is our understanding that these items complete the list of items required per the DOGM review of our application to reclaim the Blazon No. 1 Mine. We look forward to a quick reply from the DOGM concerning permission to proceed with reclamation.

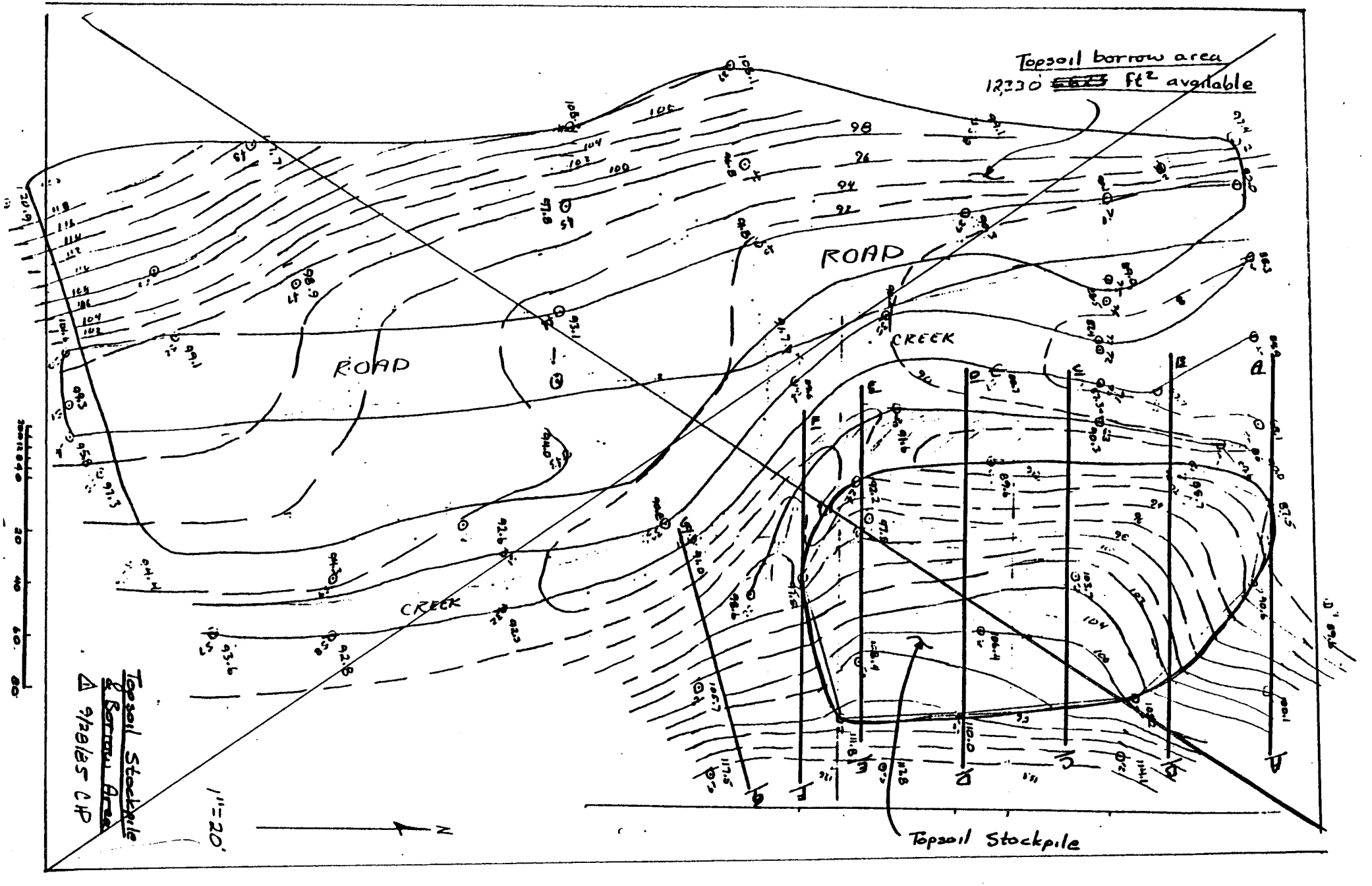
Sincerely,

NORTH AMERICAN EQUITIES, NV

Alan Smith /CHP

Alan W. Smith
President

Encls.


Topsoil borrow area
12,330 ~~6625~~ ft² available
ROAD
ROAD
CREEK
CREEK
Topsoil Stockpile
Topsoil Stockpile & Borrow Area
Δ 9/28/85 CHP
1" = 20'
N

STEAMBOAT SPRINGS, CO

JOB 169

EST. BY CHP DATE 9/28/85

NAE BERM A

BERM A Contains runoff from the lower pad area which is an area which slopes gently in the direction of the sediment ponds.

Design event = 10yr 24 hour Storm = 2.45"

Berm Height = 9".

Since the pad area is relatively flat normal to the berm, the berm is more than sufficient to contain a storm which will drop 2.45 inches of precipitation in 24 hours.

PROFESSIONAL ENGINEER'S CERTIFICATION

I, ELDON D. STRID, certify that this sediment pond design was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

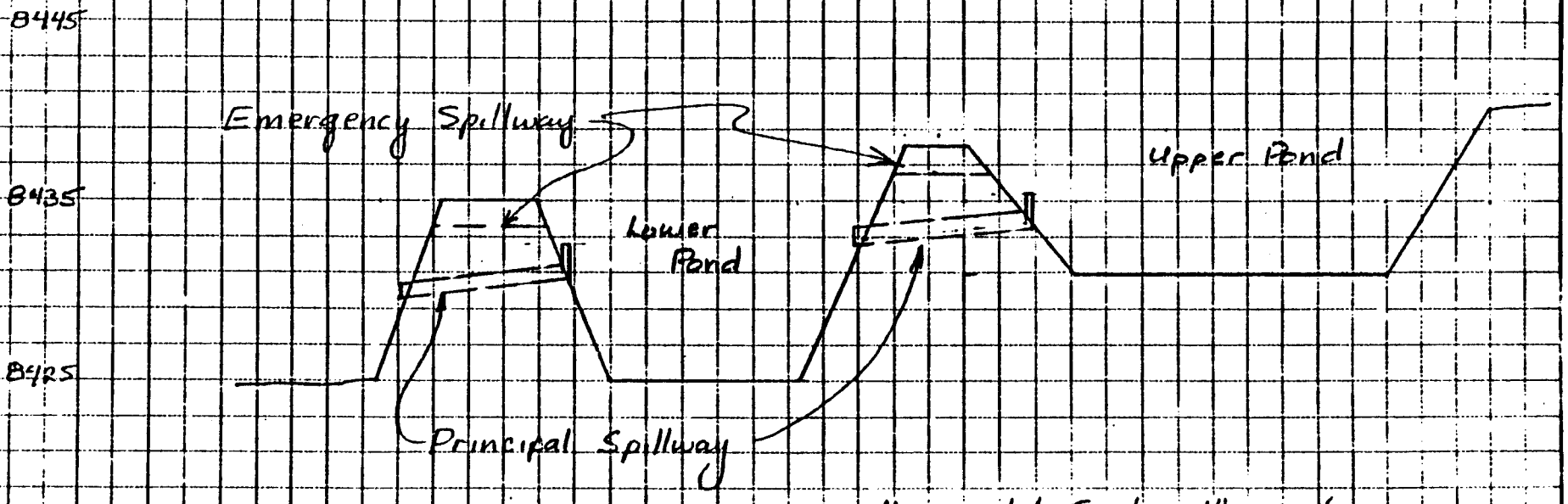
7/28/85

Eldon D. Strid

REGISTERED PROFESSIONAL ENGINEER
No. 5672
Eldon D. Strid
STATE OF UTAH

NAE BLAZON NO.1 MINE

SEDIMENT POND CROSS SECTION



Horizontal Scale 1" = 30'

Reference Section A-A', Map 7, Reclamation Plan

STEAMBOAT SPRINGS, CO
JOB 169
EST. BY CHP
DATE 9/28/85

EXHIBIT 14

OCTOBER 3, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ANSWERING VERBAL QUESTIONS REGARDING TIMING AND DENSITY OF SEEDING, DISTRIBUTION OF TOPSOIL AND SIZE OF THE DITCH ALONG THE ROAD TO THE TRANSFORMER PAD AREA

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH
AMERICAN
EQUITIES, n.v.

October 3, 1985

Mr. Lowell P. Braxton
Administrator
Mineral Resources Development
and Reclamation Program
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Final Responses to Questions on
Blazon No. 1 Mine Reclamation

Dear Mr. Braxton:

This letter is in response to telephone conversations held between members of the Division of Oil, Gas & Mining (DOGM) staff and ACZ INC. personnel. It is our understanding that during these telephone conversations of the last two (2) days, ACZ INC. received the final comments from DOGM staff members on the Blazon No. 1 Mine Reclamation. Our responses to these verbal DOGM questions are as follows.

The Utah DOGM has requested clarification on the timing of the planting of seedlings for reclamation. Seedlings will be planted during the spring months of the year. The seedlings to be planted are the seedlings noted in the response letter dated September 25, 1985 from North American Equities NV (NAE) to the Utah DOGM.

The Utah DOGM has requested clarification of the density of seeding of woody plants. NAE has submitted to the Utah DOGM a seed mix designed to provide 2,410 woody plant stems per acre. NAE will strive to attain the 2,410 shrubs per acre density on the reclaimed surfaces that are seeded with woody plant species.

NAE is concerned that the previously established reference area does not adequately portray the conditions found in the steep areas to be reclaimed in the 1985 reclamation work. Presently, NAE plans to restore the site for commercial/industrial uses and will only seed certain steeper slopes. Nonetheless, NAE will attempt to utilize the reference area previously established as a means for determination of reclamation success.

Given the above potential conflicts in reference area conditions versus re-seeded steep slope areas, NAE would like the flexibility in the future to work with the Utah DOGM with regard to reclamation success. This might include a slight variation from the conditions found in the reference area.

The Utah DOGM has requested a clarification on the use of topsoil in reclamation. NAE will use only the topsoil currently found in the topsoil stockpile area. No topsoil will be borrowed during the course of reclamation activities. Distribution of the topsoil from the topsoil stockpile area shall be prioritized as follows:

- Six inches (6") of topsoil material will be spread over the reclaimed area underneath the current underground development waste pile. This area is known as the Little Snyder Canyon drainage.

- Topsoil will be spread to a thickness of six inches (6") over the topsoil substitute material covering the final underground development waste stockpile.

- Topsoil will be spread in these areas to a thickness of six inches (6") until all topsoil in the current topsoil stockpile is consumed.

- Remaining areas will be covered with the topsoil substitute material found on the site.

Attached is a brief description of the methods used to determine the size of the ditch along side the road to the transformer pad area.

I hope that these comments satisfy the requirements of Utah DOGM. NAE appreciates Utah DOGM giving immediate attention to these responses. We look forward to a speedy approval of the reclamation plan so that work can proceed this construction season before the onset of bad weather.

Sincerely,

NORTH AMERICAN EQUITIES NV

Alan W. Smith /CP

Alan W. Smith
President

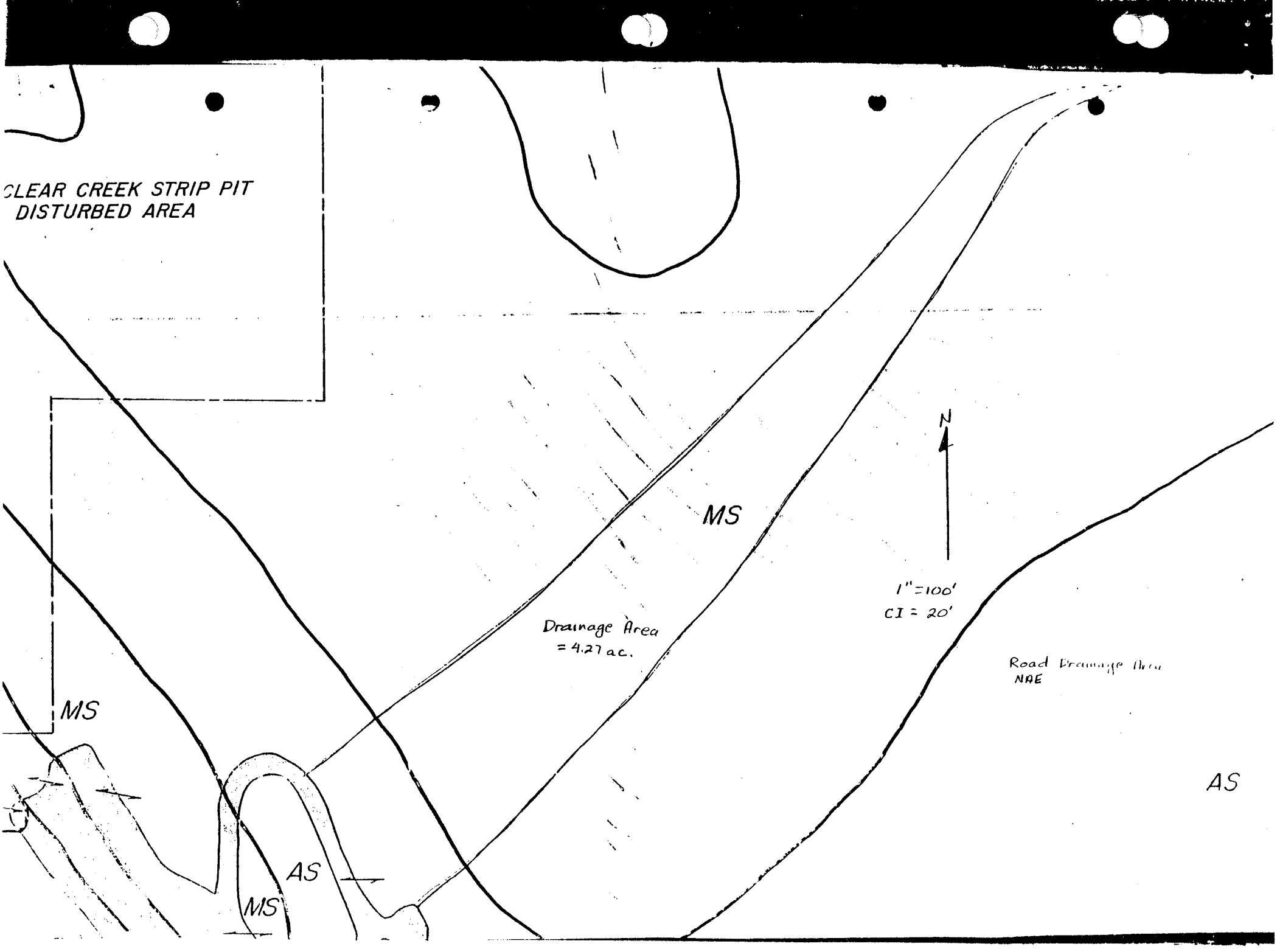

CLEAR CREEK STRIP PIT
DISTURBED AREA
MS
N
1"=100'
CI = 20'
Drainage Area
= 4.27 ac.
Road Drainage Area
NAE
MS
AS
MS
AS

EXHIBIT 15

OCTOBER 17, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM ENCLOSING LABORATORY RESULTS TAKEN FROM NORTH AMERICAN EQUITIES PROPERTY

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH
AMERICAN
EQUITIES, n.v.

October 17, 1985

Mr. Lowell P. Braxton
Administrator
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: North American Equities Overburden Samples

Dear Lowell:

Enclosed please find laboratory results for four (4) samples taken at the North American Equities property. The first three (3) samples represent underground development waste material. The fourth sample represents material on the face of the portal bench area.

Based on these sample results North American Equities is hereby requesting that the cover material over the underground development waste be reduced from 4 feet in thickness to 1 foot in thickness. We appreciate your prompt response to this request as North American Equities is currently engaged in finding a contractor to complete the reclamation work this construction season.

Very truly yours,

NORTH AMERICAN EQUITIES

Conrad Parrish for
Alan W. Smith

Alan W. Smith

AWS/wv
Enclosures

Date: October 9, 1985

BOOKCLIFFS COMMERCIAL LABORATORIES
OVERBURDEN ANALYSIS REPORT

Client: North American Equities
Address: 1401 17th Street, Suite 1510
Denver, CO 80202

Sample Date: Unknown
Date Received: September 23, 1985

Attn: Mr. Alan Smith

Sample I.D.	Lab No.	pH[1]	E.C.[1] (mmhos/cm @ 25°C)	Calcium[1] meq/l	Magnesium[1] meq/l	Sodium[1] meq/l	SAR
Number 1	85-0065-OB	7.0	1.22	9.36	3.95	0.82	0.32
Number 2	85-0066-OB	7.0	1.09	9.53	3.70	0.40	0.16
Number 3	85-0067-OB	7.8	2.17	4.94	2.63	15.7	8.07
Number 4	85-0068-OB	7.6	0.60	4.61	1.98	0.60	0.33

[1] Saturated Paste Extraction

Ralph V. Poulsen

Ralph V. Poulsen, Director

Date: October 9, 1985

BOOKCLIFFS COMMERCIAL LABORATORIES
OVERBURDEN ANALYSIS REPORT

Client: North American Equities
Address: 1401 17th Street, Suite 1510
Denver, CO 80202

Sample Date: Unknown
Date Received: September 23, 1985

Attn: Mr. Alan Smith

Sample I.D.	Lab No.	Boron[2] ppm	Selenium[2] ppm	Arsenic[3] ppm	Total Sulfur %	Neutralization Potential (as CaCO3 %)	Acid-Base Potential (Tons CaCO3/ 1000 Tons)
Number 1	85-0065-OB	0.5	-0.01	0.07	0.43	0.7	-6
Number 2	85-0066-OB	0.4	-0.01	0.05	0.44	0.8	-6
Number 3	85-0067-OB	0.3	0.02	0.12	0.42	1.2	-1
Number 4	85-0068-OB	0.1	-0.01	0.02	0.04	4.0	39

[2] Hot Water Extraction [3] AB-DTPA Extraction

Ralph V. Poulsen

Ralph V. Poulsen, Director

Date: October 9, 1985

BOOKCLIFFS COMMERCIAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: North American Equities
Address: 1401 17th Street, Suite 1510
Denver, CO 80202

Sample Date: Unknown
Date Received: September 23, 1985

Attn: Mr. Alan Smith

Sample I.D.	Lab No.	Combustible Solids %	Sand %	Silt %	Clay %	Texture	VFS %
Number 1	85-0065-OB	49	--Sample contains large amounts of coal--				16
Number 2	85-0066-OB	44	--Sample contains large amounts of coal--				14
Number 3	85-0067-OB	40	--Sample contains large amounts of coal--				17
Number 4	85-0068-OB	9	30	46	24	L	20

Ralph V. Poulsen

Ralph V. Poulsen, Director

Date: February 25, 1984

BOOKCLIFFS COMMERCIAL LABORATORIES

OVERBURDEN REPORT

Client: North American Equities

Address: 1401 Seventeenth Street, Suite 1510
Denver, Colorado 80202

Date Received: 2/22/83

Attn: Mr. Alan Smith

Sample I.D.	Lab No.	Sample Date	Pyritic Sulfur %	Organic Sulfur %	Sulfate Sulfur %	Total Sulfur %
Blazen #1 Development Waste	84-0574-OB	9/22/84	0.20	0.18	<0.01	0.38
Above Coal Seam	84-0575-OB	Unknown	0.07	0.03	<0.01	0.10
Below Coal Seam	84-0576-OB	Unknown	0.04	<0.01	<0.01	0.04

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date: October 5, 1983

BOOKCLIFFS ... ERICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: North American Equities
Address: 1401 Seventeenth Street, Suite 1510
Denver, Colorado 80202
Attn: Mr. Alan Smith

Date Received: 83-3864-OB 9/28/83
83-3897-OB 9/29/83
83-3898-OB 9/29/83

Sample I.D.	Sample Date	Lab. No.	pH	Conductivity[1]	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR
Blazon #1 Mine, Development Waste	9/22/83	83-3864-OB*	7.3	0.6	46	4.0	2.2	0.7	
Above Coal Seam OB	Unknown	83-3897-OB	7.3	0.4	52	3.2	0.4	0.9	
Below Coal Seam OB	Unknown	83-3898-OB	7.2	0.4	55	2.3	0.6	0.6	

[1] mmhos/cm @ 25°C

* Sample contained a large amount of coal

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

Date: October 5, 1983

BOOKCLIFFS C[illegible]RICAL LABORATORIES

OVERBURDEN ANALYSIS REPORT

Client: North American Equities
Address: 1401 Seventeenth Street, Suite 1510
Denver, Colorado 80202
Attn: Mr. Alan Smith

Date Received: 83-3864-OB 9/28/83
83-3897-OB 9/29/83
83-3898-OB 9/29/83

Sample I.D.	Sample Date	Lab. No.	Boron ppm	Total Sulfur %	Sulfate Sulfur %	Acid-Base Potential[1]	Neutralization Potential (as $CaCO_3$) %	Sand %	Silt %	Clay %
Blazon #1 Mine Development Waste	9/22/83	83-3864-OB	1.5	0.38	<0.01	-7	0.6	55	17	28
Above Coal Seam OB	Unknown	83-3897-OB	1.5	0.09	<0.01	-1	0.2	15	41	44
Below Coal Seam OB	Unknown	83-3898-OB	0.3	0.03	<0.01	14	1.5	10	48	42

[1] Tons $CaCO_3$/1000 Tons

Ralph V. Poulsen

Ralph V. Poulsen, Director

BOOKCLIFFS
COMMERCIAL LABORATORIES

EXHIBIT 16

OCTOBER 29, 1985 LETTER FROM ALAN W. SMITH OF NAE TO LOWELL P. BRAXTON OF UDOGM REQUESTING REDUCTION OF POST-RECLAMATION BOND RELEASE PERIOD

THIS EXHIBIT CONSISTS OF OFFICIAL CORRESPONDENCE BETWEEN NAE AND UDOGM. SOME OF THE INFORMATION CONTAINED IN THIS EXHIBIT HAS BEEN SUPERSEDED BY LATER CORRESPONDENCE. THE SUPERSEDED INFORMATION HAS BEEN CROSSED OUT TO AVOID CONFUSION.

NORTH AMERICAN EQUITIES, n.v.

October 29, 1985

Mr. Lowell P. Braxton
Administrator
Utah Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Post-Reclamation Liability Period for the Blazon No. 1 Mine

Dear Lowell:

North American Equities NV ("NAE") would like to formally request that the post-reclamation bond release period be reduced from ten (10) years to five (5) years at the Blazon No. 1 Mine. Our research indicates that the climatological station at Clear Creek, Utah has recorded an average annual precipitation in excess of 30 inches. This is in excess of the 26 inches of precipitation required for reduction of post-reclamation bond liability as stated in UMC 805.13.

The reference we used to determine the rainfall amount at Clear Creek, Utah is Hydrologic Atlas of Utah, Roland W. Jeppson et. al., Utah Water Research Laboratory, Utah Agricultural Experiment Station, Utah State University, in cooperation with the Division of Water Resources, Utah Department of Natural Resources, November, 1968.

NAE appreciates your consideration of this request. We look forward to hearing from you concerning your determination of this request and our earlier request to reduce the cover material over the underground waste disposal area to one (1) foot.

Very truly yours,

NORTH AMERICAN EQUITIES

Alan W. Smith /by Alan Czarnowsky

Alan W. Smith

AWS:ski
cc: Alan W. Czarnowsky - ACZ Inc.

Suite 1510 1401 17th Street Denver, Colorado 80202 (303) 296-9441 TELEX 450094

EXHIBIT 17

LEGAL, FINANCIAL, COMPLIANCE, AND RELATED INFORMATION

UMC 782.13 IDENTIFICATION OF INTEREST

The original Mining and Reclamation Plan listed Blazon Company as permit applicant. Blazon Company was the agent and mining contractor for the mine owner, TOE Investment Company NV.

Effective July, 1981, TOE Investment Company changed its corporate name to North American Equities NV. Evidence of the corporate name change is provided as Exhibit 1, Corporate Name Change Documentation.

Blazon Company has been discharged as agent and mining contractor for North American Equities NV.

North American Equities NV is the permit applicant for the Blazon No. 1 Mine. North American Equities NV has general offices located at the following address:

North American Equities NV
1401 17th Street, Suite 1510
Denver, Colorado 80202
(303) 296-9441

All correspondence should be sent to the attention of Mr. Alan W. Smith.

The owners of record of surface areas contiguous to the permit area are shown on the Surface Ownership Map (Map 1) and listed below:

Milton E. Jacob, et al - 2759 Edgewood, Provo, Utah 84604
Calvin K. Jacob, et al - 754 S. Cherry Dr., Orem, Utah 84057
Kanawha & Hocking Coal and Coke (Valley Camp of Utah, Inc.)
- P.O. Box 507, Clear Creek, Utah 84517
The United States Government

Jack Otani

UMC 782.14 COMPLIANCE INFORMATION

The Blazon No. 1 Mine is currently under interim permit status. The mine produced coal from March 1981 through the time of closure in February 1982. Subsequent personnel cutbacks have delayed North American Equities NV in the continuing efforts to permit the Blazon No. 1 Mine under the Utah Permanent Program.

North American Equities NV has been in contact with DOGM regarding the situation and will continue diligent efforts to complete permitting in a time frame acceptable to DOGM. Submittal of the response to the Apparent Completeness Review ("ACR") will take place no later than October 7, 1983.

North American Equities NV has not forfeited mining bond or similar security deposited in lieu of bond.

The complete list of violations, notices and descriptive information is shown below.

The Notice of Violation referred to in the Mining and Reclamation Plan was number N80-1-7-3 issued October 1, 1980 by DOGM.

- Violation 1. Side Cast Fill Construction. Data was submitted proving construction stability. The violation was vacated December 3, 1980.

- Violation 2. Failure to Pass Surface Drainage Through Sediment Pond. Maintenance was performed on berms and drainage ditches to alleviate the problem. The violation was terminated October 15, 1980.

- Violation 3. Failure to Protect Topsoil. Topsoil stockpiles were moved, consolidated, re-seeded and protection berms constructed. The violation was terminated October 15, 1980.

Violation 2 and Violation 3 carried a civil penalty assessment of $200.00 which was promptly paid.

North American Equities NV contact with the Office of Surface Mining in Albuquerque, New Mexico, indicates that no Federal Notice of Violation has ever been issued.

UMC 771.23 PERMIT APPLICATIONS - GENERAL REQUIREMENTS FOR FORMAT AND CONTENTS

North American Equities NV requested that the Utah State Historical Society conduct a search to determine the existence of any known cultural and historical resources within the permit area and adjacent areas. The search resulted in the conclusion that there are no resource sites listed or eligible for listing on the National Register of Historic Places within the permit area or adjacent areas.

The Blazon No. 1 Mine facilities are located on privately owned surface which has not been previously disturbed. The mine related disturbance of approximately seven (7) acres over the mine life is expected to have no impact on cultural or historical resources due to the absence of any known historical/cultural resources in the area and the limited amount of area to be disturbed. If any historical/cultural resources are discovered, North American Equities NV will notify the Utah State Historical Society.

In response to Utah Division of Oil, Gas, and Mining (UDOGM) comments, vegetation field work was performed and final report preparation was completed during the month of September, 1983.

The field work was performed at the Blazon No. 1 Mine by:

Ms. Claire Semmer Reclamation Biologist P.O. Box 990341 Steamboat Village, CO 80499	and	Ms. Rebecca Gillan Reclamation Technician Route 2 Forsyth, Montana 59327

Field data reduction and compilation of vegetation reports, submitted as part of the Apparent Completeness Response (ACR) Document on October 7, 1983 and the Determination of Completeness (DOC) Response on March 1, 1984, was completed in Ms. Semmer's Steamboat Springs, Colorado offices.

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

Coal Mine Safety and Health
District 9

July 28, 1980

Mr. Joseph A. Harvey
President
Blazon Company
P. O. Box 327
Ferron, Utah 84523

Re: Blazon No. 1 Mine
I. D. No. 42-01582
Roof Control Plan

Dear Mr. Harvey:

The roof control plan dated July 22, 1980, has been reviewed by MSHA personnel and is approved for six months. However, if conditions warrant, the plan may be changed at any time.

Sincerely,

for John W. Barton
District Manager

GENERAL INFORMATION

BLAZON COMPANY - BLAZON NO. 1 MINE

PERMIT APPLICATION

Identification of interest.

1. Permit Application - BLAZON COMPANY, Agent and Mining Contractor for TOE INVESTMENT COMPANY.

   The BLAZON COMPANY is a corporation formed under the laws of the State of Utah.

   The principal officers names, addresses and phone numbers are:

   a. Joseph A. Harvey, President
      P. O. Box 327, Ferron, Utah 84523
      Phone: (801) 384-2755

   b. Stanley C. Harvey, Vice President
      133 East 2nd North, Price, Utah 84501
      Phone: (801) 637-3548

   c. Jack Otani, Secretary & Treasurer
      Clear Creek, Utah, 84517
      Phone: (801) 448-9225

2. The legal and equitable owner of the coal to be mined is the TOE INVESTMENT COMPANY N.V. of Denver, Colorado.

   The principal officer and representative of the TOE INVESTMENT COMPANY N.V.:

   Esben S. Svalastog
   909 Seventeenth Street, Suite 601
   Denver, Colorado 80202
   Phone: (303) 825-2283

   The coal lands to be mined are fee lands held or controlled by lease on Section 4, Range 7 East, Township 13 South, SLBM.

3. The BLAZON COMPANY is a newly formed corporation and have not previously held or applied for mining permits. The TOE INVESTMENT COMPANY N.V. has not held or applied for mining permits.

   The names and address of owners of surface lands or control leases on surface lands affected are:

   a. Sophie Fotes ETAL
      1451 Logan Avenue
      Salt Lake City, Utah

b. Valley Camp of Utah Inc.
Scofield, Utah 84538

c. Paul Jacobs
349 East 2nd South
Pleasant Grove, Utah 84062

All of the above owners and lease holders were notified by mail of the intent to mine on the subject lands.

4. Subsurface lands contiguous to the proposed mine is owned or controlled by:

a. Valley Camp of Utah Inc.
Scofield, Utah 84538

b. Kaiser Steel Corporation
P.O. Box 58
Oakland, California 94604

c. U.S. Government
Department of the Interior
Bureau of Land Management

5. The name of the proposed mine is the BLAZON NO. 1 MINE. An application has been submitted for a M.S.H.A. identification number.

6. No application, options, bids for lands beyond the described boundaries of the mine are currently active.

7. Complaince Information: Three violations were issued on October 16, 1980. One was terminated a short time later and a civil assessment was paid on the other two of $200.00 combined. None are currently pending.

8. Right of Entry:

The BLAZON COMPANY negotiated a mining contract with TOE INVESTMENT COMPANY N.V., the legal and equitable holders of leases negotiated with the Kaiser Steel Corporation and Carbon County of the State of Utah. These lands are described in the main body of the MINING AND RECLAMATION PLAN submitter herewith. The execution date of the above contract is the 16th day of November, 1978.

No surface mining of coal is contemplated in the mining plan.

9. Relationship to Area Designated as Unsuitable for Mining:

The district office of the Bureau of Land Management was contacted. Investigation revealed that the proposed mining site has not been classed as unsuitable for mining.

10. Permit Term Information:

The actual start-up of operations was contingent upon receipt of the mining permit and the weather conditions. Present operations started on July 27, 1980 and are continuing through the present.

The anticipated life of the mine is (10) ten years within the present boundaries. Continued operation beyond the life will be contingent upon the leasing policies of the U.S. Government.

11. Identification of Other Licenses or Permits:

See attached permits in Section Appendix.

12. Identification of Location of Public Office for Filing of Application:

Utah Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

13. Newspaper Advertisement and Proof of Publication:

A copy of the newspaper advertisement will be filed with the regulatory authority. The advertisement was in the Sun Advocate, a local newspaper of Price, Carbon County, State of Utah from July 18 through August 8, 1979.

14. Personal Injury and Property Damage Information:

a. BLAZON COMPANY has in effect a liability policy with Continental Insurance Company of Aurora, Colorado, Policy No. 428978 in the amount of one million ($1,000,000) dollars.

b. BLAZON COMPANY also utilizes the State of Utah Workmen's Compensation as required by law.

Note: The above coverage will be maintained in effect during the life of the coal mining operation and during the reclamation period.

15. Performance Bond:

A Performance Bond was acquired and filed May 20, 1980 in the amount of $18,517.50.

CHAPTER II

APPENDIX

CONTENTS:

UTAH PERMITS
UNITED STATES PERMITS

UTAH PERMITS

SCOTT M. MATHESON
Governor

GORDON E. HARMSTON
Executive Director,
NATURAL RESOURCES

CLEON B. FEIGHT
Director

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

OIL, GAS, AND MINING BOARD

CHARLES R. HENDERSON
Chairman

JOHN L. BELL
C. RAY JUVELIN
THADIS W. BOX
CONSTANCE K. LUNDBERG
EDWARD T. BECK
E. STEELE McINTYRE

July 3, 1980

Mr. Joseph A. Harvey
President
Blazon Mining Company
P.O. Box 327
Ferron, Utah 84523

RE: Final Approval
Blazon #1 Mine
ACT/007/021
Carbon County, Utah

Dear Mr. Harvey:

The Board of Oil, Gas and Mining, at its May 20, 1980 Executive Session, fully executed the Mined Lands Reclamation Escrow Agreement submitted by T.O.E. Investments for the Blazon #1 Mine. A copy of this Escrow Agreement is enclosed for your records.

Blazon Mining Company has now fulfilled all of the requirements under the Utah Mined Land Reclamation Act as well as the Interim Program Regulations for Coal Mining and Reclamation Operations for the Blazon #1 Mine. Further, during the 30 day public comment period subsequent to publication of the Division's tentative approval of the Mining and Reclamation Plan for this operation, no adverse comments were received.

The Division therefore issues Final Approval to Blazon Mining Company for the Blazon #1 Mine and operations may now lawfully commence. Please note however, that this approval is issued under the Interim Program Regulations only and that a Permanent Program Mining and Reclamation Plan will be required for the Blazon #1 Mine within two months of the Office of Surface Mining's approval of the State's Regulatory Program.

Please notify the Division within 30 days of commencement of operations as required under Rule 40-8-15 of the Utah Mined Land Reclamation Act. Also under this Rule it is required that an annual Operations and Progress Report be submitted at the end of each calender year for all active operations.

Should you have any questions relative to this Final Approval, please feel free to contact the Division.

Sincerely,

JAMES W. SMITH, JR.
COORDINATOR OF MINED LAND DEVELOPMENT

JWS/te

Enc: Escrow Agreement

cc: Don Crane, O.S.M., Denver
Murray Smith, O.S.M., Denver

A-3

Scott M. Matheson
Governor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

James D. Clise, Directo
Room 426 801-533-612

(801) 533-6146
September 25, 1979

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS
Community Health Services
Environmental Health
Family Health Services
Health Care Financing and Standards

OFFICES
Administrative Services
Health Planning and Policy Development
Medical Examiner
State Health Laboratory

Joseph A. Harvey
Blazon Company
Box 327
Ferron, Utah 84523

RE: Sedimentation Ponds

Dear Mr. Harvey:

We have reviewed the plans and information for the Blazon surface runoff sedimentation ponds south of Clear Creek, Utah. Plans 1-3 and information in the Land Group Engineering Drainage Study report were reviewed.

As a result of our review, the plans for the Blazon No. 1 sedimentation ponds are approved and a construction permit as constituted by this letter is hereby issued provided:

1. The dewatering outlet holes shall be at least three feet above the pond bottom and the skimming devices should not extend more than six inches below the dewatering outlets.

2. The inlet channel is diked to an elevation at least three and one half (3½) feet above the pond bottom to prevent overflow to the stream. We also suggest that the inlet manhole be eliminated to prevent the accumulation of solids at that location.

The ponds are to provide 0.1 acre-feet settling volume for the mine disturbed area surface runoff from a ten-year 24-hour 2.4 inch rainfall. The ponds are to have lined slopes of two horizontal to one vertical.

Issuance of this construction permit is not an approval of resulting effluent quality. Should the effluent not meet state or federal standards, you must provide the necessary additional treatment.

Sincerely,

UTAH WATER POLLUTION COMMITTEE

Calvin K. Sudweeks
Executive Secretary

cc: Southeast 208/Division of Oil, Gas and Mining
EPA/Salt Lake City

Scott M. Matheson
Governor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

Alvin E. Rickers, Acting Director
Room 426 801-533-6121

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS
Community Health Services
Environmental Health
Family Health Services
Health Care Financing and Standards

OFFICES
Administrative Services
Health Planning and Policy Development
Medical Examiner
State Health Laboratory

533-6146
April 7, 1980

Thomas J. Suchoski
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, UT 84116

RE: Blazon #1 Mine

Dear Tom:

I have reviewed the March 14, 1980 revised plans for the Blazon #1 mine sedimentation ponds. The additional four foot depth and associated volume in the bottom of the 2 ponds are acceptable to us. Since the upper dike dimensions, width, slope and outlet have not been changed, our September 25, 1979 construction permit for this project is still valid.

Sincerely,

Steven R. McNeal

Steven R. McNeal
Public Health Engineer
Bureau of Water Pollution Control

SRM:een

cc: Blazon Company

RECEIVED
APR 08 1980
DIVISION OF
OIL, GAS & MINING

Scott M. Matheson
Governor

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110

James D. Clise, Director
Room 426 801-533-6121

533-6108

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS
Community Health Services
Environmental Health
Family Health Services
Health Care Financing and Standards

OFFICES
Administrative Services
Health Planning and Policy Development
Medical Examiner
State Health Laboratory

December 6, 1979

Sanders Exploration, Ltd.
10 West Center Street
P.O. Box 377
Kaysville, UT 84037

Re: Air Quality Approval Order for Blazon No. Mine and Crushing Facilities

Gentlemen:

The proposal to extract coal from the Blazon Mine #1 in Carbon County and crush/load coal in the Colton, Utah area, Utah County, has been advertised for public comment for 30 days; no comments were received.

The plans have met all the requirements of the Utah Air Conservation Regulations and this air quality approval order is issued authorizing the construction and operation of the facilities upon the following conditions:

1. Water (or other suppressant) sprays operated and maintained on the conveyor and crusher/screening area transfer/drop points. Opacity at any of these points not to exceed 20%.

2. Haul trucks to be covered to reduce spillage.

3. Unpaved portion of haul roads and operational areas at mine and crushing area sprayed as required to reduce fugitive dusts. Records of spraying done (specific days) required upon demand of the Bureau of Air Quality.

4. Operation maintained at the levels specified in your submission, i.e., 500 tons/day mined and 400 tons/day crushed/screened.

An initial compliance inspection is required by our staff when you are operating. Please provide your estimated operational date for our planning purposes and then notify us of the actual date you become operational.

Sincerely,

Alvin E. Rickers
Executive Secretary
Utah Air Conservation Committee

MRK:ll

cc: City-County Health Dept, of Utah County
Southeastern District Health Dept.
EPA/Region VIII (Norman Huey)

An Equal Opportunity Employer

SCOTT M. MATHESON
Governor

ORDON E. HARMSTON
Executive Director,
NATURAL RESOURCES

CLEON B. FEIGHT
Director

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

OIL, GAS, AND MINING BOARD

CHARLES R. HENDERSON
Chairman

JOHN L. BELL
C. RAY JUVELIN
THADIS W. BOX
CONSTANCE K. LUNDBERG
EDWARD T. BECK
E. STEELE McINTYRE

April 15, 1980

Mr. Joseph A. Harvey
Blazon Mining Company
Box 367
Ferron, Utah 83532

RE: Blazon #1 Mine
Blazon Mining Company
Sediment Pond Approval
ACT/007/021

Dear Mr. Harvey:

Enclosed please find approval from the Division of Water Rights for the sediment ponds for Blazon #1 Mine, and the letter from the Department of State Health indicating that the construction permit which they issued September 25, 1979 is still valid.

Please keep these letters with your mine plan file as they shall be required with State and Office of Surface Mining inspections throughout the life of the mine. I hope this is helpful to you. Please call if you need any assistance.

Sincerely,

THOMAS J. SUCHOSKI
ENGINEERING GEOLOGIST

TJS/te

Enclosures: State Health Letter
Water Rights Letter

cc: Don Crane, O.S.M.

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

DEE C. HANSEN
STATE ENGINEER

EARL M. STAKER
DEPUTY

200 EMPIRE BUILDING
231 EAST 400 SOUTH
SALT LAKE CITY, UTAH 84111
(801) 533-6071

DIRECTING ENGINEERS
HAROLD D. DONALDSON
DONALD C. NORSETH
STANLEY GREEN
ROBERT L. MORGAN

April 3, 1980

Mr. Thomas J. Suchoski
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Re: Blazon #1 Mine Sedimentation Ponds

Dear Mr. Suchoski:

This office has completed its review of the above mentioned project and approval is given for its construction subject to the approval of other involved agencies.

The most recent correspondence will serve as notice to the State Engineer thus satisfying Section 73-5-12 of the Utah Code Annotated 1953.

Although not absolutely required, I would suggest some cutoff collars around the outlet for the terminal sedimentation pond.

Sincerely,

Dee C. Hansen

Dee C. Hansen, P.E.
State Engineer

DCH:RLM:sn

BEFORE THE STATE ENGINEER OF THE STATE OF UTAH

IN THE MATTER OF EXCHANGE APPLI-)
) MEMORANDUM DECISION
CATION NUMBER 1669 (91 Area))

Exchange Application Number 1669 (91 Area) was filed by T. O. E. Investment Company, 909 17th Street, Denver, Colorado 80202 and was made for the right to exchange a maximum of 3.0 acre-feet of water represented by Stock Certificate Number 3667, Price River Water User's Association, indicating the ownership by the applicant of one share of the capitol stock of said association which has storage rights in Scofield Reservoir. Stock Certificate Number 3667 has been stamped NON-TRANSFERABLE by the Price River Water User's Association. A maximum of 3.0 acre-feet of water will be released from Scofield Reservoir into the Price River and, in lieu thereof, a maximum of 3.0 acre-feet of water will be diverted from a four-inch well at a point South 2640 feet and East 1056 feet from the NW Corner of Section 4, T14S, R7E, SLB&M. The water will be used for the operation of a coal mine.

It is the opinion of the State Engineer that this exchange may be made providing that the provisions of the Scofield Exchange Policy of the Utah State Engineer, as outlined herein, are adhered to.

It is, therefore, ORDERED and Exchange Application Number 1669 (91 Area) is hereby APPROVED subject to the following stipulations:

1. No more water may be diverted during the use period than is represented by the Stock in the Price River Water User's Association, which is the basis for the exchange.

2. Installation of a totalizing water meter at the expense of the applicant will be required before any water is diverted. Water meters shall be available to the Price River Commissioner for examination at all reasonable times.

3. The water being exchanged shall be regulated by the Price River Commissioner at the expense of the applicant.

4. Continued ownership of the Stock Certificate which is the basis for the exchange shall be required in order to maintain this exchange.

5. No change of point of diversion or place of use of the water covered by this exchange shall be made without first obtaining the approval of the State Engineer.

OCT 25 1990

BOARD OF COUNTY COMMISSIONERS

UTAH COUNTY, UTAH

MINUTES

Wednesday, April 30, 1980 3:00 p.m.

	Present	Absent
KARL R. LYMAN	X	
KENNETH J. PINEGAR	X	
H. JERRY BRADSHAW	X	

APPROVAL FOR CONDITIONAL USE PERMIT TO ALLOW RETAIL SALE OF COAL AT CRUSHER SITE

Present: Jeff Mendenhall, Planning Staff Director
Guy R. Burningham, Deputy County Attorney
Lynn Davis, Deputy County Attorney
Josephine Zimmerman, The Daily Herald
Kris Radish, The Deseret News

In accordance with Section 4-5-7 C 3 of the Utah County Zoning Ordinance (See Ordinance No. 1980-12), a motion was made by Commissioner Pinegar and seconded by Commissioner Bradshaw that the Commission grant a conditional use permit to Joseph A. Harvey in behalf of Blazon Company to allow the retail sale of coal at the crushing site of their operation location near Clear Creek in the Colton area along with approval for a rock crusher which was previously authorized by the County Commission.

Motion carried by the following vote: AYE: Karl R. Lyman
Kenneth J. Pinegar
H. Jerry Bradshaw

NAY: None

✓cc: Joseph A. Harvey
P.O. Box 327, Ferron, UT 84523

REPORTED BY: Cheryl Jones
Deputy Clerk

DATE-PAGE: 8004-30-06

SOUTHEASTERN UTAH HEALTH DISTRICT

CARBON • EMERY • GRAND • SAN JUAN COUNTIES

Silvagni Building
6 East Main Street
Price, Utah 84501
Phone 637-3671

Court House
Castle Dale, Utah 84513
Phone 748-2252

Court House
Moab, Utah 84532
Ph 259-5602

88 North Main Street
Monticello, Utah 84535
Phone 587-2324

July 27, 1979

Mr. Joe Harvey
Blazon Co.
Box 327
Ferron, Utah 84523

Dear Mr. Harvey:

We have received the plans you submitted for the Blazon No. 1 mine. We wish to apologize for the delay in sending our comments; we didn't realize you needed more than our telephone conversation regarding this.

Accordingly, we can give Health Department approval for the sewage disposal system to consist of a 900 gallon septic tank and 600 lineal feet of three foot wide seepage trench.

On change should be made in that the separation barrier between the gravel fill and the backfill should either be straw or untreated paper. A plastic liner is not acceptable. The gravel in this trench should be clean and sized ½" - 2½".

Please remember that when you have completed the construction, but before backfilling we need to be called for a final on-site inspection. If you have any questions, please call me.

Sincerely,

Gerald C. Story

Gerald C. Story, R.S.
Senior Sanitarian

jk

UNITED STATES PERMITS

December 17, 1980

Mr. Roger E. Frenette
Chief, Water and Hazardous Waste Information
Branch, Enforcement Division
United States Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80293

RE: EPA Consolidated Permit Effluent Sampling.

Dear Mr. Frenette:

The Blazon #1 Mine is, at present, under construction. Sediment control facilities, listed as outfall #1, are under construction and should be completed by the time you receive this application. The second outfall, a proposed mine water discharge site, has not been and will not be constructed until it is necessary to discharge excess water produced in the mine.

Blazon Mining Company hereby requests an extension on the time limit for submission of the water quality analyses required under Part V of form 2C. It is requested that the time deadline be, extended until discharge from each outfall occurs. At which time samples will be taken and the analyses, pertaining to this operation, will be run.

Thank you for your consideration. Blazon Mining Company await your reply.

Sincerely,

Joseph A. Harvey RJ

BLAZON MINING COMPANY

NPDES 12/19/80

CC: T.O.E. Investment Company
909 17th Street, Suite 601
Denver, Colorado 80202

Agency
1860 Lincoln St.
Denver, CO. 80295
South Dakota,
Utah, Wyoming

EPA

AUG 12 1980

Ref: 8E-WE

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Joseph A. Harvey
Blazon Company
Box 327
Ferron, Utah 84523

Dear Mr. Harvey:

Herewith enclosed is the NPDES permit for Blazon Company, No. 1 Mine, UT-0023647. This permit shall become effective upon the date specified, unless within thirty (30) days following the date of receipt you submit a request for an evidentiary hearing in accordance with the provisions of 40 CFR Section 124.74. Such request must be addressed to:

Roger L. Williams (8E-WE)
Regional Administrator
U.S. Environmental Protection Agency
Region VIII, Suite 103
1860 Lincoln
Denver, Colorado 80295

If you have any legal questions with regard to this matter, please contact Mr. Alfred C. Smith of this Agency at (303) 837-4812. Questions regarding monitoring requirements should be directed to Mr. Doug Skie of this office at (303) 837-4335.

Sincerely yours,

Lance C. Vinson
Director
Enforcement Division

Enclosures

NPDES Discharge Permit
EPA Form 3320-1 for reporting self-monitoring

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295

Ref: 8E-WE

Re: NPDES Discharge Monitoring Report Forms

Dear Permittee:

The NPDES permit for your facility has been amended. Enclosed is a set of the above-referenced forms reflecting the amendment.

Please discard the original set of preprinted self-monitoring forms that you received and use the enclosed forms to comply with your self-monitoring requirements of the amended permit.

Regarding the enclosed forms, for each discharge point, please compare the parameters printed on the form and the reporting period with the self-monitoring requirements of the permit to assure that you have a complete set. Fill in only the blanks; should you have a situation where there is no discharge from your facility during the reporting period, write "no discharge" across the form.

If there are errors or discrepancies, please make a notation of such on the form. If the changes warrant sending you a new set of forms we will do so at our earliest convenience.

Please send one copy of the report to your State Office and a copy to us; Attention: Compliance Assurance Section.

If you have questions, please call Ms. Pauline Afshar of this Office, telephone (303) 837-4335. Your patience and cooperation in utilizing these forms will be appreciated.

Sincerely yours,

Robert J. Burm
Acting Chief
Water & Hazardous Waste
Enforcement Branch
Enforcement Division

Enclosure

MI

Permit No.: UT-0023647

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq.)(hereinafter referred to as "the Act"),

Blazon Company, No. 1 Mine,

is authorized to discharge from a facility located at Section 4, Township 14 South, Range 7 East, Carbon County, Utah,

to receiving waters named Mud Creek, which is a tributary of the Price River,

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on the date of issuance.*

This permit and the authorization to discharge shall expire at midnight, December 31, 1980.

Signed this 12th day of August, 1980.

for Roger E. Tremaine

Lance C. Vinson
Director
Enforcement Division

*Thirty (30) days after the date of receipt of this permit by the Applicant.

Enclosed you will find the new NPDES Discharge Monitoring Report Forms (EPA Form 3320-1) for use in reporting your self-monitoring results. A few notes about the use of these forms:

1. This report requires no carbon, therefore, please bear down on pen when completing the report.
2. Please remember to include a valid telephone number at the bottom right hand corner next to the signature of the Executive Officer or Authorized Agent.
3. IF NO DISCHARGE OCCURS, PLEASE REPORT NO DISCHARGE.
4. If you are not chlorinating, please so indicate on the form.
5. Please report the actual frequency at which you are sampling and the type of sample taken in the blank spaces under the columns marked "Frequency of Analysis" and "Sample Type".
6. Please READ THE INSTRUCTIONS on the back of the form CAREFULLY before completing the form. If you have any questions, please call (303) 837-4335 for further information.

THANK YOU.

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety and Health
District 9

August 14, 1980

Joseph A. Harvey
President
Blazon Company
PO Box 327
Ferron UT 84523

Re: Blazon #1 Mine
I.D. No. 42-01582
Fan Stoppage Plan

Dear Mr. Harvey:

The fan stoppage plan for the subject mine has been approved in accordance with Section 75.321, 30 CFR 75. The plan is subject to review and possible revision at any time and any changes proposed to the plan shall be approved by MSHA prior to implementation.

Sincerely yours,

for John W. Barton
District Manager

Enclosure

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety and Health
District 9

August 14, 1980

Joseph A. Harvey
President
Blazon Company
PO Box 327
Ferron UT 84523

Re: Blazon #1 Mine
I.D. No. 42-01582
Smoking Prohibition Plan

Dear Mr. Harvey:

The smoking prohibition plan for the subject mine has been approved in accordance with Section 75.1702, 30 CFR 75. The plan is subject to review and possible revision at any time and any changes proposed to the plan shall be approved by MSHA prior to implementation.

Sincerely yours,

for John W. Barton
District Manager

Enclosure

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

EDUCATION AND TRAINING
DENVER TRAINING CENTER

August 14, 1980

Joseph L. Harvey
President-Superintendent
Blazon Co.
Box 327
Ferron, UT 84523

RE: 42-01582 Blazon No. 1 Mine
UNDERGROUND AND SURFACE

Dear Mr. Harvey:

Your training plan submitted under the requirements of CFR Title 30, Part 48 is approved as of the date of this letter.

Any proposed revisions or changes to your approved plan must be submitted to the miner's representative and approved by the Training Center Chief.

Included is an initial supply of the 5000-23 form on which training must be recorded. A copy of this record must be given the employee at the completion of the training received (i.e. New Miner Training, Refresher Training, etc.) The other copy must be retained at the mine site. A copy of the 5000-23 should not be sent to this or any other MSHA office. Additional 5000-23 forms may be obtained from this office as needed.

Please do not record Part 48 training on the 5000-1 forms.

Sincerely,

Walter R. Schell
Chief, Denver Training Center

Legal Identity Report

U.S. Department of Labor
Mine Safety and Health Administration

U.S

This report is required by law (30 C.F.R. 41). Failure to report can result in assessment of a civil penalty. Knowingly making a false statement can result in criminal prosecution under § 110 of the Federal Mine Safety and Health Act of 1977.

Form Approved. OMB No. 44-R1677 Expires Sep 1983

☒ Initial Notice

☐ Change Notice

Note: If more space is required in any section below, please use a separate sheet.

Date APRIL 9, 1979

Federal Mine Identification Number	Mine Name
42-01582	BLAZON NO. 1 MINE

Mine Address	City	County	State	Zip Code
P.O. BOX 327	FERRON	EMERY	UTAH	84523

Commodity	Name of Operator
COAL	BLAZON COMPANY (Joseph A. Harvey, President, address above)

Person at Mine in Charge of Health and Safety

Name and Title — Address

Person with Overall Responsibility for a Health and Safety Program at All of the Operator's Mines, If the Operator is Not Directly Involved in the Daily Operation of the Mine

Name and Title — Address

JOSEPH A. HARVEY — P.O. BOX 327 FERRON, UTAH 84523

Agent for TOE INVESTMENT COMPANY

Federal Mine Identification Numbers of All Other Mines in which the Sole Proprietor, Partnership, Corporation, or Other Organization Has a 20% or Greater Ownership Interest

ID Numbers

N/A

Federal Mine Identification Numbers of All Other Mines in which Any Partner, Corporate Officer, or Other Organization Official Or Member Has a 20% or Greater Ownership Interest [not applicable to sole proprietorship]

ID Numbers

N/A

Address of Record and Telephone Number [service of documents upon the operator will be completed by mailing the documents to this address]

Name	Title	Telephone Number
JOSEPH A. HARVEY	PRESIDENT, BLAZON COMPANY	801-384-2755

Street Address	City	State	Zip Code
P.O. BOX 327	FERRON	UTAH	84523

RECEIVED APR 23 1979 MINE SAFETY AND HEALTH ADMINISTRATION DISTRICT 9 DENVER, CO

Please Check the Appropriate Box and Complete the Applicable Section

☐ I. Sole Proprietorship ☐ II. Partnership ☒ III. Corporation ☐ IV. Other

I. Sole Proprietorship

Trade Name — Proprietor

Proprietor's Address (street) — City — Zip Code

RECEIVED APR 27 1979 MINE SAFETY AND HEALTH ADMINISTRATION

II. Partnership

Trade Name

ership Address (street)	City	State	Zip Code

Names of Partners	Street Address	City	State	Zip Code

III. Corporation

Corporation Name	State of Incorporation
BLAZON COMPANY	UTAH

Corporation Address (street)	City	State	Zip Code
P.O. BOX 327	FERRON	UTAH	84523

Names & Titles of Corporation Officers and Directors	Street Address	City	State	Zip Code
Joseph A. Harvey, Pres.	P.O. Box 327	Ferron	Utah	84523
Stanley C. Harvey, Vice	133 E. 2nd North	Price	Utah	84501
Jack Otani, Sec-Treas.		Clear Creek	Utah	84517

Is Corporation a Subsidiary?

☐ Yes ☒ No

If yes, give name and address of parent corporation.

Name and Address of Parent Corporation

IV. Other

Name of Organization	Type of Organization

Address (street)	City	State	Zip Code

Names & Titles of Principal Organization Officials or Members	Street Address	City	State	Zip Code

Names of Individuals with Ownership Interests in Organization	Street Address	City	State	Zip Code

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225
Coal Mine Safety and Health
District 9

August 14, 1980

Joseph A. Harvey
President
Blazon Company
PO Box 327
Ferron UT 84523

Re: Blazon #1 Mine
I.D. No. 42-01582
Firefighting & Evacuation Plan

Dear Mr. Harvey:

The firefighting and evacuation plan for the subject mine has been approved in accordance with Section 75.1101-23, 30 CFR 75. The plan is subject to review and possible revision at any time and any changes proposed to the plan shall be approved by MSHA prior to implementation.

Sincerely yours,

for John W. Barton
District Manager

Enclosure

EMERGENCY MEDICAL ASSISTANCE

July 14, 1980

Mr. John W. Barton
District Manager, (9)
Mine Health and Safety Adm.
P.O. Box 25367 D.F.C.
Denver, Colorado 80225

Re: Blazon No.1 Mine
ID# 42-01582

Dear Mr. Barton,

Per 75:1713-1, Mandatory Standards for Underground Mines, the follow- is submitted:

75:1713-1(a), Arrangements have been made with O.W. Phelps, M.D. of Helper, Utah and the Castleview Hospital of Price, Utah for 24 hr/7 days per week service.

75:1713-1 (b), Emergency transportation for persons injured will be furnished by Carbon County Ambulance Service of Price, Utah.

75:1713 (c), (See (a) and (b) above.)

75:1713 (d), Changes will be reported within 10 days.

75:1713 (e), The home phone numbers of Dr. O.W. Phelps, the Castleview Hospital and Carbon County Ambulance will be posted at the mine. New arrangements will be posted immediately as they occur.

Sincerely,

Joseph A. Harvey

Joseph A. Harvey

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

Coal Mine Safety & Health
District 9

August 11, 1980

Joseph A. Harvey
Blazon Company
P.O. Box 327
Ferron, UT 84523

Re: Blazon No. 1 Mine
I.D. #42-01582
Emergency Medical Assistance Plan

Dear Mr. Harvey:

The emergency medical assistance plan submitted in compliance with Section 75.1713, 30 CFR, has been received and placed on file.

Sincerely,

for John W. Barton
District Manager

Enclosure

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

Coal Mine Safety and Health
District 9

August 12, 1980

Joseph A. Harvey
President
Blazon Company
PO Box 327
Ferron UT 84523

Re: Blazon #1 Mine
I.D. No. 42-01582
Ventilation System and Methane
and Dust Control Plan

Dear Mr. Harvey:

The ventilation system and methane and dust control plan dated July 30, 1980, for the subject mine has been approved in accordance with Section 75.316, 30 CFR 75. The plan is subject to revision at any time and shall be reviewed by the operator and MSHA at least once every six months. Before any changes are made in the approved ventilation system, they shall be submitted to and approved by the District Manager prior to implementation.

The mine maps appear acceptable and will be distributed as such.

This plan supersedes any previously approved plans and a copy of this plan shall be made available to the miners.

Sincerely yours,

Harold E. Barton for
John W. Barton
District Manager

Enclosure

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

Coal Mine Safety and Health
District 9

July 28, 1980

Mr. Joseph A. Harvey
President
Blazon Company
P. O. Box 327
Ferron, Utah 84523

Re: Blazon No. 1 Mine
I. D. No. 42-01582
Roof Control Plan

Dear Mr. Harvey:

The roof control plan dated July 22, 1980, has been reviewed by MSHA personnel and is approved for six months. However, if conditions warrant, the plan may be changed at any time.

Sincerely,

Harold E. Delan

for John W. Barton
District Manager

EXHIBIT 18

SIGNS AND MARKERS

mining in the old Clear Creek No. 2 Mine (in appendix). Faulting is assumed to be the reason for this termination, as drill hole No. 10 exhibits good mineable thickness. There may also develop a problem of past subsidence associated with pillar mining in the old Clear Creek No. 2 Mine.

3.3.3.3 Access to Future Reserves.

Access to federal coal to the south of the property, in the same fault block, will be left as required by appropriate authorities.

3.3.4 Equipment Selection.

3.3.4.1 Surface Equipment.

The only surface equipment proposed, but not previously mentioned in this chapter, would be a front-end loader used for cleanup around loading areas and some maintenance around the surface facilities, a pickup truck(s) and coal haulage trucks which will be under contract. All other surface quipment will be for short-term specific use and be contracted from outside sources.

3.3.4.2 Underground Equipment.

A list of major equipment is included in Chapter III appendix, Mining Operations.

3.3.5 Mine Safety, Fire Protection and Security.

3.3.5.1 Signs.

30 CFR 816.11 Signs and Markers - - - The general signs in and around the area of the Blazon No. 1 Mine will

contain the following information and be of adequate size and be made of durable material as required by the purtenient regulations.

1. The identification sign which will be posted next to the access road prior to entry to the outside facilities area will contain the following information:

BLAZON NO. 1 MINE
Operator
Blazon Company

Utah
for
Toe Investment Company N.V.

Denver, Colorado
Surface Mining Permit No.

_____

Mine Identification No. (MSHA)

_____

AUTHORIZED PERSONNEL ONLY

2. The Perimeter Markers which will be place on the boundaries of the permit area at points of likely access prior to commencement of operation shall read:

NOTICE: Boundary of Blazon No. 1 Mine Property
NO TRESPASSING
Mining Permit No. _____

3. Buffer Zone signs shall be placed at the north and south construction perimeters along Mud Creek and at points 100 feet from the stream channels east and west at the areas not considered for diversion in the plan and this volume. Signs will also be placed in Long

Canyon and Snider Canyon 100 feet from the channels on either side. These signs shall read:

BUFFER ZONE

No Construction Beyond This Point

4. Topsoil Storage signs will be placed around the storage area(s) and read as follows:

TOPSOIL STORAGE AREA

No Vehicular Travel Allowed Beyond This Point

5. Public Road Safety signs placed south of Clear Creek and in Long Canyon shall read:

CAUTION
COAL TRUCK TRAFFIC
ON ROADWAY

Note: All signs will comply with the proper safety or other regulations requiring and specifying the dimensions, materials, and wording on all signs.

3.3.5.2 Fences and Gates.

Fences will be erected as required to protect wildlife and humans against hazards at the mine site.

A substantial gate at a stratigic location on the road will bar unauthorized persons from driving to the mine site during all periods of non-operation, i.e. nights and weekends, etc. and the area will be kept as secure as possible and patrolled as necessary.

3.3.5.3 Fire Protection.

Facilities - Sturctures are constructed to be as fire proof as possible considering their use etc. Fire

EXHIBIT 19

HISTORICAL AND CULTURAL RESOURCES

Chapter V

5.0 Table of Contents.

		Page
5.1	Scope	V-1
5.3	Historical Resources	V-1
5.4	Archeological Resources	V-1
5.5	Paleontological Resources	V-1
5.6	Public Parks	V-2

5.1 Scope

The purpose of this Chapter is to list any Historical, Archeological, Paleontological and public values in the mine plan area.

5.3 Historical Resources.

5.3.1 Historical Inventory.

No historical values were found either before or during construction at the mine site.

5.3.2 History of Mining.

Mining in the lower seam in the Clear Creek No. 2 Mine in 10-14 foot thick coal was done in the early part of the century 1907-1916, as can be seen on the Clear Creek No. 2 Mine Map, Chapter III appendix.

5.3.3 Effects of Mining on Historical Resources.

There should be no effects on historical resources caused by operations.

5.4 Archeological Resources.

5.4.2 Archeological Inventory.

No archeological values were found at the site either before, during or after construction of facilities.

5.4.2 Effects of Mining on Archeological Resources.

No effects are expected.

5.5 Paleontological.

5.5.1 Paleontologic Inventory.

No inventory was made prior to construction, but no values were noted at the site and none are known in the Black Hawk formation.

5.5.2 Effects of Mining on Paleontological Resources.

None are expected.

5.6 Public Parks.

5.6.1 Inventory of Public Facilities.

There are none in permit area.

5.6.2 Effects of Mining on Public Facilities.

None are expected.

EXHIBIT 20

VEGETATION INFORMATION

UMC 783.19 VEGETATION INFORMATION

Mr. George Cook of the Price, Utah office of the Department of Agriculture Soil Conservation Service (SCS) was contacted on February 14, 1984 regarding verification of production figures. Mr. Cook indicated the information on productivity was compiled by him on March 11, 1980 and was used to estimate production for the five (5) vegetation types. A letter from Mr. Cook verifying the estimated productivity figures is attached as Figure 2, Vegetation Productivity Letter.

The vegetation type has been classified spruce/fir/aspen for the reference area based on information obtained from the March 1980 SCS survey and from the September 1983 vegetation study. The five (5) vegetation types delineated during these studies are shown on the Vegetation Map (Map 4) and described in Exhibit 6, Vegetation Information. Spruce is found within the reference area; however, it is present at a very low density and, therefore, spruce was not encountered during sampling.

In discussions with Susan Linner of DOGM it was determined that a reference area of one (1) acre would be adequate. The selected reference area as shown on the Vegetation Map (Map 4) is located on a 57% slope. Due to the severity of the slope, transects were oriented parallel to the slope. A random numbers table obtained from Statistical Methods, Snedecor and Cochran, 1976, was used to construct sets of numbers for the starting points of the transects. The methods utilized to sample each transect and the reference area is outlined below.

One side of the reference area measures 63 meters. In order to extend the entire 50 meter tape, the starting point from either side running perpendicular to the slope could not exceed 10 meters. The random numbers range from 0 to 9 with 0 representing 10 meters. The initial starting point was the NE corner, at the top of the slope. The first random number represented the number of meters to move west or downslope. The second number reflected the meters to move south, along the slope. At that point, the tape was extended parallel to the slope.

Once data was collected for the tape, the tape was taken to the boundary perpendicular to the slope. The random numbers table was utilized each time for tape placement parallel to the slope within the reference area boundary. This procedure was continued until the downslope west boundary was reached. At that time, the same system was utilized going upslope starting at the SW corner. The results of this work are shown in Exhibit 12, Vegetation Field Work Sheets.

The following sampling procedure was used to obtain cover data.

Two (2) samples of 50 hits were obtained from each 50 meter tape. Transects were randomly located. Data from the 10 point frame was collected every 5 meters for a total of 25 meters per transect. The first 50 hits were recorded from the upslope side of the tape. The second set of 50 were recorded from the downslope side of the tape. By alternating the slope position respective to the tape, 2 samples can be independently located per 50 meter tape, a total of 17 samples were obtained.

The vegetation sampling methods utilized by North American Equities NV, including pin frame, belt transects, and point-center quarter measurements, are not randomly located, as described in Section UMC 783.19, Vegetation Information and in Exhibit 6, Vegetation Information. These data were obtained by the systematic stratified sampling methods described above and in Exhibit 6, Vegetation Information.

Shrub density was described on page 13 of Exhibit 6, Vegetation Information, as being obtained by counting all shrubs rooted within one (1) meter of the 50 meter tape. This could be described more precisely as "rooted" within 0.5 meters of either side of the tape. Therefore, the transects measure 1 x 50 m.

The sentence on page 21 "total amount of rooted species within the transect divided by 17" contains a typographical error. The "17" should be 20 and has been corrected in the text, Exhibit 6, Vegetation Information, on the appropriate page.

Determination of points for Douglas fir and aspen were determined in the following manner:

> Points for PCQ readings were spaced at ten (10) meter intervals along randomly located transects. Readings for aspen were initiated at the 0 mark and those for Douglas fir were started at 5. Each transect yields five (5) points for each species. Eight (8) transects provide 40 points which is the maximum number needed as defined in the vegetation guidelines provided by DOGM.

Vegetation types are delineated on the Vegetation Map (Map 4). The divisions shown on the areas of disturbance are the best estimates possible based on surrounding vegetative patterns, slope, aspect, and drainages. Acreage estimates for the five (5) vegetation types thought to have been present within the area prior to disturbance are as follows:

- Spruce/Fir 0.6 acres
- Spruce/Fir/Aspen 1.2 acres
- Mixed Mountain Shrub 0.8 acres
- Meadow 0.9 acres
- Aspen 1.5 acres

The locations of all reference area transects are shown on the Vegetation Map (Map 4).

Copies of all field data sheets and summary sheets compiled during the September 1983 vegetation survey are presented in Exhibit 12, Vegetation Field Work Sheets.

VEGETATION INFORMATION

VEGETATION TYPE DESCRIPTIONS

Meadow

The meadow vegetation type is found along drainages and often within one to ten feet of waterways. Slopes are gentle to moderate, 2-5 percent, and soils are deep and moderately well drained.

The area is considered to be a good range condition. Using SCS production guidelines for average precipitation years, usable forage would be 2,000 lbs/acre. Grasses and forbs dominate the area with canary reedgrass, sedges and nettles being prominent. Clumps of willow are located sporadically along the waterways. The site specific species list is on Table 1, Vegetation Species - Meadow.

Mixed Mountain Shrub

The mixed mountain shrub type of vegetation is generally found on moderately steep to very steep mountain slopes of 40-65 percent. Exposures are west to southwest. The soils are moderately deep and well drained.

According to SCS guidelines, this area, reported in good condition, would yield 3,500 lbs/acre of usable forage.

The dominant overstory shrub is big sagebrush and the prevalant grass is Kentucky bluegrass. Major forbs consisted of monument plant and penstemon. The species list for mixed mountain shrub vegetation type is on Table 2, Vegetation Species - Mixed Mountain Shrub.

Table 1 - Part 1
VEGETATION SPECIES - MEADOW

Scientific Name	Common Name
Grasses and Grasslike	
Agropyron trachycaulum	slender wheatgrass
Bromus anomalus	nodding brome
Bromus carinatus	mountain brome
Carex nebraskensis	sedge
Carex spp.	sedge
Elymus canadensis	Canada wild rye
Juncus spp.	rush
Phalaris arundinacea	canary reedgrass
Poa pratensis	Kentucky bluegrass
Stipa lettermanii	Letterman needlegrass
Forbs	
Achillea millefoliom	yarrow
Artemisia dracunculus	false tarragon
Circium spp.	thistle
Delphinium occidentalis	tall larkspur
Equisetum arvense	field horsetail
Epilobium paniculatum	willowherb
Erigeron speciosus	fleabane
Fragaria spp.	wild strawberry
Frasera speciosa	monument plant
Geranium richardsonii	wild geranium
Hackelia floribunda	false forget-me-not
Heracleum sphondylium	cow parsnip
Heuchera parvifolia	alum root
Lathyrus spp.	aspen peavine
Osmorhiza occidentalis	sweet anise
Polemonium spp.	jacob's ladder
Potentilla gracilis	cinquefoil

Table 1 - Part 2

VEGETATION SPECIES - MEADOW

Scientific Name	Common Name
Forbs (continued)	
Potentilla spp.	cinquefoil
Rudbeckia laciniata	western coneflower
Senecio eromophilus var. kingii	groundsel
Senecio serra	groundsel
Smilacina stellata	false solomon seal
Thalictrum fendleri	meadow rue
Trifolium spp.	clover
Urtica dioica	stinging nettles
Shrubs	
Ribes spp.	currant
Rubus spp.	wild raspberry
Symphoricarpos spp.	snowberry

Table 2 - Part 1

VEGETATION SPECIES - MIXED MOUNTAIN SHRUB

Scientific Name	Common Name
Grasses	
Agropyron trachycaulum	slender wheatgrass
Bromus marginatus	mountain brome
Elymus canadensis	Canada wild rye
Poa pratensis	Kentucky bluegrass
Forbs	
Achillea millefolium	western yarrow
Agastache urticifolia	nettleleaf horsemint
Androsace septentrionalis	rock primrose
Aster spp.	aster
Castilleja spp.	Indian paintbrush
Chaenactis douglasii	false yarrow
Delphinium occidentalis	tall larkspur
Eriogonum spp	buckwheat
Frasera speciosa	monument plant
Geranium spp.	geranium
Heliomeris multiflora	little sunflower
Ipomopsis aggregata	skyrocket gilia
Linum lewisii	prairie flax
Mahonia repens	Oregon grape
Penstemon spp.	penstemon
Potentilla spp.	cinquefoil
Ranunculus spp.	buttercup
Rudbeckia laciniata	western coneflower
Senecio serra	groundsel
Tragopogon dubius	salsify
Vicia americana	American vetch

Table 2 - Part 2

VEGETATION SPECIES - MIXED MOUNTAIN SHRUB

Scientific Name	Common Name
Shrubs	
Artemisia tridentata	big sagebrush
Chrysothamnus nauseosus	rubber rabbitbrush
Chrysothamnus viscidiflorus	green rabbitbrush
Ribes cereum	wax currant
Sambucus spp.	elderberry
Symphoricarpos spp.	snowberry

Aspen

The aspen vegetation type occurs on all aspects but is predominantly found on north and east facing slopes. The slopes are generally steep, 50-70 percent, and soils are moderately deep and well drained. This type is in good condition and, according to SCS guidelines, will produce approximately 4,000 lbs/acre of usable forage.

The dominant overstory is aspen with Kentucky bluegrass, nodding brome, and aspen peavine being prominent in the understory. Table 3, Vegetation Species - Aspen, lists specific species for this area.

Spruce/Fir

The spruce/fir vegetation type is generally located on north facing slopes although may be spread from the northeast to northwest portion of a hillside. Slopes are 50-70 percent with moderately deep and well drained soils. Reported in fair condition, usable forage would be 800 lbs/acre.

Douglas fir is the dominant overstory with litter being the major understory component. Site specific species are found on Table 4, Vegetation Species - Spruce/Fir.

Spruce/Fir/Aspen

This vegetation type is found between spruce/fir and aspen vegetation types on steep slopes of 50-70 percent. Soils are moderately deep and well drained. The aspect is generally north to northwest. Determined to be in good condition, the SCS guidelines report 2,400 lbs/acre of usuable forage for this type.

Co-dominant overstory species are Douglas fir and aspen with an upward trend of Douglas fir seedlings and consequent decline of aspen saplings. The understory dominants were nodding brome, wild strawberry and snowberry. Vegetation species of this community are shown on Table 5, Vegetation Species - Spruce/Fir/Aspen.

Table 3 - Part 1
VEGETATION SPECIES - ASPEN

Scientific Name	Common Name
Grasses and Grasslike	
Agropyron trachycaulum	slender wheatgrass
Bromus anomalus	nodding brome
Bromus carinatus	mountain brome
Carex spp.	sedge
Elymus canadensis	Canada wild rye
Elymus glaucus	blue wild rye
Poa pratensis	Kentucky bluegrass
Stipa lettermannii	letterman needlegrass
Forbs	
Achillea millefolium	western yarrow
Androsace septentrionalis	rock primrose
Aster spp.	aster
Delphinium spp.	larkspur
Dugaldia hoopesii	orange sneezeweed
Epilobium angustifolium	fireweed
Erigeron spp.	fleabane
Erysimum spp.	wallflower
Frageria spp.	wild strawberry
Frasera speciosa	monument plant
Galium spp.	bedstraw
Geranium spp.	geranium
Hackelia floribunda	false forget-me-not
Lathyrus spp.	aspen peavine
Lupinus spp.	lupine
Mahonia repens	Oregon grape
Osmorhiza occidentalis	sweet anise
Polemonium spp.	jacob's ladder
Potentilla spp.	cinquefoil

Table 3 - Part 2
VEGETATION SPECIES - ASPEN

Scientific Name	Common Name
Forbs (continued)	
Senecio spp.	groundsel
Smilacina stellata	false solomon seal
Taraxacum officianale	dandelion
Thalictrum fendleri	meadowrue
Vicia americana	American vetch
Viola spp.	violet
Shrubs	
Arcotostaphylos uva-ursi	kinnikinnik
Rosa woodsii	woods rose
Shepherdia canadensis	buffaloberry
Symphoricarpos spp.	snowberry
Physocarpus spp.	ninebark
Sambucus spp.	elderberry
Ribes cereum	wax currant
Ribes spp.	currant
Trees	
Populus tremuloides	quaking aspen

Table 4

VEGETATION SPECIES - SPRUCE/FIR

Scientific Name	Common Name
Grasses	
Bromus anomalus	nodding brome
Forbs	
Mahonia repens	Oregon grape
Shrubs and Subshrubs	
Arctostaphylos uva-ursi	kinnikinnik
Trees	
Picea engelmannii	Engelmann spruce
Picea pungens	Colorado blue spruce
Pseudotsuga menziesii	Douglas fir

Table 5 - Part 1

VEGETATION SPECIES - SPRUCE/FIR/ASPEN

Scientific Name	Common Name
Grasses and Grasslike	
Agropyron trachycaulum	slender wheatgrass
Agrostis spp.	redtop
Bromus anomalus	nodding brome
Bromus carinatus	mountain brome
Carex spp.	sedge
Elymus canadensis	Canada wild rye
Elymus glaucus	blue wild rye
Poa pratensis	Kentucky bluegrass
Stipa lettermannii	Letterman needlegrass
Forbs	
Achillea millefolium	yarrow
Androsace septentrionalis	rock primrose
Aster spp.	aster
Delphinium spp.	larkspur
Dugaldia hoopesii	orange sneezeweed
Epilobium angustifolium	fireweed
Erigeron spp.	fleabane
Erysimum spp.	wallflower
Fragaria spp.	wild strawberry
Frasera speciosa	monument plant
Galium spp.	bedstraw
Geranium spp.	geranium
Hackelia floribunda	false forget-me-not
Lathyrus spp.	aspen peavine
Lupinus spp.	lupine
Mahonia repens	Oregon grape
Osmorphiza occidentalis	sweet anise
Polemonium spp.	polemonium

Table 5 - Part 2

VEGETATION SPECIES - SPRUCE/FIR/ASPEN

Scientific Name	Common Name
Forbs (continued)	
Potentilla spp.	cinquefoil
Senecio spp.	groundsel
Similacina stellata	false solomon seal
Taraxacum officianale	dandelion
Thalictrum fendleri	meadowrue
Vicea americana	American vetch
Viola spp.	violet
Shrubs	
Arcostaphylos uva-ursi	bearberry
Rosa woodsii	woods rose
Shepherdia canadensis	buffaloberry
Symphoricarpos spp.	snowberry
Physocarpus spp.	ninebark
Sambucus spp.	elderberry
Ribes cereum	wax current
Ribes spp.	current
Trees	
Picea engelmannii	Engelmann spruce
Picea pungens	Colorado blue spruce
Populus tremuloides	quaking aspen
Pseudotsuga menziesii	Douglas fir

Disturbed

Areas of disturbance include roads, the portal pad, office and shop building areas, conveyor area, refuse area and are chiefly limited to the east side of Mud Creek at the base of the slope.

Reference Area

A reference area was selected in the spruce/fir/aspen vegetation type. The location of this reference area was based on similarities of slope, aspect, soils, and drainage proximity to that of the previously disturbed area. The Vegetation Map (Map 4) shows the location of the one acre reference area in Long Canyon.

SAMPLING METHODS

A vegetation sampling program was initiated in September, 1983 for the spruce/fir/aspen reference area within the permit area of the Blazon #1 Mine near Clear Creek, Utah. The vegetation parameters of cover and woody plant density were quantified during this survey. Information concerning plant production has been compiled from Soil Conservation Service surveys.

A reference area of approximately one acre in size was established for the spruce/fir/aspen vegetation type. The reference area established is delineated on the Vegetation Map (Map 4). This reference area was selected for use in determining success of reclamation for the disturbed area. During discussions with DOGM personnel, it was agreed that this vegetative community most accurately represented the area which has been disturbed by the surface facilities of the Blazon #1 Mine.

In September, quantitative vegetation data for cover and density was collected at the reference area. The techniques utilized for field data collection involved the use of a 50 meter tape and a standard 10-point frame. Transects were randomly located within the reference area. To determine cover, the ten point frame was read at every five meters along the 50 meter tape which yielded a total of 50 hits per transect, thus 2 transects per 50 meter tape. Shrub density was obtained by counting all shrubs rooted within one meter of the 50 meter tape. Tree density was obtained using the Point-Center-Quarter method. Center-points were located every ten meters along the 50 meter tape.

The statistical method for sample adequacy recommended in the State of Utah Vegetation Guidelines for Permanent Program Submissions for Coal Mines, was used to determine minimum sample size. The sample adequacy formula is:

$$m = \frac{t^2 s^2}{(dx)^2}$$

where:

m = the minimum number of observations needed

t = t-table value,

(t = 1.282 for 80% confidence,

t = 1.645 for 90% confidence)

s = the sample standard deviation

d = the desired change in the mean (.1)

x = the sample mean of the parameter in question

The reference area is considered a woodland, therefore, the 80% confidence interval was used where t = 1.282.

RESULTS

Total Cover

A total of 17 transects were taken in the reference area to document cover. The mean total vegetative cover was 25.06 hits per 50 points (50.12%). Standard deviation was 5.67. The required sample size determined was 9, which was acceptable.

Density (Shrub)

A total of 20 - 1 x 50 meter belt transects were taken in the reference area to determine density for shrubs. The mean density for this area was 14.95 shrubs/transects, with the standard deviation of 5.13. The required sample size was determined to be 20; therefore, sample adequacy was met for this area.

Density (Tree)

A total of 80 Point-Center-Quarter points, 40 points each for Douglas fir and aspen, were taken to determine tree density for the reference area. Tree density was calculated using the following approved formula in the Utah Vegetation guidelines:

For each point: $$\left(\frac{y^1 = y^2 = y^3 = y^4}{4}\right)^2 = A_j$$

$$\text{Density} = 43{,}560 \div \frac{\sum A_j}{n}$$

where yi = measurement from point to nearest plant in the ith quarter (in feet)

A_j = mean area/plant at the j^{th} point

n = sample size (number of points sampled)

Density = plants/acre

The mean density of Douglas fir was 556.5 stems/acre with a standard deviation of 491.9. Aspen values were 910.5 and 598.3, respectively. The average tree density was 733.5 stems/acre with a standard deviation of 572.6. Using the average tree values, the minimum sample size was over 100. Therefore, 40 PCQ points were sampled for each which is the maximum sample size as delineated by the Utah State Guidelines, and thus is adequate.

Production

Production estimates for each vegetation type shown on the Vegetation Map (Map 4) were obtained from information compiled from Soil Conservation Service surveys. The preliminary soil and vegetation survey for the Blazon Mining Company was conducted on March 11, 1980. Included in this study are production estimates for range sites found on and adjacent to the permit area. Using these estimates in conjunction with SCS field data compiled on July 23, 1980 and field survey notes of September 17, 1983, annual yield in pounds per acre for each of the five vegetation types was obtained. The respective amounts are reported in the preceding vegetation type descriptions and summarized below:

- Meadow 2,000 lbs/acre
- Mixed Mountain Shrub 3,500 lbs/acre
- Aspen 4,000 lbs/ acre
- Spruce/Fir 800 lbs/acre
- Spruce/Fir/Aspen 2,400 lbs/acre

North American Equities NV proposes to initiate a production sampling program prior to reclamation. Site sepcific data will serve as a basis for success standards for production.

VEGETATIVE COVER SUMMARY

Vegetative cover is compiled and presented by species type in Table 6, Vegetative Cover Summary. The total vegetative cover is 50.12 percent.

Grass and grasslike species compose 9.42 percent of total cover and 18.77 percent of relative vegetative cover (composition). Nodding brome and Kentucky bluegrass are the dominant grasses of the reference area.

The forbs compose a total of 32.82 percent for total cover and 65.52 percent of composition. The prevalant forbs are wild strawberry, aspen peavine, Oregon grape and violet.

The remainder of total vegetative cover, 7.88 percent, is provided by shrubs and trees. This lifeform provides 15.75 percent of the vegetative composition. Douglas fir was the prevalent tree; snowberry and woods rose were dominant shrubs.

Total litter is 45.77 percent, bare ground 2.82 percent and rocks comprise 1.29 percent.

Diversity for each species has been calculated using the Shannon Wiener Index Formula, as approved by the Utah Vegetation Guidelines:

$$H' = \sum Pi \log Pi$$

where: H' = diversity measure

$$Pi = \frac{Ni}{N}$$

Ni = cover value of species i

N = sum of all species cover value

The total reported diversity is 1.306.

Table 6 - Part 1
VEGETATIVE COVER SUMMARY

Species	Percent Cover	Composition	Diversity
Grasses and Grasslike			
Agropyron trachycaulum slender wheatgrass	.24	.48	.011
Agrostis spp. bentgrass	.47	.96	.019
Bromus anomalus nodding brome	4.47	8.92	.094
Carex spp. sedge	.59	1.16	.022
Elymus canadensis Canadian wild rye	.94	1.87	.032
Poa pratensis Kentucky bluegrass	2.71	5.38	.068
Sub-Total	9.42	18.77	.246
Forbs			
Achillea millefolium western yarrow	1.88	3.75	.053
Androsace septentrionalis rock primrose	.24	.48	.011
Aster spp. aster	.47	.96	.019
Dugaldia hoopesii orange sneezeweed	2.36	4.70	.062
Epilobium spp. fireweed	.11	.24	.006
Erigeron spp. fleabane	.11	.24	.006
Forb #1 unknown	.24	.48	.011
Fragaria spp. wild strawberry	4.94	9.84	.099

Table 6 - Part 2
VEGETATIVE COVER SUMMARY

Species	Percent Cover	Composition	Diversity
Forbs (continued)			
Frasera speciosa monument plant	1.18	2.35	.038
Galium spp. bedstraw	.35	.72	.015
Geranium spp. geranium	.12	.24	.006
Hackelia floribunda false forget-me-not	.12	.24	.006
Lathyrus spp. aspen peavine	4.24	8.45	.091
Lupinus spp. lupine	.94	1.87	.032
Lycopodium spp. clubmoss	.82	1.63	.029
Mahonia repens Oregon grape	4.00	7.97	.088
Osmorhiza spp. sweet anise	2.12	4.22	.058
Senecio spp. groundsel	.47	.96	.019
Smilacina stellata false solomon seal	.82	1.63	.029
Taraxacum officianale dandelion	.24	.48	.011
Thalictrum fendleri meadow rue	.58	1.16	.022
Vicia americana American vetch	.35	.72	.015
Viola spp. violet	6.12	12.19	.111
Sub-Totals	32.82	65.52	.937

Table 6 - Part 3
VEGETATIVE COVER SUMMARY

Species	Percent Cover	Composition	Diversity
Shrubs and Trees			
Arctostaphylos vra-ursi kinnikinnik	.35	.72	.015
Physocarpos spp. ninebark	.12	.24	.006
Populus tremuloides aspen	.71	1.40	.026
Pseudotsuga menziesii Douglas fir	4.23	8.45	.091
Rosa woodsii woods rose	1.06	2.11	.035
Shepherdia canadensis buffalo berry	.35	.72	.015
Symphoricarpos spp. snowberry	1.06	2.11	.035
Sub-Totals	7.88	15.75	.223
TOTAL	50.12	100.04	1.306

WOODY PLANT DENSITY SUMMARY

Woody plant density is compiled and presented by species in Table 7.

Shrub density was determined by 1 x 50 m belt transects. the total amount of rooted species within the transect was divided by 20 (total transects) to determine average stem number per transect. This number is then divided by 50 (for stems/m^2). Finally, the stems/m^2 is multiplied by a factor of 4,047 to determine density of stems/acre. Snowberry and woods rose were found to be the dominant shrubs.

Tree density was acquired with the utilization of the Point Center Quarter method. Density values were obtained by the utilization of the accepted formula as previously outlined in Methodology: Density (Trees).

The density of Douglas fir is 556.5 stems/acre and that of aspen is 910.5 stems/acre. These values totaled yield 1,467.0 mature woody stems/acre.

Both shrub and tree densities combined indicate the selected reference area has a total woody plant density of 2,677.05 stems per acre.

Table 7

SPRUCE/FIR/ASPEN WOODY PLANT DENSITY SUMMARY

Species	Average Stems/Acre
Shrubs	
1 x 50 belt transects	
Arctostaphylos uva-ursi kinnikinnik	141.65
Ribes cereum squaw currant	12.14
Ribes spp. currant	20.24
Rosa woodsii wood's rose	424.94
Shepherdia canadensis buffaloberry	36.42
Symphoricarpos spp. snowberry	574.67
Sub-Total	1,210.06
Trees	
Point Center Quarter	
Populus tremuloides aspen	910.5
Pseudotsuga menziesii Douglas fir	556.5
Sub-Total	1,467.0
TOTAL	2,677.06

Exhibit 15

SOILS INFORMATION

SOIL SURVEY AND INTERPRETATIONS
PRELIMINARY VEGETATION SURVEY
for
Blazon Mining Company
March 11, 1980
Gary Moreau, District Conservationist
Earl Jensen, Soil Scientist
George Cook, Range Conservationist

The proposed Blazon Mine Mine area is located one mile south of Clear Creek, Utah, in Carbon County. At the request of Joe Harvey representing Blazon Mining Company and the Price River Watershed Soil Conservation District, the Soil Conservation Service performed a soil survey on the proposed mining site. The survey was designed to comply with the Permanent Regulatory Program, Office of Surface Mining Reclamation and Enforcement, Department of Interior.

The soils included in the inventory cover approximately 25 acres of land near Mud Creek and Little Snider Canyons, Section 4, T. 14 S., R. 11 E., SLBM. The soils are shown on the attached map. Each soil is identified with a three letter symbol, and the pattern and extent denoted by the soil boundary lines on the map. All areas having the same symbol are essentially the same kind of soils. There may be small areas of included soils that are slightly different. The soils have not been named or correlated. When the overall county survey is completed, small areas may become inclusions in other map units. Immediately following the soil descriptions is a table pointing out limitations of the soils for a variety of uses.

The vegetation was analyzed using the range site methods of the Soil Conservation Service. Range sites are shown on the attached map. Only preliminary information was obtained before a light snow arrived in the survey area. Another field trip will be required to identify the low growing grasses and forbs, and therefore, to assess present vegetation, productivity, and range condition. Presented in this report are the range site delineations with potential productivity according to favorable and unfavorable precipitation years.

More detailed information is on file in the Price Field Office of the Soil Conservation Service.

SOIL LEGEND

Soil Symbol	Soil Mapping Unit Name
BIG	BI stony loam, 50 to 70 percent slopes
CIG	CI loam, 40 to 65 percent slopes
DIB	DI Loam, 2 to 5 percent slopes

DESCRIPTIONS OF THE SOILS

BIG BI stony loam, 50 to 70 percent slopes

This BI soil is moderately deep and well drained. It occurs on very stony mountain sideslopes along Mud Creek at elevations of 2590 to 2680 meters (8500 to 8800 feet). This soil formed in colluvium and residium derived mainly from sandstone and shale.

The average annual precipitation is 56 to 64 centimeters (22 to 25 inches). Mean annual air temperature 2 to 3°C (36 to 37°F), mean annual soil temperature is 3 to 4°C (37 to 39°F), and the average freeze-free season is 57 days. Slopes are 50 to 70 percent and east, west, and north facing. They are medium and long in length and concave-convex in shape.

Vegetation is dominantly aspen, Douglas fir, white fir, peavine, blue wildrye.

Included in mapping are small areas of rock outcrop near the foot of the slopes.

In a representative profile the surface layer is dark grayish brown stony loam about 8 centimeters (3 inches) thick. The subsurface layer is light yellowish brown stony sandy loam about 20 centimeters (8 inches) thick. The subsoil is pale brown and light brownish gray, very stony clay loam about 74 centimeters (29 inches) thick over sandstone at a depth of 102 centimeters (40 inches).

Permeability is moderately slow. Available water capacity is about 13 centimeters (5 inches). Organic matter content in the surface layer is 5 to 10 percent. Effective rooting depth is about 102 centimeters (40 inches). Surface runoff is slow and erosion hazard is slight under potential native vegetation and very high if vegetation is removed and the soil is left bare. Erodibility is moderate.

This soil is used for range, wildlife habitat, and woodland.

Taxonomic classification is fine-loamy, mixed typic cryoboralfs.

A representative pedon of BI stony loam, 50 to 70 percent slopes was described near the proposed portal of Blazon Company Mine.

O1—2.5 to 0 centimeter (1 to 0 inch); leaves and fir needles.

A1—0 to 8 centimeters (0 to 3 inches); dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) when moist; moderate coarse granular structure; soft, friable, slightly sticky, slightly plastic; many very fine to large roots; 5 percent stones, 5 percent cobbles, 10 percent gravel; neutral reaction (pH 6.8); abrupt wavy boundary.

A2—8 to 30 centimeters (3 to 11 inches); light yellowish brown (10YR 6/4) stony sandy loam, yellowish brown (10YR 5/4) when moist; moderate coarse platy structure; slightly hard, friable, nonsticky, nonplastic; common very fine to medium roots; 5 percent stones, 5 percent cobbles, 10 percent gravel; neutral reaction (pH 6.6); clear smooth boundary.

B21t—30 to 61 centimeters (11 to 24 inches); pale brown (10YR 6/3) stony clay loam, brown (10YR 4/3) when moist; moderate medium subangular blocky structure; extremely hard, very firm, sticky, plastic; common very fine to large roots; common moderately thick clay films; 5 percent gravel, 5 percent cobbles, 10 percent stones; neutral reaction (pH 6.6); abrupt irregular boundary.

B22t—61 to 102 centimeters (24 to 40 inches); light brownish gray (10YR 6/2) very stony clay loam, dark grayish brown (10YR 4/2) when moist; moderate medium subangular blocky structure; hard, firm, sticky, plastic; common very fine to large roots; 10 percent gravel, 20 percent cobbles, 10 percent stones; mildly alkaline (pH 7.8); abrupt irregular boundary.

R—102 centimeters (40 inches); sandstone.

CIG CI loam, 40 to 65 percent slopes

This CI soil is moderately deep and well drained. It occurs on very steep mountain sideslopes on the east side of Mud Creek at elevations of 2560 to 2620 meters (8400 to 8600 feet). This soil formed in local colluvium and residium derived mainly from shale and sandstone.

The average annual precipitation is 56 to 64 centimeters (22 to 25 inches). Mean annual air temperature is 2 to 3°C (36 to 37°F), mean annual soil temperature is 3 to 4°C (37 to 39°F), and the average freeze-free season is 57 days. Slopes are 40 to 65 percent and west facing. They are medium and long in length and convex-concave in shape.

Vegetation is dominantly aspen, snowberry, blue wildrye, and native bluegrass.

Included in mapping are small areas of rock outcrop near the foot of the slopes.

In a typical profile the surface layer is dark brown loam about 10 centimeters (4 inches) thick. The underlying layer is brown, gravelly loam about 20 centimeters (8 inches) thick. The next layer is very pale brown, stony loam and stony clay loam about 66 centimeters (26 inches) thick. Depth to soft shale is 97 centimeters (38 inches).

Permeability is moderately slow. Available water capacity is 11 to 13 centimeters (4.5 to 5 inches) to a 97 centimeter (38 inch) depth. Organic matter content in the surface layer is 5 to 10 percent. Effective rooting depth is about 97 centimeter (38 inches). Surface runoff is medium and erosion hazard is moderate under potential native vegetation and very high if vegetation is removed and the soil is left bare. Erodibility is moderate.

This soil is used for range and wildlife habitat.

Taxonomic classification is fine-loamy, mixed typic cryoborolls.

A typical pedon of CI loam 40 to 65 percent slopes was described in the excavation east of the junction of Long Canyon and Mud Creek.

A11—0 to 10 centimeters (0 to 4 inches); dark brown (10YR 4/3) loam, very dark brown (10YR 2/2) when moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine, common medium and coarse roots; 10 percent gravel; neutral reaction (pH 6.8); abrupt wavy boundary.

A12—10 to 30 centimeters (4 to 12 inches); brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine and coarse roots; 15 percent gravel, 5 percent cobbles; neutral reaction (pH 6.6); clear wavy boundary.

C1—30 to 81 centimeters (12 to 32 inches); very pale brown (10YR 7/3) stony loam, brown (10YR 4/3) when moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine, and coarse roots; 15 percent gravel, 10 percent cobbles, 10 percent stones; slightly acid (pH 6.4); clear wavy boundary.

C2—81 to 97 centimeters (32 to 38 inches); very pale brown (10YR 7/3) stony clay loam, grayish brown (10YR 5/2) when moist; rock structure; very hard, very firm, very sticky, very plastic; few very fine and fine roots; 15 percent gravel, 10 percent cobbles, 10 percent stones; slightly acid (pH 6.4); abrupt smooth boundary.

C35—97 centimeters (38 inches); soft shale.

DIB DI loam, 2 to 5 percent slopes

This DI soil is very deep and moderately well drained. It occurs on flood plains and alluvial fans at elevations of about 2590 meters (8500 feet). This soil formed in alluvium derived mainly from sandstone, quartzite and shale.

The average annual precipitation is 56 to 64 centimeters (22 to 25 inches). Mean annual air temperature is 2 to 3 C (36 to 37 F), mean annual soil temperature is 3 to 4 C (37 to 39 F), and the average freeze-free season is 57 days. This soil occurs adjacent to Mud Creek.

Slopes are 2 to 5 percent and north facing. They are short in length and concave-convex in shape.

Vegetation is dominantly sedge, slender wheatgrass, and native bluegrass.

Included in mapping are small areas of poorly drained soils with wet meadow vegetation. These areas are located near the stream and may be flooded at times.

In a typical profile the surface layer is dark grayish brown loam about 71 centimeters (28 inches). The underlying layer is brown, very fine sandy loam 43 centimeters (17 inches) thick. The next layer is grayish brown, cobbly very fine sandy loam to a depth of more than 152 centimeters (60 inches). The water table is at a depth of about 114 centimeters (45 inches) for a short time in the spring.

Permeability is moderate. Available water capacity is 20 to 23 centimeters (8 to 9 inches) to a depth of 152 centimeters (60 inches). Organic matter content in the surface layer is 5 to 10 percent. Effective rooting depth is more than 152 centimeters (60 inches). Surface runoff is slow and erosion hazard is slight under potential native vegetation and moderate if vegetation is removed and the soil is left bare. Erodibility is moderate.

This soil is used for range and wildlife habitat.

Taxonomic classification is fine-loamy, mixed cumulic cryoborolls.

A typical pedon of DI loam, 2 to 5 percent slopes was described near the stream bank of Mud Creek about 15 meters (50 feet) south of the junction of Little Snider Canyon and Mud Creek.

A1—0 to 8 centimeters (0 to 3 inches); dark grayish brown (10YR 2/2) loam, very dark brown (10YR 2/2) when moist; moderate medium granular structure; soft, very friable, slightly sticky, slightly plastic; common fine and very fine roots; neutral reaction (pH 6.6); clear smooth boundary.

A12—8 to 61 centimeters (3 to 24 inches); dark grayish brown (10 YR 4/2) loam, very dark brown (10YR 2/2) when moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common fine and very fine roots; neutral reaction (pH 6.8); abrupt smooth boundary.

A13—61 to 71 centimeters (24 to 28 inches); dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; moderate medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; neutral reaction (pH 7.0); clear smooth boundary.

C1—71 to 114 centimeters (28 to 45 inches); brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky, nonplastic; 10 percent gravel; neutral reaction (pH 7.0); clear wavy boundary.

C2—114 to 152 centimeters (45 to 60 inches); grayish brown (10YR 5/2) cobbly very fine sandy loam, very dark brown (10YR 2/2) when moist; massive; soft, very friable, slightly sticky, nonplastic; 15 percent gravel, 20 percent cobbles; neutral reaction (pH 7.0).

SOIL INTERPRETATIONS AND LIMITATIONS**

Blazon Mine Survey Area

Use	Soil		
	CIG	BIG	DIB
Shallow Excavation	Severe—Slope	Severe—Depth to rock, slope	Slight
Local Roads and Streets	Severe—Slope	Severe—Low strength, slope	Moderate—Low strength, floods
Roadfill	Poor—Slope	Poor—Low strength, slope	Fair—Low strength, wetness
Topsoil	Poor—Large stones, slope	Poor—Large stones, slope	Good
Pond Reservoir Area	Severe—Slope	Severe—Slope	Moderate—Seepage, slope
Embankments, Dikes, Levees	Moderate—Thin layer, large stones	Moderate—Thin layer, piping, large stones	Severe—Piping
Seeding	Poor—Slope, large stones	Poor—Slope, large stones	Good

** Ratings are based on criteria in the National Soils Handbook, SCS, USDA

MAR 24 1980

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

4012 Federal Building
125 South State Street
Salt Lake City, UT 84138

March 8, 1980

Mr. Joe Harvey
Blazon Mining Company
Box 327
Ferron, UT 84523

Dear Mr. Harvey:

After site investigation the Soil Conservation Service has determined that no prime farmland occurs in Section 4, T.14 S., R.11 E., SLBM.

Neither does there exist any alluvial valley floors according to the definition in the Permanent Regulatory Program, Office of Surface Mining, Department of Interior.

Sincerely,

T. B. Hutchings
State Soil Scientist

cc:
Ed Burton, AC, Orem
Gary Moreau, DC, Price

EXHIBIT 21

SOIL RESOURCES

UMC 817.22 TOPSOIL: REMOVAL

The soils which have been disturbed by surface activity at the Blazon No. 1 Mine are shown on the Soils Map (Map 17) and consist of three (3) distinct units. These three (3) units are BI stony loam, CI loam, and DI loam.

The mapping unit descriptions for the three (3) units developed by the SCS indicate the following topsoil thicknesses.

- BI Stony Loam — 3 inches
- CI Loam — 4 inches
- DI Loam — 28 inches

The areas which exhibit the most severe soil disturbance include the portal face-up area and mine access road. Both are located in areas where BI Stony loam and CI loam soils are the typical soil units present. The DI loam is found in the Mud Creek drainage and extends approximately 25 feet on either side of the stream channel. Mine related surface activities have resulted in minimal disturbance to areas adjacent to the stream channel, therefore, the majority of the thick DI loam topsoil resource is still in place. Site preparation activities resulted in minimal topsoil disturbance with a small amount of topsoil being stockpiled on the mine site as shown on the Surface Facilities Map (Map 9).

North American Equities NV plans to utilize the existing topsoil stockpiles to reclaim the noted severly disturbed areas of the BI Stony loam and CI loam soil units and the minimal disturbance area of the DI loam soil unit. Calculations indicate that existing stockpiled topsoil will cover these areas to a thickness of approximately two (2) to three (3) inches. The SCS soil unit description indicates the presence of topsoil resources exceeding three (3) inches prior to disturbance. In order to approximate original topsoil thicknesses on reclaimed areas,

North American Equities NV plans to utilize suitable topsoil substitute material from the portal bench area. This material will be used to supplement available topsoil material, with the placement objective being a total of six (6) inches of suitable seedbed material for reclamation.

North American Equities NV estimates the volume of suitable topsoil substitute material available on the portal bench to be approximately 7,000 yd^3.

North American Equities NV will utilize the guidelines shown on the attached tables (Table 9, Soil Sampling Guidelines; Table 10, Recommended Procedures for Analyzing Soils and Overburden/Interburden Quality; and Table 11, Criteria to Establish Suitability of Topsoil (or Topsoil Substitutes) to confirm topsoil substitute suitability. The portal bench material will be sampled using a hand auger or other site specific hand sampling methods as appropriate to obtain representative samples.

The portal bench area is approximately 300 feet long and 50 feet wide. North American Equities plans to obtain five (5) samples from the bench area for analysis. Three (3) of the samples will be obtained along the crest of the bench and the remaining two (2) samples will be obtained along the toe of the outslope of the bench.

Table 5

SOIL SAMPLING GUIDELINES

- Sampling sites will be clearly identified on an appropriate map

- Sampling sites will be located to accurately represent the predominant soil unit. Transition zones and previously disturbed areas will be avoided.

- A soil profile description will be prepared for each sampling site. The soil profile description will identify and describe each major soil horizon sampled

- Soil samples will be placed into clean polyethylene bags, labeled, and transported to the laboratory for analysis as soon as possible after sampling

- Analytical results for laboratory analyses of soil samples will be presented in a standard tabular form and will identify the sampling date, sample location, soil unit, soil horizon, analysis date, analysis laboratory, analytical job number, and the analysis methodologies used.

Table 6

RECOMMENDED PROCEDURES FOR ANALYZING SOILS AND OVERBURDEN/INTERBURDEN QUALITY - Part 1

1.	pH	pH	Hydrogen ion activity at saturation (paste)	USDA Handbook 60, method (21a), pg. 102
2.	Conductivity	Conductivity	mmhos/cm @ 25°C	USDA Handbook 60, method (3a), pg. 84 and method (4b), pg. 89-90, or ASA Mono. No. 9, Pt. 2 pg. 937-940 1/
3.	Saturation	Saturation	Percent	USDA Handbook 60, method (27a & b), pg. 107
4.	Particle size-Analysis		% clay, silt, sand, and very fine sand (vfs=0.05 - 0.1 mm)	ASA Mono. No. 9, Pt. I, method 43-5, pgs. 562-566. Sieve Analysis for vfs (140-270 mesh)
5.		Particle size Analysis	% clay, silt, and sand	ASA Mono. No. 9, Pt. I, method 43-5, pg. 562-566
6.	Texture	Texture	USDA textural class	USDA Handbook 18, pgs. 205-223
7.	Soluble Ca, Mg, and Na	Soluble Ca, Mg, and Na	meq/l	Extraction of Ca, Mg, & Na by USDA Handbook 60, method (3a), pg. 84. Analysis by atomic absorption spectrophotometry
8.	Sodium-Adsorption ratio	Sodium-adsorption ratio	SAR calculated from soluble Ca, Mg, & Na concentrations	USDA Handbook 60, pg. 26
9.	Carbonates 2/		Percent	USDA Handbook 60, method (23b), pg. 105

Table 6

RECOMMENDED PROCEDURES FOR ANALYZING SOILS AND OVERBURDEN/INTERBURDEN QUALITY - Part 2

10. Selenium 3/	Selenium	ppm to a lower detection limit of 0.02	Extraction by ASA Mono. No. 9, pt. 2, method 80-3, pg. 1122; Analysis by the DAN-Fluorometric method (Levesque & Vendett, 1971) or the Gaseous Hydride Method (US EPA 1979) & atomic absorption spectrophotometry
11. Boron	Boron	ppm	Extraction by ASA Mono No. 9, Pt. 2, method 75-4, pg. 1062. Analysis by the curcumin method (Standard Methods, 1976)
12.	Nitrate-Nitrogen	ppm	Extraction by ASA Mono No. 9, Pt. 2, method 84-5. 3.3, pg. 1216
13. Organic Matter		Percent	ASA Mono. No. 9 Pt. 2, method 90-3, pg. 1372-1376
14.	Molybdenum	ppm to a lower detection limit of 0.1	$(NH_4)_2 CO_3$ extractable (Vlĕk, 1975). Acceptable procedure available from LQD
15.	Copper	ppm	DTPA Extraction (Follett & Lindsay, 1971). Analysis by atomic absorption spectrophotometry

Table 7

CRITERIA TO ESTABLISH SUITABILITY OF TOPSOIL

(OR TOPSOIL SUBSTITUTES)

Parameter	Suitable			Unsuitable
	Good	Fair	Poor	
pH	6.0 - 8.4	5.5 - 6.0 8.4 - 8.8	5.0 - 5.5 8.8 - 9.0	<5.0 >9.0
EC (Conductivity) mmhos/cm	0 - 4	4 - 8	8 - 16 >8 may prove difficult to revegetate	>16
Saturation Percentage	25 - 80		>80 <25	
Texture 1/	sl, l, sil, scl, vfsl, fsl	cl, sicl, sc, ls, lfs	c, sic, s	
SAR	<6	6 - 10	10 - 15 10 - 12 2/	>15 >12 2/
Selenium	<2.0 ppm			>2.0 ppm
Boron	<5.0 ppm			>5.0 ppm
Calcium Carbonate	0 - 15%	15 - 30%	Over 30%	
Coars Frag 3-10 in. (% vol) 10 in.	0 - 15 0 - 3	15 - 25 3 - 7	25 - 35 7 - 10	>35 >10
Moist Consistency Dry Consistency	vfr, fr, lo, so	lo, fi, sh, h	vfi, exfi, vh	

1/ SCS 1978. National Soils Handbook, Notice 24

2/ For fine textured soils (Clay 40%) (Gee et al., 1978)

Chapter VIII

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8.1 Scope.

To map and identify soil types, characteristics, growing capabilities and needs for the area of surface disturbance.

8.2 Methodology.

The Price office of the U.S. Soil Conservation Service completed a soil survey as part of a range-site study on the Blazon No. 1 Mine area.

8.3 Soil Resource Information of Mine Plan Area.

Information is included in study by the SCS, which was previously submitted. Copies have not been received as yet and will be included in a future submittal.

8.4 Prime Farmland Investigation and Determination.

See letter from the SCS in Chapter VII appendix.

8.5 Soils, Physical and Chemical Properties of Soils and Test Results.

Information is contained in SCS study which will be submitted later. Also, see appendix, Chapter VIII.

8.6 Use of Selected Overburden Materials or Substitutes.

None is planned.

8.7 Plans for Removal, Storage and Protection of Soils.

Topsoil materials were scraped where possible from the area where surface facilities were to be constructed prior to excavation. These soils were removed to a depth where root growth of most plant species was almost nothing. These soils were then hauled to the soil

storage site. The storage pile will be planted with grasses selected from the revegetation plant list to prevent erosion and leaching. The storage area will be posted and no one will be allowed to damage the area until reclamation.

8.8 Plans for Redistribution of Soils.

See Chapter III appendix, Reclamation Plan Information.

8.9 Nutrients and Soil Ammendments.

Prior to reclamation soil from the storage area will be sampled and analysed and whatever ammendments are needed will be added.

8.10 Effects of Mining Operations on Soils.

See Chapter III, 3.4.4.1.

8.11 Mitigation and Control Plans.

See Chapter III, 3.4.4.2.

CHAPTER VIII

APPENDIX

CONTENTS: SOIL TEST RESULTS

30 CFR 783.21 Soil Resources Information

Four soil samples were taken by Mr. Joseph Harvey of Blazon, in the proposed portal area, locations shown on Plate 4. Following is a general description of the samples with Mr. Harvey's comments.

The samples were analysed at Utah State University and fertilizer recommendations made as can be seen on enclosed sheet of analyses:

Sample No.	Depth of Sample	Comments
#1	14" deep	Soil in creek bottom is probably several feet deep as no change in appearance or texture was experienced in an 8' deep perculation test at the site.
#2	14" deep	To broken rock
#3	10" deep	To rock at coal seam level
#4	1' deep	To rock

SOIL TESTING LABORATORY
Utah State University UMC 48
Logan, Utah 84322

SOIL TEST REPORT
and
FERTILIZER RECOMMENDATIONS

Date received 6/21/79

Payment received $16.00

Balance due $0

Name Joseph A. Harvey

Street Box 327

City, State Ferron, UT 84523
ZIP

Your USU Extension Agent Jay Hall

Price, UT

LABORATORY REPORT

Lab. No.	Sample No.	Crop	Soil Texture (Estimated)	Lime	pH	Soluble Salts EC_e	Organic Matter %	Plant Nutrient Index			
								Nitrate ppm N	Phosphorus ppm P	Potassium ppm K	
588	1		Loam	0	7.4	.3			58	135	
589	2		Loam	0	7.1	.3			50	341	
59	3		Loam	0	7.1	.5			7.8	170	
591	4		Loam	0	7.3	.2			11	250	
					OK						

ATTENTION GROWERS

These fertilizer recommendations are based on the soil analysis results, the information you supplied on the Description sheet, and on the average growing season for your area. They are guides developed from the best available scientific data, but may require some modification for your specific situation. Consult your Extension Agent for more details.

Remember that a high yield goal can be attained only when proper fertilization is used in combination with crop production management and climatic conditions consistent with that yield goal.

USU POLICY

It is the policy of the USU Soil Testing Laboratory to recommend only those nutrients that offer a reasonable possibility of increasing the yield of your crops, and in those amounts that should be necessary to achieve your yield capability. Ranges of nutrients are sometimes given, to permit some farm operator judgement.

FERTILIZER RECOMMENDATIONS FOR 1979 CROP

Sample No.	Pounds of Nutrient per acre				* Special Notes
	Nitrogen (N)	Phosphorus (as P_2O_5)	Potassium (as K_2O)	Other	
1	30-50	0	0		3
2	"	0	0		
3	"	0-40	0		
4	"	0	0		

*See referenced notes on the back of this sheet for explanations and special instructions.

$P_2O_5 \times .45 = P$

$K_2O \times .82 = K$

SOIL TEST INDEX
Utah State University Laboratory

Plant Nutrient or Other Test	Test Values*	Interpretation*
Lime	0	No lime
	+	Some lime
	++	High lime
pH	below 7	Acid
	above 7	Alkaline
	6.5 - 8.5	Normal for Utah soils
	above 8.5	Sodium-affected (black alkali)
Salt ($EC \times 10^5$)	below 2	No salt problem
	2 - 4	Some salt
	4 or more	Saline or salty
	above 12-16	Serious salt problem. Not suitable for crops
Organic Matter	Utah soils vary from 0.5 to 5%	Not used in making recommendations
Nitrate	Requires topsoil and subsoil (12-36") sampling, and special handling of samples. See Extension Agent	
Phosphorus	below 8 ppm	Probably deficient for most crops
	8 - 10 ppm	Marginal for most crops
	11 or above	Adequate for all but potatoes
	above 20	Adequate for potatoes
Potassium	below 100 ppm	Probably deficient for most crops
	100 - 120 ppm	Marginal for most crops
	above 120 ppm	Adequate for all but potatoes
	above 250 ppm	Adequate for potatoes
Iron (Tentative)	below 2.0 ppm	Probably deficient for Iron-sensitive cr
	2 - 4.5 ppm	Marginal for Iron-sensitive crops
	above 4.5 ppm	Adequate for most crops
Zinc	below 0.5 ppm	Probably deficient for Zinc-sensitive cr
	0.5 - 1.0 ppm	Marginal for Zinc-sensitive crops
	above 1.0 ppm	Adequate for most crops

Tests for other trace elements not yet standardized and correlated

Table 6

RECOMMENDED PROCEDURES FOR ANALYZING SOILS AND OVERBURDEN/INTERBURDEN QUALITY - Part 3

16.	Acid-base potential 4/	Acid potential in meq H^+/100 gr., neutralization potential in tons $CaCO_3$ equiv. / 1000 tons acid-base potential ± tons $CaCO_3$ equiv. / 1000 tons	Smith R.M. et al. (1974) pg. 48-51
17.	Lead	ppm	DTPA Extraction (Follett & Lindsay, 1971). Analysis by atomic absorption spectrophotometry
18.	Arsenic	ppm	pH 6.5 Mixed acid extractable As (0.04N HCl & 0.025N H_2SO_4), (Nelson et al. 1953). pH 6.5 Bicarbonate-Extractable As (0.4N $NaHCO_3$)(Olson et al. 1954)
19.	Coarse Fragment	Percent	USDA Handbook 436, App. I, pg. 472; Soil Survey Laboratory Methods & Procedures for Collecting Soil Samples, pgs. 9 and 12-13

1/ Conductivity should be determined immediately after the extract is obtained.
2/ Analysis recommended where calcic horizon is suspected.
3/ Analysis for selenium recommended on soils where primary selenium indicator plants are present (Rosenfeld and Beath, 1964).
4/ Referred to as acid-neutralization account by Smith et al. (1974).

EXHIBIT 22

FISH AND WILDLIFE RESOURCES

Chapter X

		Page
10.0	Table of Contents.	
10.1	Scope	X-1
10.2	Methodology	X-1
10.3	Existing Fish and Wildlife Resources	X-1
10.4	Expected Impacts of Mining	X-1
10.5	Mitigation and Management Plan	X-1
10.6	Stream Buffer Zone Determination	X-1
10.7	Fish and Wildlife Monitoring, Appendix	

10.1 Scope.

To identify fish and wildlife resources in the mine plan area and develop plans for protection and restoration of habitats.

10.2 Methodology.

The Utah Division of Wildlife Resources prepared a report at the Blazon No. 1 Mine site.

10.3 Existing Fish a nd Wildlife Resources.

Information is contained in Chapter 10, appendix. Fish and Wildlife information and on the Fish and Wildlife Map, Chapter 10, appendix.

10.4 Expected Impacts of Mining Operations on Fish and Wildlife.

See Chapter III, 3.4.6.1.

10.5 Mitigation and Management Plans.

See Chapter III, 3.4.6.2.

10.6 Stream Buffer Zone Determination.

10.7 Fish and Wildlife Monitoring.

See Chapter III, 3.4.6.3.

CHAPTER X

APPENDIX

CONTENTS:

FISH AND WILDLIFE INFORMATION
FISH AND WILDLIFE MAP

CLEAR CREEK MINE

30 CFR, PART 783.20 FISH AND WILDLIFE RESOURCE INFORMATION

The mine plan area for Blazon Mining Company encompasses a portion of the Wasatch Plateau in Carbon County, Utah. The Division publication No. 78-16 "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah" adequately identifies occurrence, status, population trend and habitat use areas for wildlife species that inhabit the Wasatch Plateau. Generally speaking, the mine plan area is inhabited on occasion and during different seasons of the year by about 350 species of vertebrate wildlife, (no known fish species -- Mud Creek above the town of Clear Creek is often dry, 6 amphibian species, 18 reptile species, 242 bird species and 84 mammal species), some of which are considered to be high interest species for the habitats and local area represented. High interest wildlife are defined as all game species; any economically important species; and any species of special aesthetic, scientific or educational significance. This definition would include all federally listed, threatened and endangered species of wildlife.

The attached map (Figure 1) displays mapable, high value habitats for high interest wildlife (mule deer, moose, elk, riparian zones and snowshoe hare) on and adjacent to the mine plan area. Mule deer, moose and elk normally utilize the high-priority summer ranges between May 16 and October 31 each year. In the instance of moose, their use of the summer range normally extends to November 30 each year. The crucial-critical areas for moose are used yearlong.

Golden eagles are common, summer residents of the mine plan area. Due to the high elevation (8,400 to 9,200 feet above sea level) of the mine plan area, no nesting golden eagles are expected. If an eagle nest was placed in the area it would be extremely sensative to disturbance within one-fourth mile of the nest site when active between the period of April 15 and June 15.

The riparian zones associated with drainage bottoms, streams (ephemeral, intermittent or perennial -- 30 CFR, part 701.5), seeps and springs are ranked as being crucial-critical to all aquatic and terrestrial wildlife species. All of the streams associated with the mine plan area are ranked as having limited value for any fishery. They allrepresent class 6 waters in Utah -- class 1 waters are the best blue ribbon waters and class 6 waters are dewatered during portions of the year.

It should be noted that in addition to the mapable areas of high value habitat that have been ranked as being either crucial-critical or of high-priority to some wildlife, that the entire lease area provides high-priority yearlong habitat for cougar and black bear. Mountain cottontail (above 7,000 feet elevation), snowshoe hare, ruffed and blue grouse also inhabit the mine plan area. The entire lease area provides substantial value, yearlong habitat for cottontail rabbits. The snowshoe hare is entirely dependent upon the fir-spruce vegetation type as a yearlong habitat use area. The coniferous vegetation provides crucial-critical breeding

areas for the snowshoe hare between April 1 and August 15 each year. Ruffed grouse for the most part are dependant upon wildlands vegetated by aspen and coniferous vegetation and that are located within one-quarter mile of stream courses. These areas are crucial-critical, yearlong use areas for ruffed grouse. Blue grouse utilize the mountain brush and coniferous areas of wildlands and are not dependent upon stream courses. The mountain brush zones provide crucial-critical breeding territories for blue grouse between March 15 and June 15 each year. The high elevation, mature stands of Douglas fir are crucial-critical winter range for blue grouse during December, January and February each year.

It should be noted that the high elevation, montane habitats provide summer range for a substantial numbers of mule deer, elk and some moose between May 16 and October 31 each year. Fawning/calving and rearing processes for deer and elk take place on the summer range between May 16 and July 15 each year. Moose calf in the crucial-critical areas between May 16 and July 15 each year.

Since Utah's Division of Oil, Gas and Mining and the U.S. Fish and Wildlife Service have been provided with a copy of the publication "Vertebrate Wildlife that Inhabit Southeastern Utah" there is no apparent reason why all of the species that occur on the mine plan area should be listed in the application for a mining permit. Additionally, it is not believed that detailed population studies of wildlife specific to the mine plan area should be required.

It is recommended that your primary effort be placed on identifying species of vegetation in each vegetative association for the purposes of reclamation. It is believed that if satisfactory reclamation is achieved and man's disturbance does not continue or become a factor that most species of wildlife will return. Without doubt the key to success for enhancing or restoring wildlands will be development of habitats so that the postmining condition as compared to the premining condition will have similar species, frequency and distribution of permanent plants in each vegetative type that will allow for natural plant succession.

CLEAR CREEK MINE
30 CFR, PART 784.21 FISH AND WILDLIFE PLAN

Utah Division of Wildlife Resources provides the following recommendations to minimize disturbances and impacts on wildlife and their habitats that could be impacted during mining and reclamation operations at the Clear Creek mine. The recommendations will also address how enhancement of the wildlife resource and their habitats as discussed in 30 CFR, 783.20 can be achieved. The recommendations for minimizing disturbances and impacts and potential enhancements where practicable are consistent with the performance standards of 30 CFR, 817.97. In instances where it will be necessary to restore or beneficial to enhance high value habitats for fish and wildlife (30 CFR, part 817.97 d 4 and 817.97 d 5); or that the primary or secondary postmining land use will be for wildlife habitat (30 CFR, part 817.97 d 9) and rangeland seedings are to be used, recommended seed lists and rates of application are provided (30 CFR, parts 817.111 through 817.117; note 817.116 a, 817.116 b 3 IV and 817.117 c 2).

Threatened and endangered wildlife and their habitats

No threatened or endangered species of wildlife inhabit the mine plan area.

Eagles and other migratory birds

The golden eagle is a common, summer resident that nests on the Wasatch Plateau. There are no known golden eagle nests on the mine plan area. If an active nest is located by persons associated with the mine it should be reported to Utah Division of Wildlife Resources and

the U.S. Fish and Wildlife Service. Every effort should be made to eliminate man's disturbance within one-fourth mile of an active nest when in use between the period of April 15 and June 15, since golden eagles are sensitive to disturbance and could abandon the nest. Disturbance that would come from above and within view of the nest should be precluded for a distance of at least one-half mile. Adult birds are not to be molested or killed.

Several other species of raptors inhabit the mine plan area. To date, location of their nests and other parameters of the population are not known. If located, nests should not be disturbed when active and abandoned stick nests are not to be damaged during inactive periods. As a general comment, whenever active raptor nests are observed, they should be reported to the Utah Division of Wildlife Resources and the U.S. Fish and Wildlife Service. All persons regularly associated with the mining operation should be made aware of the value of raptors to society and the fact that they are protected by both state and federal laws.

Design and construction of all electrical power lines and other transmission facilities shall be designed in accordance with guidelines set forth in "Environmental Criteria for Electric Transmission System" published by the USDI and USDA in 1970 and/or the REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds".

All birds other than resident upland game birds, house sparrows and starlings are protected under the Federal Migratory Bird Treaty Act. All

of the migratory birds and their eggs and nests (when active) are not to be harassed, disturbed, destroyed or killed by any persons without valid federal and state collecting permits. Plantings of native and/or ornamental berry-producing shrubs around surface facilities will provide food and cover for many of the smaller species of these birds. This would enhance their natural habitat and would mitigate for disturbances and destruction of their habitats at other sites in the mine plan area.

High interest wildlife and their high value habitats

It is important to note that moose that utilize the crucial-critical areas during the winter are sensitive to disturbance. These animals are always depleted by winter conditions. Unnecessary disturbance by man causes them to use up critical and limited energy reserves which, often times, results in mortality. In less severe cases, the fetus being carried by females can be aborted or absorbed by the animal, thus reducing reproductive success. Proposed industrial activities that would permanently or for a long period of time occupy crucial-critical habitats should be placed on alternate, lesser-valued sites.

Mule deer, moose and elk inhabit the high-priority and crucial-critical summer ranges identified in Figure 1 between May 16 and October 31 each year. Fawning and calving areas should be protected from exploration or other industrial activities between May 16 and July 15 each year. Disturbances on high-priority summer ranges should be kept to a minimum.

If the mining operation should ever require any structures that would present a barrier to daily movements of wildlife, suitable passage structures are to be constructed along with wing fences to guide the animals to passageways. Detailed studies will be required to determine placement of passageways.

Most wildlife that are summer residents of the higher montane habitats give birth to their young between April 16 and July 15 each year. It is also during this period that young animals gain the strength and ability to elude man and other predators. During this period the young animals need the peace and tranquility normally afforded by remote wildlands. This allows the young animal to develop in relatively unstressed situations and to utilize habitats that are secure from predators. Disturbance by man can compromise this situation and result in abandonment of the young by the female or increased natural predation. It is recommended that employees be cautioned against disturbing these animals if accidentally located. Additionally, exploration activities should be limited as much as possible during the fawning/calving period.

It is important that blue grouse, ruffed grouse, cottontail rabbits and the limited numbers of snowshoe hares not be unnecessarily disturbed during any period of the year. During winter periods such disturbances deplete the animals' energy reserves resulting in similar losses as discussed for moose. During the spring and summer periods the birds and rabbits are producing and rearing young. Breeding territories for blue grouse (March 15 to June 15) and drumming logs for ruffed grouse (March 1 to May 30) must be

protected from disturbance while being utilized each year. In the instance of ruffed grouse their display areas must be protected from alteration or destruction since they represent traditional sites that are reused each year. Snowshoe hares give birth to their young between April 1 and August 15 each year. The nests of rabbits and grouse must also be protected from disturbance or destruction when being used. Scattering of broods and litters causes a greater frequency of accidents and increases opportunity for predation. Employees associated with the mining operation should be instructed to not molest any wildlife, their young or to disturb breeding, nesting and/or rearing sites.

It is important to note that roads and other surface facilities to be constructed should as far as practicable be placed at sites where they will not compromise wildlife or habitats previously discussed. Also, surface facilities, including roads, should be screened if possible from wildlife use areas by vegetation or terrain. Employees associated with mining operations should be instructed that when wildlife are encountered during routine work that they not stop vehicles for viewing purposes. Moving traffic is less disturbing to wildlife than traffic that stops or results in out of the vehicle activities. If viewing is desireable, the vehicle should only be slowed, but no stopped.

Hunting and other state and federal wildlife regulations should be adhered to by sportsmen utilizing the mine plan area.

All hazards associated with the mine operation should be fenced or covered to preclude use by wildlife.

In situations where wildland habitats are disturbed, reclamation will be required. Also, there are sites where enhancement of wildland habitats through vegetation treatments and/or seedings and transplants of seedlings could benefit wildlife. The attached tables (1 through 10) depict recommended seed lists for several vegetative associations and application rates for rangeland seedings that would benefit wildlife. If seed for a plant species is not available, suitable alternates are also listed. For some vegetation associations, plant species are recommended that will assist in erosion control of special sites such as roadbanks. Seedling transplants from nursery stock or nearby rangelands would also be acceptable for enhancement or reclamation of wildlands. In either instance, tables 1 through 10 provide lists of vegetation species by habitat association that would benefit wildlife.

Temporary control of rodents may be required to ensure a successful rangeland treatment. It is recommended that the county agent be consulted in this area of concern. Poisoned oats are the most common and acceptable method for rodent control, however, only licensed persons may apply the treatment.

Currently, there are some new concepts in methodology for revegetation that are being successfully implemented in other parts of the nation and world. One promising method is a procedure where a large scoop removes, from a natural and stabilized site, a small area of earth intact with vegetation and subsurface soils for placement on a site to be reclamated. This same procedure can be utilized when disturbing pristine sites, except that the

native vegetation is stored for use in latent reclamation. Another meritorious method for stimulating natural revegetation, in combination with other reclamation techniques, is to plan facility developments so that islands of natural, native vegetation remain. This will allow for natural vegetation to spread from the islands. These techniques can also be useful for enhancement of poor quality sites that currently exist on the mine plan area.

Encapsulation of seed and fertilizer for several releases over a period of years after a single application is a new and possibly advantageous procedure. This technique along with soil stabilizing structures has been successfully used in South Africa. Dr. J. Van Wyk in the Department of Botany at Potchefstroom University in South Africa could provide additional information on this new technique.

There are also new specialized techniques coming to the forefront for stabilization of problem sites such as roadbanks and steep slopes. It is important that these sites be promptly and permanently revegetated in order to reduce siltation into local riverine systems. This will mitigate for damage to aquatic wildlife populations and habitats from siltation. Enhancement of existing problems sites or reclamation of disturbed sites can mitigate for salt loading of local river systems. It is believed that natural, nonpoint sources represent 50 percent of the salinity in the upper basin of the Colorado River system into which this mine plan area drains.

It is recommended the company make numerous contacts with appropriate agencies, institutions and persons to ensure that enhancement or reclamation projects achieve the required degree of permanency, plant diversity, extent

of cover and capability of regeneration to ensure plant succession. Generally speaking, seeding should be accomplished as late in the fall as possible. Seedling transplants need to be coordinated with local soil moisture conditions. It is paramount that suitable vegetation be maintained and/or reestablished if the life requirements of wildlife are to be satisfied in the postmining period. Success in this area of concern along with cessation of man's disturbances will likely result in natural invasion and the resultant inhabitation by most wildlife species of an impacted site.

There is also some concern for the effects that subsidence may have on sources of water that support existing wildlife populations and their habitats. If hydrologic monitoring shows a significant reduction or total loss of ground and/or surface waters, the company should immediately consult the Division of Wildlife Resources and the U.S. Fish and Wildlife Service on emergency procedures if needed. A significant local loss of water may demand temporary or permanent alternative sources of water to be established by the company for use by wildlife.

It is recommended that all natural wetlands and riparian vegetation along streams, drainage bottoms, or around seeps and springs be maintained. Roads and other facility developments should not destroy these limited, highly productive and specialized habitats. Roads crossing through those areas should do so in a manner that is least damaging to the habitat. Wetlands and riparian habitats are ranked as crucial-critical habitats and are the most productive sites in terms of herbage and biota produced as compared to other local habitat types. It is probable that a majority of the vertebrate

wildlife that inhabit the mine plan area make some use of riparian or wetland areas.

It is recommended that persistent pesticides not be utilized on the mine plan area. Other alternate pesticides or forms of control should be utilized.

It is recommended that aquatic resources be protected by avoiding impacts to stream channels. Utah Division of Wildlife Resources reaffirms all of the recommendations in 30 CFR, parts 817.44, 817.57 and 817.126 for protection of stream channels. It is also recommended that adequate precautions be taken to keep all forms of coal from being deposited in stream channels. This would include blow coal from haulage trucks, railroads or other transportation systems and storage piles along with larger particles from similar and other sources. If needed to control blow coal, haulage systems should be covered or the surface of the coal sprayed in order to solidify it against wind movement.

COMMON AND BOTANICAL NAMES FOR VEGETATION SPECIES IN THE ATTACHED TABLES THAT HAVE BEEN SUGGESTED FOR USE WITH ENHANCEMENT OR RECLAMATION PROJECTS THAT WOULD BENEFIT WILDLIFE

Common Name	Botanical Name
Alfalfa, (Ladak, Nomad, Rambler, Teton, Travois)	Medicago sativa
Alfalfa, sickle	M. falcatus
Alfileria	Erodium cicutarium
Alkaligrass, nuttall	Puccinellia airoides
Angelica, small-leaf	Angelica pinnata
Apache-plume	Fallugia paradoxa
Ash, singleleaf	Fraxinus anomala
Aspen, quaking	Populus tremuloides
Aster, alpine leafybract	Aster foliaceus
Aster, Engelmann	A. engelmannii
Aster, Pacific	A. chilensis adscendens
Aster, smooth (or blue)	A. glaucodes
Balsamroot, arrowleaf	Balsamorhiza sagittata
Balsamroot, cutleaf	B. macrophylla
Barberry, creeping	Berberis repens
Barberry, Fremont	B. fremontii
Barley, bulbous	Hordeum bulbosum
Barley, meadow	H. brachyantherum
Bassia, fivehook (alkaliweed, ragweed, smotherweed)	Bassia hyssopifolia
Bitterbrush, antelope	Purshia tridentata
Bitterbrush, desert	P. glandulosa
Blackbrush	Coleogyne ramosissima
Bladdersenna, common	Colutea arborescens
Bluegrass, big	Poa ampla
Bluegrass, bulbous	P. bulbosa
Bluegrass, Canada	P. compressa
Bluegrass, Kentucky	P. pratensis
Bluegrass, Nevada	P. nevadensis
Bluegrass, Sandberg	P. secunda
Bouncing-bet	Saponaria officinalis
Boxelder	Acer negundo negundo
Brome, cheatgrass	Bromus tectorum tectorum
Brome, meadow	B. erectus
Brome, mountain	B. carinatus
Brome, nodding	B. anomalus
Brome, red (foxtail)	B. rubens
Brome, smooth (northern)	B. inermis
Brome, smooth (southern)	B. inermis
Brome, subalpine	B. tomentellus
Buffaloberry, roundleaf	Shepherdia rotundifolia
Buffaloberry, russet	S. canadensis
Buffaloberry, silver	S. argentea
Burnet, small	Sanguisorba minor
Buttercup, bur	Ranunculus testiculatus
Cacti	Cactaceae
Canarygrass, reed	Phalaris arundinacea
Ceanothus, Martin	Ceanothus martinii
Ceanothus, redstem	C. sanguineus
Ceanothus, snowbrush	C. velutinus
Checkermallow, Oregon	Sidalcea oregana
Cherry, Bessey (sand)	Prunus besseyi
Chokecherry, black (common)	P. virginiana melanocarpa

Common Name	Botanical Name
Cinquefoil, bush	Potentilla fruticosa
Cliffrose, Stansbury	Cowania mexicana stansburiana
Clover, alsike	Trifolium hybridum
Clover, strawberry	T. fragiferum
Collomia, slenderleaf	Collomia linearis
Columbine, Colorado	Aquilegia coerulea
Cotoneaster, Peking	Cotoneaster acutifolia
Cowparsnip, common	Heracleum lanatum
Creosotebush, spreading	Larrea divaricata
Crownvetch, coronilla	Coronilla varia
Currant, golden	Ribes aureum
Currant, gooseberry	R. montigenum
Currant, squaw	R. cereum inebrians
Currant, sticky	R. viscosissimum viscosissimum
Cypress, Arizona	Cupressus arizonica
Cypress, Belvedere summer	Kochia scoparia
Daisy, common oxeye	Chrysanthemum leucanthemum
Dandelion, common	Taraxacum officinale
Deathcamas	Zigadenus spp.
Dogwood, redosier	Cornus stolenifera stolenifera
Douglas-fir	Pseudotsuga menziesii menziesii
Dropseed, sand	Sporobolus cryptandrus
Dropseed, spike	S. contractus
Elder, blueberry	Sambucus cerulea
Elder, redberry	S. racemosa pubens microbotrys
Ephedra, green	Ephedra viridis
Ephedra, Nevada	E. nevadensis
Eriogonum, cushion	Eriogonum ovalifolium
Eriogonum, Wyeth	E. heracleoides

Common Name	Botanical Name
Fescue, hard sheep	Festuca ovina durisc
Fescue, reed (alta or tall)	F. arundinacea
Fescue, sulcata sheep	F. sulcata
Fescue, Thurber	F. thurberi
Fir, subalpine	Abies lasiocarpa
Fir, white	A. concolor
Flax, Lewis (or blue)	Linum lewissi
Fleabane, Oregon	Erigeron speciosus macranthus
Forestiera, New Mexican	Forestiera neomexica
Forestiera, New Mexican olive	F. phillyneoides
Foxtail, barley	Hordeum jubatum jubatum
Foxtail, meadow	Alopecurus pratensi
Foxtail, reed	A. arundinaceus
Galleta	Hilaria jamesii
Geranium, sticky	Geranium viscosiss
Gianthyssop, nettleleaf	Agastache urticifoli glaucifolia
Globemallow, gooseberryleaf	Sphaeralcea grossulariaefolia
Globemallow, stream	S. rivularis
Goldeneye, Nevada showy	Viguiera multiflora nevadensis
Goldeneye, Canada	Solidago canadensis
Goldenrod, low	S. multiradiata
Goldenrod, Parry	S. parryi
Goosefoot	Chenopodium spp.
Greasewood, black	Sarcobatus vermicu vermiculatus
Goldeneye, showy	Viguiera multiflora

Common Name	Botanical Name
Painted-cup, Northwestern	Castilleja hispida
Peachbrush, desert	Prunus fasciculata
Peashrub, Siberian	Caragana arborescens
Peavine, flat	Lathyrus sylvestris
Peavine, perennial	L. latifolius
Peavine, thickleaf	L. lanszwertii
Peavine, Utah	L. utahensis
Penstemon, Eaton	Penstemon eatonii
Penstemon, littlecup	P. sepalulus
Penstemon, low	P. humilis
Penstemon, Palmer	P. palmeri
Penstemon, Rydberg	P. rydbergii
Penstemon, sidehill	P. platyphyllus
Penstemon, thickleaf	P. pachyphyllus
Penstemon, toadflax	P. linarioides
Penstemon, Wasatch	P. cyananthus
Pine, pinyon	Pinus edulis
Pine, ponderosa	P. ponderosa
Pine, singleleaf pinyon	P. monophylla
Plum, American	Prunus americana
Quackgrass	Agropyron repens
Rabbitbrush, Douglas	Chrysothamnus viscidiflorus viscidiflorus
Rabbitbrush, dwarf	C. depressus
Rabbitbrush, Parry	C. parryi parryi
Rabbitbrush, rubber	C. nauseosus nauseosus
Rabbitbrush, small	C. stenophyllus
Rasberry, American red	Rubus idaeus sachalinensis
Redtop	Agrostis alba
Reedgrass, chee	Calamagrostis epigeios
Rhubarb, garden	Rheum rhapenticum
Ricegrass, Indian	Oryzopsis hymenoid hymenoides
Rose, Woods	Rosa woodsii ultramontana
Rush, Baltic	Juncus balticus
Russian-olive	Elaeagnus angustifol
Russianthistle	Salsola kali tenuifoli
Rye, mountain	Secale montanum
Rye, winter	S. cereale
Sacaton, alkali	Sporobolus airoides airoides
Sagebrush, Louisiana	Artemisia ludovician ludoviciana
Sagebrush, tarragon	A. dracunculus
Sagebrush, big	A. tridentata trident
Sagebrush, black	A. arbuscula nova
Sagebrush, bud	A. spinescens
Sagebrush, fringed	A. frigida
Sagebrush, silver	A. cana cana
Salsify, vegetable-oyster	Tragopogon porrifoliu
Saltbush, fourwing	Atriplex canescens
Saltbush, Gardner	A. gardneri
Saltbush, shadscale	A. confertifolia
Saltgrass, inland	Distichlis spicata stricta
Salt-tree, Siberian	Halimodendron halodendron
Sedge, ovalhead	Carex festivella
Seepweed (pickleweed)	Suaeda spp.
Serviceberry, Saskatoon	Amelanchier alnifol

Common Name	Botanical Name
Groundsel, butterwood	Senecio serra
Hair-grass, tufted	Deschampsia caespitosa
Halogeton	Halogeton glomeratus
Hawthorn, river	Crataegus douglasii rivularis
Helianthella, oneflower	Helianthella uniflora
Honeylocust, common	Gleditsia triacanthos
Honeysuckle, bearberry	Lonicera involucrata
Honeysuckle, Tatarian	L. tatarica
Hopsage, spineless	Grayia brandegei
Hopsage, spiny	G. spinosa
Iodine bush	Allenrolfea occidentalis
Iris, German (common iris)	Iris germanica
Ivesia, Gordon	Ivesia gordonii
Juniper, Rocky Mountain	Juniperus scopulorum
Juniper, Utah	J. osteosperma
Knotweed, Douglas	Polygonum douglasii douglasii
Larkspur	Delphinium spp.
Leptotaenia, carrotleaf	Lomatium dissectum
Lettuce, prickly	Lactuca serriola
Ligusticum, Porter	Ligusticum porteri
Lilac, common	Syringa vulgaris
Lilac, late	S. villosa
Locust, black	Robinia pseudoacacia
Lomatium, nineleaf	Lomatium triternatum
Lomatium, Nuttall	L. nuttallii
Lupine, mountain	Lupinus alpestris
Lupine, Nevada	L. nevadensis
Lupine, silky	L. sericeus
Lupine, silvery	L. argenteus
Maple, bigtooth	Acer grandidentatum
Maple, Manchurian	A. mandshuricum
Maple, Rocky Mountain	A. glabrum
Matrimony-vine	Lycium halimifolium
Medick black	Medicago lupulina
Mesquite	Prosopis spp.
Milkvetch, chickpea	Astragalus cicer
Milkvetch, sicklepod	A. falcatus
Milkvetch, Snakeriver plains	A. filipes
Milkvetch, tall	A. galegiformis
Mountain-mahogany, curlleaf	Cercocarpus ledifolius ledifoli
Mountain-mahogany, littleleaf	C. ledifolius intrica
Mountain-mahogany, true or birchleaf	C. montanus montan
Muhly, mat	Muhlenbergia richardsonis
Mustard, African	Malcolmia africana
Needlegrass, green	Stipa viridula
Needlegrass, Letterman	S. lettermani
Oak, Gambel (shrubby)	Quercus gambelii
Oatgrass, tall	Arrhenatherum elatius
Orchardgrass	Dactylis glomerata

Common Name	Botanical Name	Common Name	Botanical Name
Willow, Scouler	S. scouleriana		
Winterfat, common	Eurotia lanata lanata		
Woad, Dyers	Isatis tinctoria		
Wormwood, oldman	Artemisia abrotanum		
Wyethia, mulesears	Wyethia amplexicaulis		
Yarrow, western	Achillea milefolium lanulosa		
Yellowbrush	Chrysothamnus viscidiflorus lanceolatus		
Yucca	Yucca spp.		
Yucca, Joshua-tree	Yucca brevifolia brevifolia		

Common Name	Botanical Name
Serviceberry, Utah	A. utahensis utahensis
Snowberry, longflower	Symphoricarpos longiflorus
Snowberry, mountain	S. oreophilus
Solomon-plume, fat	Smilacina racemosa amplexicaulis
Sophora, Arizona	Sophora arizonica
Spruce, Colorado blue	Picea pungens
Spruce, Engelmann	P. engelmannii
Squirreltail, bottlebrush	Sitanion hystrix
Squaw-apple	Peraphyllum ramosissimum
Starwort, tuber	Stellaria jamesiana
Sumac, Rocky Mountain smooth	Rhus glabra cismontana
Sumac, skunk bush	R. trilobata trilobata
Sweetanise	Osmorhiza occidentalis
Sweetclover, white	Melilotus alba
Sweetclover, yellow	M. officinalis
Sweetroot, spreading	Osmorhiza chilensis (divaricata)
Sweetvetch, Utah	Hedysarum boreale utahensis
Tansymustard, flixweed	Descurainia sophia
Tansymustard, pinnate	D. pinnata
Tarweed, cluster	Madia glomerata
Tenella weed	Chorispora tenella
Timothy	Phleum pratense
Tumblemustard	Sisymbrium altissimum
Valerian, edible	Valeriana edulis
Vetch, American	Vicia americana minor
Vetch, bramble	V. tenuifolia
Violet, goosefoot	Viola purpurea
Virginsbower, western	Clematis ligusticif
Wheatgrass, bearded	Agropyron subsecur
Wheatgrass, bearded bluebunch	A. spicatum
Wheatgrass, beardless bluebunch	A. spicatum inerme
Wheatgrass, bluestem	A. smithii
Wheatgrass, crested (Fairway)	A. cristatum
Wheatgrass, crested ((Standard)	A. desertorum
Wheatgrass, intermediate	A. intermedium
Wheatgrass, pubescent or stiffhair	A. trichophorum
Wheatgrass, Scribner	A. scribneri
Wheatgrass, Siberian	A. sibiricum
Wheatgrass, slender	A. trachycaulum
Wheatgrass, tall	A. elongatum
Wildrye, blue	Elymus glaucus
Wildrye, Colorado	E. ambiguus ambig
Wildrye, creeping	E. triticoides
Wildrye, Great Basin	E. cinereus
Wildrye, mammoth	E. giganteus
Wildrye, Russian	E. junceus
Wildrye, sabulosa	E. sabulosus
Wildrye, Salina	E. salina
Wildrye, yellow	E. flavescens
Willow, Gyer	Salix exigua stenophylla
Willow, purpleosier	S. purpurea purpure

Table 1. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed mountain brush associations characterized by Gambel oak, bigtooth maple, black chokecherry and serviceberry. Also included are acceptable alternatives if seed for a plant species is not available. Alternatives marked with an asterisk (*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Grasses:				
Fairway crested wheatgrass	2	1	2	1
Smooth brome (southern strains)	4	2	2	1
Intermediate wheatgrass	4	2	2	1
Pubescent wheatgrass	0	0	2	1
Bluestem wheatgrass	0	0	1	1/2
Orchardgrass	1	1/2	1	1/2
Russian wildrye	0	0	1	1/2
Tall oatgrass	1	1/2	0	0
Forbs:				
Alfalfa (Nomad, Rambler, Travois, Ladak-equal parts)	2	1	2	1
Chickpea milkvetch	0	0	1	1/2
Utah sweetvetch	0	0	1	1/2
Yellow sweetclove	0	0	1	1/2
Arrowleaf balsamroot	1	1/2	1	1/2
Pacific aster	1	1/2	1	1/2

Mixture for tall mountain brush type, shaded sites.	
Species	Seeding per acre
	Pounds
Grasses:	
Smooth brome (southern strain)	5
Fairway crested wheatgrass	1
Intermediate wheatgrass	3
Orchardgrass (Utah grown)	2
Tall oatgrass	1
Mountain brome	1
Forbs:	
Alfalfa (creeping strains or Ladak)	1
Pacific aster	1/4
Oneflower helianthella	1/2
Showy goldeneye	1/4
Totals	15

Table 1. Continued

Alternate Species for Mountain Brush Associations		
Shrubs: (continued)		
Rocky Mountain juniper*	Skunk bush sumac*	Winterfat*
Roundleaf buffaloberry*	Squaw apple*	Wyeth eriogonum
Russian-olive*	Tatarian honeysuckle*	Yellowbrush
Siberian peashrub*	Utah serviceberry	
Silver buffaloberry*	Western virginsbower*	

Table 2. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed aspen and associated conifers, characterized by mountain snowberry, slender wheatgrass, mountain brome and sticky geranium. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Shade	Openings	Alternate Species	
	-Pounds per acre-			
Grasses:			Grasses:	
Smooth brome (equal portions of northern and southern strains)	4	4	Bearded wheatgrass	Nodding brome
Orchardgrass (Intermountain area)	2	1	Blue wildrye	Slender wheatgrass
Tall oatgrass	2	1	Fairway crested wheatgrass	Subalpine brome
Intermediate wheatgrass	0	2	Meadow brome	Thurber fescue
Mountain brome	1	1		
Meadow foxtail	1	1		
Kentucky bluegrass	1/2	1/2		
Forbs:			Forbs:	
Alfalfa	0	1	Alpine leafybract aster	Pacific aster
Chickpea milkvetch	0	1	American vetch	Porter ligusticum
Mountain lupine	2	1	Bramble vetch	Small-leaf angelica
Silky lupine	1	1	Butterweed groundsel	Smooth aster
Common cowparsnip	1	0	Colorado columbine	Spreading sweetroot
Sweetanise	1	1	Engelmann aster	Sticky geranium
Showy goldeneye	1/2	1/2	Low goldenrod	Thickleaf peavine
			Nettleleaf gianthyssop	Utah peavine
			Northwestern painted-cup	Vegetable-oyster salsif
			Oregon checkermallow	

Table 2. Continued

Species	Shade	Openings	Alternate Species	
	-Pounds per acre-			
Shrubs:			Shrubs:	
Antelope bitter brush	0	1	Big sagebrush	Creeping barberry
Mountain snowberry	1	1/2	Bigtooth maple	Redberry elder
Rubber rabbitbrush	1	1/2	Blueberry elder	Woods rose
Totals	18	18		

Table 3 . Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed wet and semi-wet meadows. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Semi-wet soil		Wet soil		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled	Semi-wet	Wet
	-Pounds per acre-					
Grasses:					Grasses and Sedges:	
Reed canarygrass	4	2	8	4	Great Basin wildrye	Meadow barley
Meadow foxtail	3	1 1/2	2	1	Kentucky bluegrass	Ovalhead sedge
Redtop	1	1/2	1	1/2	Meadow barley	Tufted hairgrass
Smooth brome (northern strain)	3	1 1/2	0	0	Ovalhead sedge	
Timothy	1	1/2	1	1/2		
Forbs:					Forbs:	
Alsike clover	1	1/2	3	1 1/2	Alpine leafybract aster	Edible valerian
Strawberry clover	2	1	3	1 1/2	Pacific aster	Pacific aster
Black medick	2	1	0	0		
Oregon checkermallow	2	1	0	0		
Totals	19	9 1/2	18	9		

Table 4 . Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Inland Saltgrass Associations, characterized by inland saltbrush, alkali sacaton, nuttall alkaligrass and creeping wildrye. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Wet Lands		Dry Lands		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled		
	-Pounds per acre-					
Grasses:					**Grasses:**	
Russian wildrye	4	2	4	2	Alkali sacaton	Reed canarygrass
Tall wheatgrass	2	1	1	1/2	Bluestem wheat-grass	Salina wildrye
Fairway crested wheatgrass	0	0	2	1		Slender wheatgrass
Tall fescue	2	1	0	0	Meadow foxtail	
Great Basin wildrye	2	1	2	1	Quackgrass	
Forbs:					**Forbs:**	
Yellow sweetclover	4	2	4	2	Alfalfa (creeping strain or Ladak)	Black medick
Strawberry clover	2	1	1	0		Fivehook bassia
Pacific aster	1	1/2	1	1/2	Belvedere summer cypress	
Shrubs:					**Shrubs:**	
Gardner saltbush	3	1 1/2	3	1 1/2	American plum	Russian-olive
Fourwing saltbush	0	0	4	2	Black greasewood	Silver buffaloberry
					Purpleosier willow	Tatarian honeysuckl
Totals	20	10	21	10 1/2	Rubber rabbitbrush	Winterfat

Table 5 . Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Shadscale Associations. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Application		Alternate Species	
	Broadcast	Drilled		
Grasses:			Grasses:	
Russian wildrye	1 1/2	1	Alkali sacaton	Sand dropseed
Fairway crested wheatgrass	1 1/2	1	Bottlebrush squirreltail	Spike dropseed
Standard crested wheatgrass	1 1/2	1	Salina wildrye	Bluestem wheatgrass
Indian ricegrass	1 1/2	1		
Forbs:			Forbs:	
Gooseberryleaf globemallow	1 1/2	1	Lewis (or blue) flax	Small burnet
Alfalfa	1 1/2	1		
Shrubs:			Shrubs:	
Winterfat	1 1/2	1	Big sagebrush	Parry rabbitbrush
Fourwing saltbush	1 1/2	1	Black sagebrush	Rubber rabbitbrush
			Bud sagebrush	Small rabbitbrush
Totals	12	8	Fringed sagebrush	Yellowbrush

Table 6 . Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Blackbush Associations, characterized by blackbush, creosotebush, Joshua tree, red brome and galleta grass. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Application		Alternate Species	
	Broadcast	Drilled		
	-Pounds per acre-			
Grasses:			**Grasses:**	
Pubescent wheatgrass	2	1	Alkali sacaton	Orchardgrass (Mediterranean type)
Intermediate wheatgrass	2	1		
Fairway crested wheatgrass	1	1/2	Bluestem wheatgrass	Russian wildrye
Sand dropseed	1	1/2	Standard crested wheatgrass	Spike dropseed
Forbs:			**Forbs:**	
Alfalfa	2	1	Alfilerla	Nevada showy goldeneye
Small burnet	3	1 1/2	German Iris	Palmer penstemon
Gooseberryleaf globemallow	1	1/2	Lewis flax	Toadflax penstemon
Shrubs:			**Shrubs:**	
Fourwing saltbush	5	2 1/2	Antelope bitterbrush	Desert peachbrush
Winterfat	3	1 1/2	Apache-plume	Longflower snowberry
			Cliffrose	Utah serviceberry
Totals	20	10	Desert bitterbrush	

Table 7. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Subalpine Herblands and Aspen Openings, characterized by redberry elder, western yarrow, Letterman needlegrass and mountain brome. Also included are acceptable alternates if seed for a plant species is not available. Alternates marked with an asterisk(*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Well drained soils		Moist soils		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled	Well drained Soils	Moist Soils
Grasses:					**Grasses:**	
Smooth brome (northern strains)	3	1 1/2	4	2	Bearded wheatgrass	Kentucky bluegrass
Smooth brome (southern strains)	3	1 1/2	4	2	Hard sheep fescue	Meadow barley
Intermediate wheatgrass	1	1/2	0	0	Kentucky bluegrass	Meadow brome
Meadow foxtail	1	1/2	2	1	Slender wheatgrass	Ovalhead sedge
Subalpine brome	1	1/2	1	1/2	Sulcata sheep fescue	Timothy
Tall oatgrass	1	1/2	0	0	Timothy	
Orchardgrass (Intermountain area)	1	1/2	0	0		
Mountain brome	1	1/2	0	0		
Reed canarygrass	0	0	2	1		
Forbs:					**Forbs:**	
Alfalfa (creeping type or Ladak)	1	1/2	1	1/2	Lewis (or blue) flax	Alpine leafybract aster
Mountain lupine	2	1	2	1	Nuttall lomatium	Fat solomon-plume
Common cowparsnip	0	0	1	1/2	Oneflower helianthella	Low goldenrod
Sweetanise	1	1/2	1	1/2	Oregon fleabane	Pacific aster
Chickpea milkvetch	2	1	0	0	Porter ligusticum	Edible valerian
					Showy goldeneye	
					Silky lupine	
					Smooth aster	

Table 7. Continued

Species	Well drained soils		Moist soils		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled	Well drained Soils	Moist Soils
Shrubs:					Shrubs:	
Mountain snowberry	1	1/2	0	0	Big sagebrush	Bush cinquefoil
Yellowbrush	1	1/2	0	0	Bush cinquefoil	Geyer willow
					Parry rabbitbrush	Scouler willow
Totals	20	10	18	9	Redberry elder	Silver sagebrush
					Rubber rabbitbrush	
					Silver sagebrush	
					Squaw currant	
					Sticky currant	
					Woods rose	
					Wyeth eriogonum	

Table 8 . Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Black Greasewood Association, characterized by black greasewood, shadscale saltbush, Gardner saltbush, bottlebrush, squirreltail and alkali sacaton. Also included are acceptable alternatives if seed for a plant species is not available. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Wet to moist soils with high water table. Broadcast	Wet to moist soils with high water table. Drilled	Dry soils with low water table. Broadcast	Dry soils with low water table. Drilled	Alternate Species	
	-Pounds per acre-					
Grasses:					**Grasses:**	
Tall wheatgrass	3	1 1/2	1	1/2	Alkali sacaton	Creeping wildrye
Fairway crested wheatgrass	1	1/2	3	1 1/2	Bluestem wheatgrass	Great Basin wildrye
Pubescent or intermediate wheatgrass	1	1/2	1	1	Bottlebrush squirreltail	Reed canarygrass
Reed fescue	2	1	0	0		
Russian wildrye	2	1	4	2		
Quackgrass[1]	2	1	2	1		
Forbs:						
Strawberry clover	1	1/2	0	0		
Yellow sweetclover	3	1	2	1		
Shrubs:					**Shrubs:**	
Fourwing saltbush	1	1/2	2	1	Big sagebrush	Russian-olive
Gardner saltbush	1	1/2	1	1/2	Russet buffaloberry	Yellowbrush
Rubber rabbitbrush	1/2	1/4	1	1/2		
Winterfat	0	0	1	1/2		
Totals	17 1/2	8 1/4	18	9 1/2		

[1] Not recommended if site is near agricultural areas onto which it might spread.

.ble 9. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Big Sagebrush Associations, characterized by big sagebrush, rubber rabbitbrush, Nevada ephedra, bluebunch wheatgrass, and Indian ricegrass. Also included are acceptable alternatives if seed for a plant species is not available. Alternates marked with an asterisk (*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species	Precipitation less than 11 inches		Precipitation 11 inches or more		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled		
Grasses:					**Grasses:**	
Fairway crested wheatgrass	3	2	4	2	Alkali sacaton*	Indian ricegrass
Standard crested wheatgrass	2	1	0	0	Bottlebrush squirreltail	Orchardgrass*
Bearded bluebunch wheatgrass	1/2	1/2	1	1/2	Bulbous barley*	Sand dropseed*
Bluestem wheatgrass	1/2	1/2	1	1/2	Bulbous bluegrass*	Siberian wheatgr
Intermediate wheatgrass	1/2	1/2	1	1	Great Basin wildrye	Smooth brome
Pubescent wheatgrass	1/2	1	1	1	Hard sheep fescue*	(southern strai
Russian wildrye	1	1	1	1		Winter rye*
Forbs:					**Forbs:**	
Alfalfa (Rambler, Nomad or Ladak - equal amount of each)	1	1	1	1	Bouncing-bet*	Pacific aster*
Utah sweetvetch	0	0	1/2	1/2	Cushion eriogonum*	Palmer penstemon
Arrowleaf balsamroot	1/2	1/4	1/2	1/2	Cutleaf balsamroot*	Showy goldeneye*
Small burnet	0	0	1/2	1/2	Eaton penstemon*	Silky lupine*
Shrubs:					Gooseberryleaf globemallow*	
Fourwing saltbush	1	1/2	1	1/2	Lewis flax	Smooth aster*
Rubber rabbitbrush	1/2	1/2	1/2	1/2	Louisiana sagebrush*	Vegetable-oyster salsify*
					Nevada lupine*	
					Nevada showy goldeneye*	Wasatch penstemo
					Oneflower helianthella*	Sicklepod milkve
Totals:	11	8-3/4	13	9-1/2		

Table 9 . Continued

Species	Precipitation less than 11 inches		Precipitation 11 inches or more		Alternate Species	
	Broadcast	Drilled	Broadcast	Drilled		
Shrubs:					**Shrubs:**	
Shrubs for separate planting in major disturbance areas - pits, tractor cleat marks, and dozer scalps:						
Antelope bitterbrush	2	1	3	2	Big sagebrush	Martin ceanothus*
Cliffrose or desert bitterbrush	1	1/2	1-1/2	1	Black sagebrush	Nevada ephedra
Fourwing saltbush	2	2	2	2	Bud sagebrush*	Rocky Mountain smooth sumac*
Utah serviceberry	1	1	1	1	Desert peachbrush*	Spineless hopsage*
Winterfat	1-1/2	1	1	1	Douglas rabbitbrush	Spiny hopsage*
Totals:	7-1/2	5-1/2	8-1/2	7	Gardner saltbush*	Squaw-apple*
					Green ephedra	Wyeth eriogonum*
					Longflower snowberry*	

Table 10. Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed Pinyon-Juniper Associations, characterized by green ephedra, big sagebrush, antelope bitterbrush, bluebunch wheatgrass, and Sandburg bluegrass. Also included are acceptable alternatives if seed for a plant species is not available. Alternatives marked with an asterisk (*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.

Species Mixture	Lower elevation (Precipitation less than 12 in.)		Upper elevation (Precipitation 12 in. or more)		Alternate Species
	Broadcast	Drilled	Broadcast	Drilled	
Grasses:					**Grasses:**
Fairway crested wheatgrass	4	2	3	1-1/2	Bearded or beardless blue-bunch wheatgrass
Standard crested wheatgrass	1	1	1	1/2	Bottlebrush squirreltail
Bluestem wheatgrass	1	1/2	0	0	Bulbous barley
Intermediate wheatgrass	1	1/2	1	1	Bulbous bluegrass
Pubescent wheatgrass	1	1/2	1	1	Great Basin wildrye
Russian wildrye	1	1/2	1	1/2	Hard fescue
Smooth brome (southern strain)	0	0	1	1	Indian ricegrass
					Meadow brome*
Forbs:					**Forbs:**
Alfalfa (Rambler, Nomad, Travois, or Ladak - equal amount of each	1	1	2	1	Lewis flax
Chickpea milkvetch	0	0	1	1/2	Nevada showy goldeneye
Utah sweetvetch	1	1/2	1	1/2	Nuttall lomatium
Yellow sweetclover	1	1/2	1	1/2	Pacific aster
Arrowleaf balsamroot	1	1/2	1	1/2	Showy goldeneye
Small burnet	1	1	1	1	Eaton penstemon*
					Gooseberryleaf globe-mallow*
					Louisiana sagebrush*
					Nevada lupine*
					Bouncing-bet*
					Bramble vetch*
					German iris*
					Mountain rye
					Orchardgras
					Sheep fescu
					Siberian wh gras
					Sulcata she fesc
					Tall wheatg
					Winter rye*
					Cutleaf bals
					Sicklepod mi
					Oneflower helianth
					Palmer penst
					Parry golden
					Silky lupine
					Small aster*
					Tarragon sag
					Thickleaf pe
					Toadflax pe
					Vegetable-oy salsify*
					Wasatch pen

Table 10 . Continued

Species Mixture	Lower elevation (Precipitation less than 12 in.) Broadcast	Lower elevation (Precipitation less than 12 in.) Drilled	Upper elevation (Precipitation 12 in. or more) Broadcast	Upper elevation (Precipitation 12 in. or more) Drilled
Shrubs:				
Big sagebrush	1	1/2	1	1/2
Black sagebrush	1	1/2	1	1/2
Rubber rabbitbrush	1	1/2	1	1/2
Winterfat	1	1/2	1	1/2
Fourwing saltbush	1	1	1	1
Totals:	19	11-1/2	20	12-1/2
Shrubs for pits, major disturbance areas, and tractor cleat marks by dribblers:				
Antelope bitterbrush	2	1	3	2
Cliffrose or desert bitterbrush	1	1/2	0	0
Fourwing saltbush	2	2	1-1/2	1
Utah serviceberry	1	1/2	0	0
Green ephedra	1	1/2	1	1
Birchleaf mountain-mahogany	1	1/2	1-1/2	1
Curlleaf mountain-mahogany	1	1/2	1-1/2	1
Woods rose	0	0	1	1
Golden currant	0	0	1/2	1/4
Totals:	9	5-1/2	10	7-1/4

Alternate Species	
Shrubs:	
Nevada ephedra	Longflower snow
Littleleaf mountain-mahogany	Martin ceanothu
Squaw-apple	Mountain snowbe
Tatarian honeysuckle	Peking cotoneas
Apache-plume*	Rocky Mountain smooth sumac
Arizona cypress*	Roundleaf buff ber
Black common chokecherry*	Russian-olive
Blueberry elder*	Siberian peas
Common lilac*	Skunk bush su
Desert peachbrush*	Spineless hop
Fringed sagebrush*	Spiny hopsage
Gardner saltbush*	Wyeth eriogon

Table 1. Continued

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Shrubs:				
Rubber rabbitbrush	1/2	1/4	1/2	1/4
Douglas rabbitbrush	1/2	1/4	1/2	1/4
Big sagebrush	0	0	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Totals	17	8 1/2	20 1/2	10 1/4
Shrubs for pits, major disturbance areas, cleat marks, and drilled areas:				
Antelope bitterbrush	1	1/2	2	1
Golden currant	1/2	1/4	1/2	1/4
Birchleaf mountain mahogany	1	1/2	1/2	1/4
Curlleaf mountain mahogany	0	0	1/2	1/4
Cliffrose	0	0	1/2	1/4
Green ephedra	1/2	1/4	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Woods rose	1	1/2	1/2	1/4
Saskatoon serviceberry	0	0	1	1/2
Totals	4	2	7	3 1/2

Table 1. Continued

Alternate Species for Mountain Brush Associations

Grasses:

- Bearded bluebunch wheatgrass
- Beardless bluebunch wheatgrass
- Big bluegrass *
- Bluestem wheatgrass
- Bottlebrush squirreltail *
- Bulbous barley*
- Bulbous bluegrass*
- Great Basin wildrye
- Green needlegrass*
- Hard sheep fescue
- Indian ricegrass*
- Kentucky bluegrass*
- Meadow brome*
- Mountain rye *
- Sand dropseed*
- Siberian wheatgrass
- Slender wheatgrass
- Standard crested wheatgrass
- Sulcata sheep fescue
- Tall wheatgrass *
- Winter rye *

Forbs:

- American vetch*
- Bouncing-bet
- Bramble vetch*
- Common cowparsnip*
- Cutleaf balsamroot
- Eaton penstemon*
- German iris*
- Gooseberryleaf globemallow*
- Lewis (or blue) flax
- Louisiana sagebrush*
- Low penstemon*
- Nevada showy goldeneye
- Nuttall lomatium
- Palmer penstemon*
- Parry goldenrod*
- Sicklepod milkvetch
- Sidehill penstemon*
- Silky lupine*
- Small burnet
- Stream globemallow*
- Sweetanise*
- Tall milkvetch*
- Tarragon sagebrush*
- Thickleaf penstemon*
- Toadflax penstemon*
- Wasatch penstemon*
- Cushion eriogonum*

Shrubs:

- Apache-plume*
- Arizona cypress*
- Black common chokecherry*
- Black sagebrush
- Blueberry elder *
- Boxelder*
- Common bladdersenna*
- Common lilac*
- Creeping barberry*
- Desert bitterbrush*
- Desert peachbrush*
- Dwarf rabbitbrush*
- Fringed sagebrush*
- Gambel oak*
- Gardner saltbush*
- Longflower snowberry*
- Martin ceanothus*
- Mountain snowberry*
- Nevada ephedra*
- New Mexican forestiera*
- Oldman wormwood (stem cuttings)*
- Parry rabbitbrush*
- Peking cotoneaster*
- Purpleosier willow*
- Redberry elder*
- Rocky Mountain sumac*

EXHIBIT 23

HYDROLOGY AND HYDRAULICS

EXHIBIT 23

TABLE OF CONTENTS

Sediment Ponds and Spillway Calculations

Culvert Calculations

Berm A Calculations

Transformer Road

Ditch B

LIST OF MAPS

MAP NO.	TITLE
23A	Drainage Basins

SEDIMENT PONDS

PROFESSIONAL ENGINEER'S CERTIFICATION

I, ELDON D. STRID, certify that this sediment pond design was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

9/25/85
Date

Eldon D. Strid, U[illegible] P.E. 5672

REGISTERED PROFESSIONAL ENGINEER
No. 5672
Eldon D. Strid
STATE OF UTAH

EST. BY CP DATE 9/24/85

Sediment Pond Calculations

Drainage	Area (ft^2)	Ac.	CN	Height	Length	Tc
1. Undisturbed/Rec.	439,740	10.06	64	630	1700	.05
2 Un reclaimed	57860	1.34	90	30	540	.05
Total	497,600	11.4				

$T_c = .0028 L^{.77} (L/H)^{.385}$

For runoff volume calculation see attached calculations

· Volume = .38 ac-ft

Watershed Slopes

	Area 1	Area 2
LC25	450	100
LC50	300	150
LC75	200	70
slope (%)	44.8	4
slope (°)	24.1	2.3

Watershed	R	K	LS[1]	CP[2]	Delivery[3]	Annual Yield
1	26	.28	51	.032	.7	8.3
2	26	.28	.81	1.30	1	7.7

1. $LS = (T/72.6)^m (65.02 \sin^2\theta + 4.54 \sin\theta + 0.065)$
2. from attached table 4
3. from Sediment Delivery Ratios (attached)

EST. BY CIP DATE 9/24/85

Sediment Calculations

Watershed	Annual Yield	Acres	Total Yield
1	8.3	10.06	83.5
2	7.7	1.34	10.3
	TOTAL		93.8 Tons/year

$$93.8 \text{ Tons per year} \times \frac{2000 \text{ lb}}{\text{Ton}} \times \frac{\text{ft}^3}{100 \text{ lb}} \times \frac{\text{ac-ft}}{43560 \text{ ft}^3} = 0.04 \text{ ac-ft}$$

Sediment Pond Volume

Runoff Volume	0.38 ac-ft
Sediment Volume	0.04 ac-ft
Total pond Volume	0.42 ac-ft

EST. BY CHP DATE 9/25/85

Sediment Pond Runoff Volume Calculations 10 yr, 24 hour storm

Undisturbed and Reclaimed Areas

$$Q = (P - 0.2S)^2 / (P + .8S)$$

Where
P = 2.45 inches
S = (1000/CN) - 10
CN = 64

Q = 0.25 inches

(0.25 in x 10.06 ac)/12 = .21 ac-ft

Un-reclaimed Areas

Where
P = 2.45 inches
CN = 90

Q = 1.49 inches

(1.49 in x 1.34 ac)/12 = .17 ac-ft

Total Runoff = 0.38 ac-ft

Note: The unreclaimed area was determined based on the area shown on the following page.

The undisturbed/reclaimed was determined by subtracting the unreclaimed area from the Ditch B drainage area previously determined.

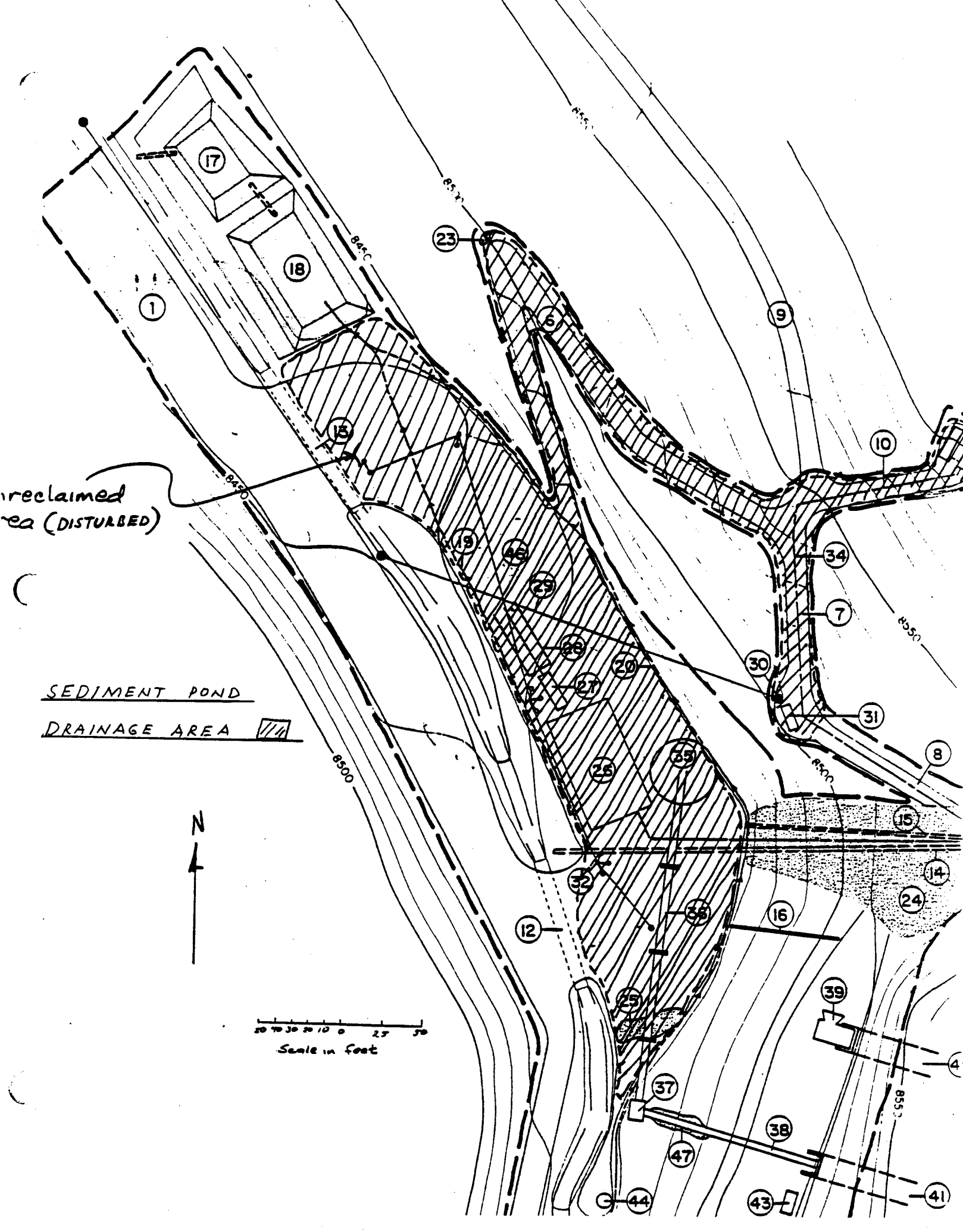

reclaimed
ea (DISTURBED)
SEDIMENT POND
DRAINAGE AREA
N
Scale in feet
8500
8450
8550

Table 4

Factor C for permanent pasture, range, and idle land[1]

Vegetative canopy		Cover that contacts the soil surface						
Type and height[2]	Percent cover[3]		Percent ground cover					
		Type[4]	0	20	40	60	80	95+
No appreciable canopy		G	0.45	0.20	0.10	0 042	0.013	0.003
		W	.45	.24	.15	.091	.043	.011
Tall weeds or short brush with average drop fall height of 20 in	25	G	.36	.17	.09	.038	.013	.003
		W	.36	.20	.13	.083	.041	.011
	50	G	.26	.13	.07	.035	.012	.003
		W	.26	.16	.11	.076	.039	.011
	75	G	.17	.10	.06	.032	.011	.003
		W	.17	.12	.09	.068	.038	.011
Appreciable brush or bushes, with average drop fall height of 6½ ft	25	G	.40	.18	.09	.040	.013	.003
		W	.40	.22	.14	.087	.042	.011
	50	G	.34	.16	.08	.038	.012	.003
		W	.34	.19	.13	.082	.041	.011
	75	G	.28	.14	.08	.036	.012	.003
		W	.28	.17	.12	.078	.040	.011
Trees, but no appreciable low brush. Average drop fall height of 13 ft	25	G	.42	.19	.10	.041	.013	.003
		W	.42	.23	.14	.089	.042	.011
	50	G	.39	.18	.09	.040	.013	.003
		W	.39	.21	.14	.087	.042	.011
	75	G	.36	.17	.09	.039	.012	.003
		W	.36	.20	.13	.084	.041	.011

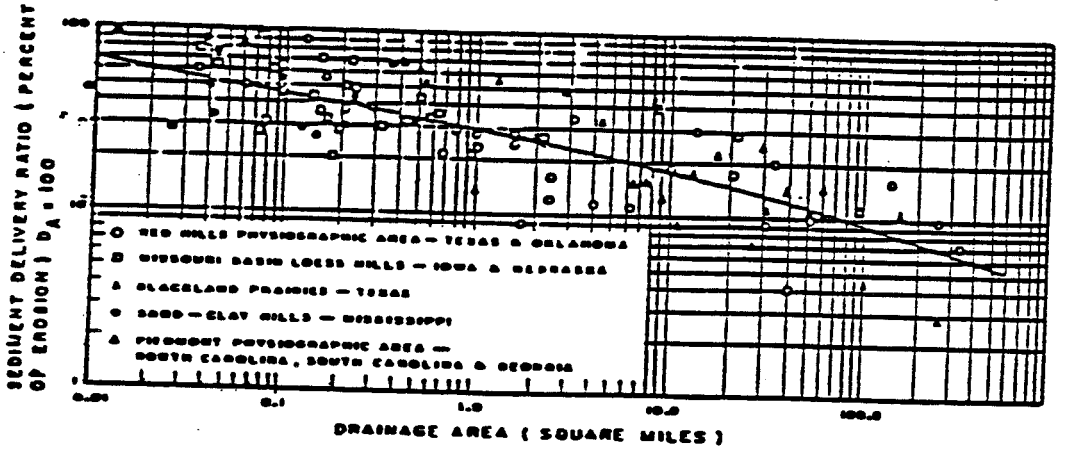
[1] The listed C values assume that the vegetation and mulch are randomly distributed over the entire area

[2] Canopy height is measured as the average fall height of water drops falling from the canopy to the ground. Canopy effect is inversely proportional to drop fall height and is negligible if fall height exceeds 33 ft.

[3] Portion of total-area surface that would be hidden from view by canopy in a vertical projection (a bird's-eye view

[4] G: cover at surface is grass, grasslike plants, decaying compacted duff, or litter at least 2 in deep

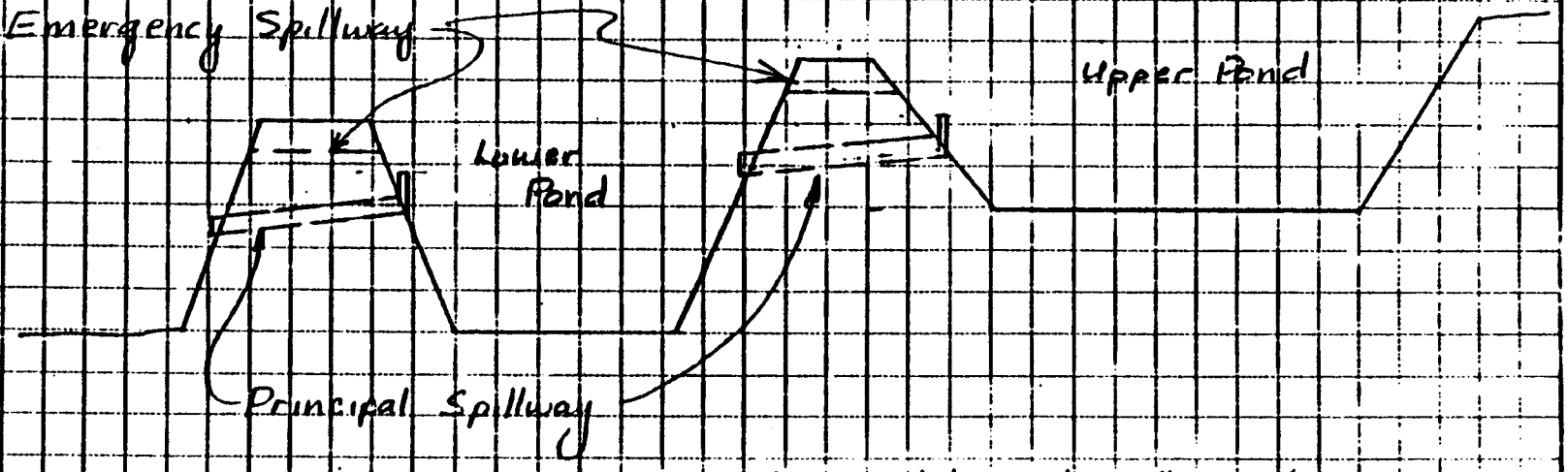
W: cover at surface is mostly broadleaf herbaceous plants (as weeds with little lateral-root network near the surface) or undecayed residues or both.



Sediment-delivery ratio versus size of drainage area, D_A. Where possible, site specific data should be used. (Boyce, 1975)

NAE BLAZON NO 1 MINE

SEDIMENT POND CROSS SECTION



Horizontal Scale 1" = 30'

Reference Section A-A', Map 7, Reclamation Plan

STEAMBOAT SPRINGS, CO
EST. BY CHD
DATE 9/28/95

Sediment Pond Calculations

Upper pond capacity at a stage of 4.5 ft
= .22 ac-ft

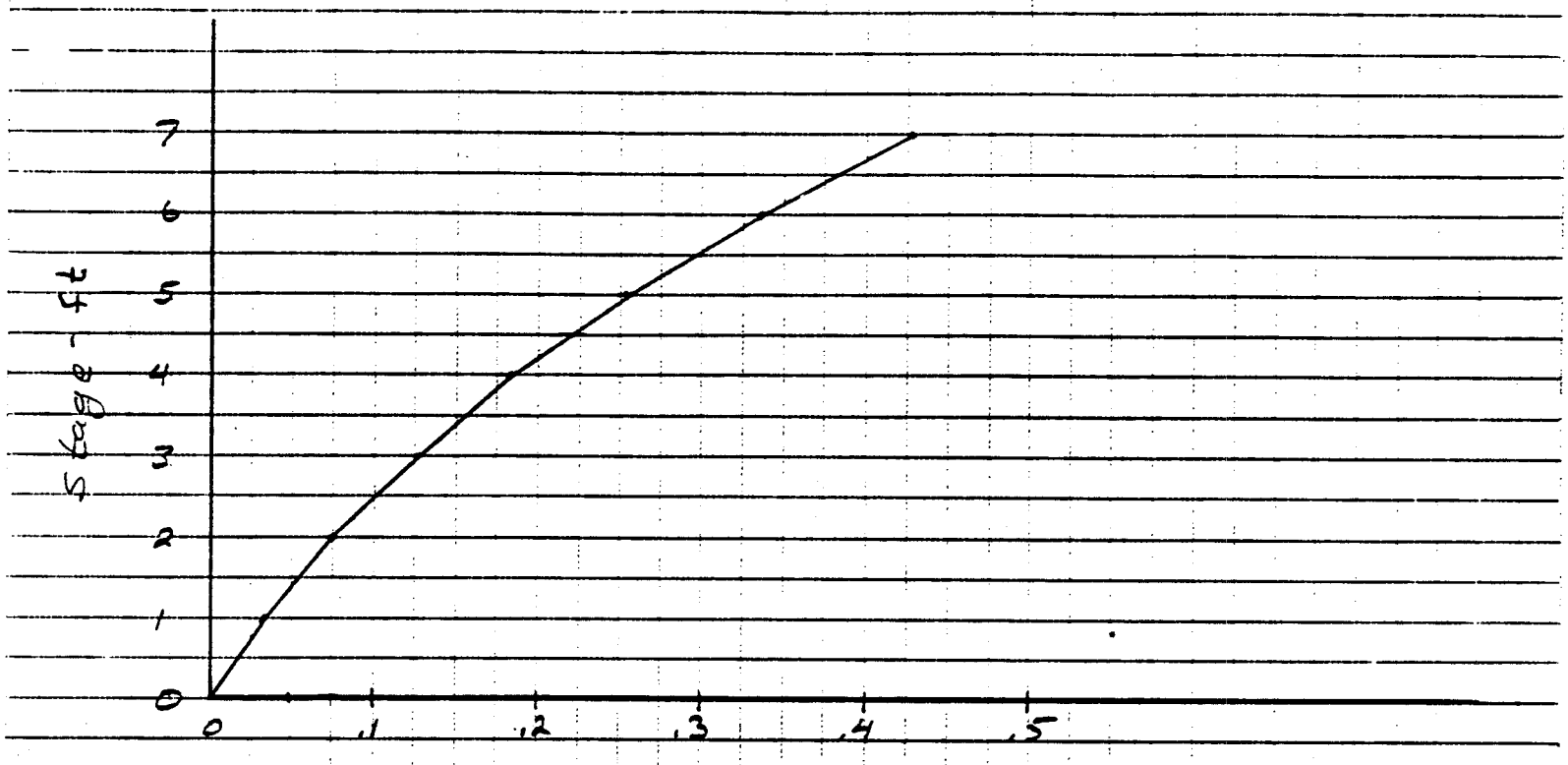
Lower pond capacity at a stage of 7.5 ft
= .19

Total pond capacity = 0.41 ac-ft

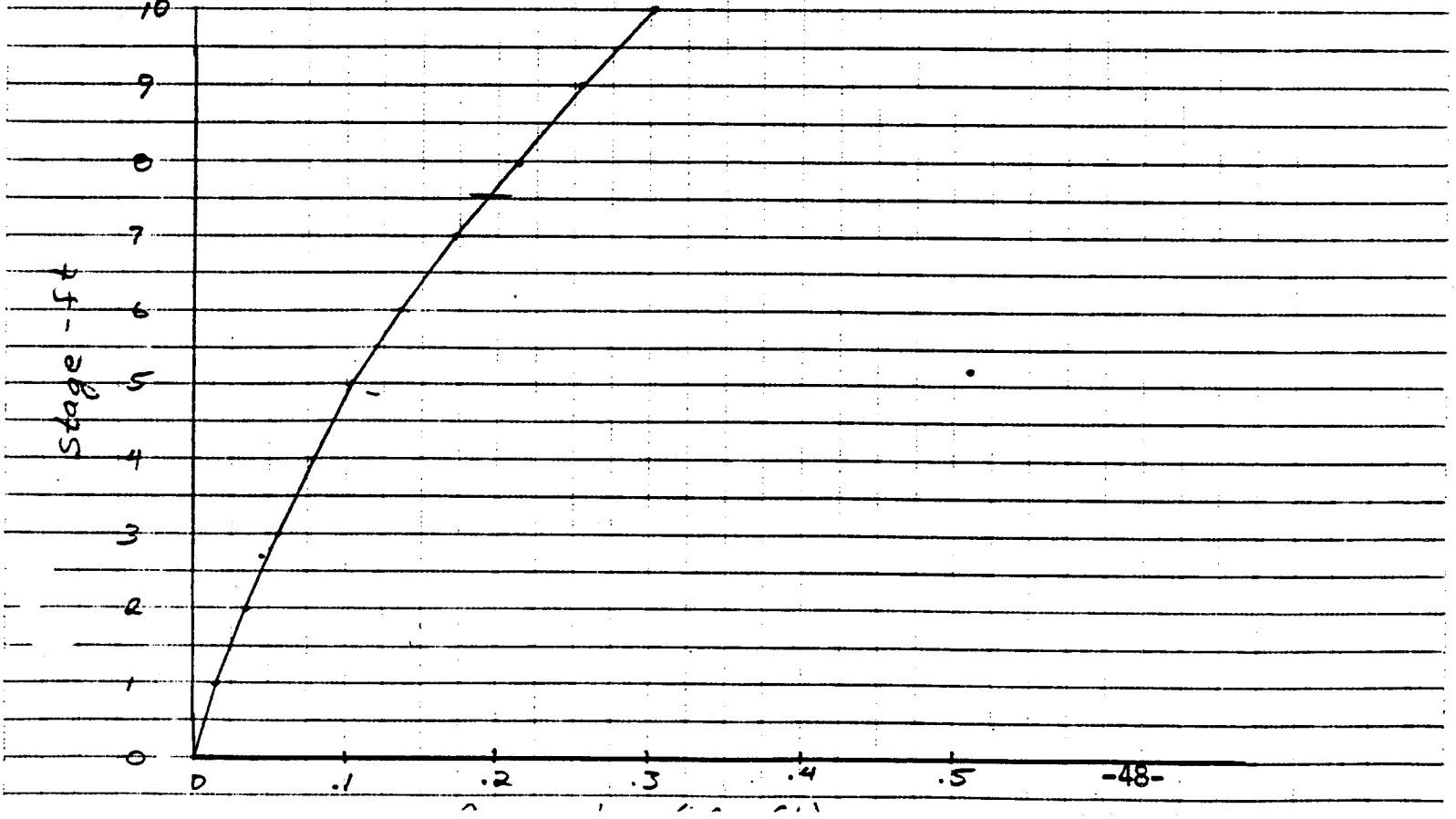
The ten year, 24 hour precipitation event plus one year sediment accumulation is 0.42 ac-ft therefore the ponds are adequate to contain the 10 year, 24 hour precipitation event.

EST. BY CP DATE 9/24/85

UPPER POND STAGE STORAGE



Lower Pond Stage Storage



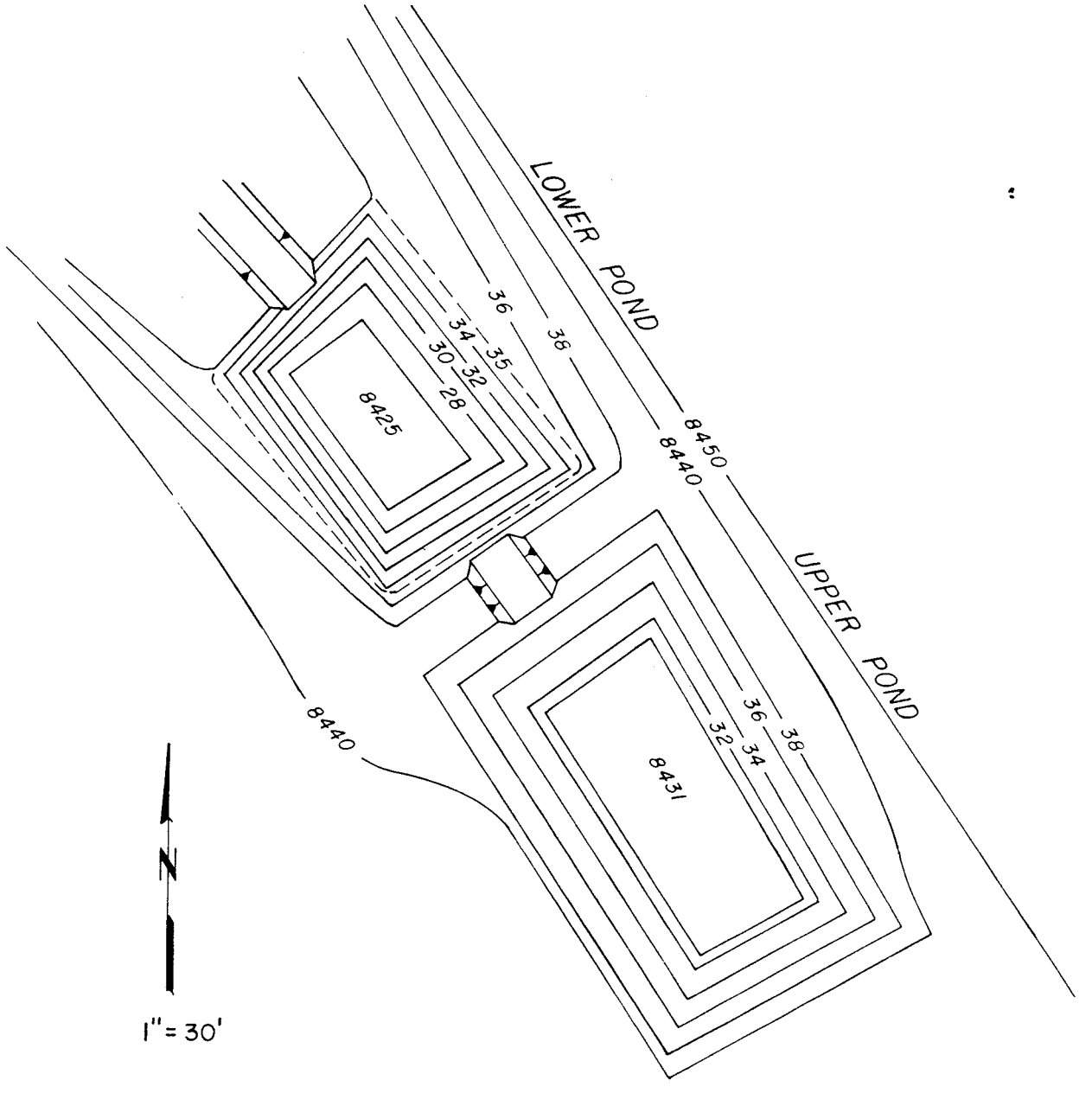
EST. BY CHP DATE 9/24/85

Upper Pond Storage Capacity

Level	Area	Ave.	Cum. Volume
0	.026		
		.032	
1	.037		.032
		.042	
2	.047		.074
		.052	
3	.056		.126
		.061	
4	.066		.187
		.070	
5	.075		.257
		.09	
6	.085		.337
		.09	
7	.094		.427

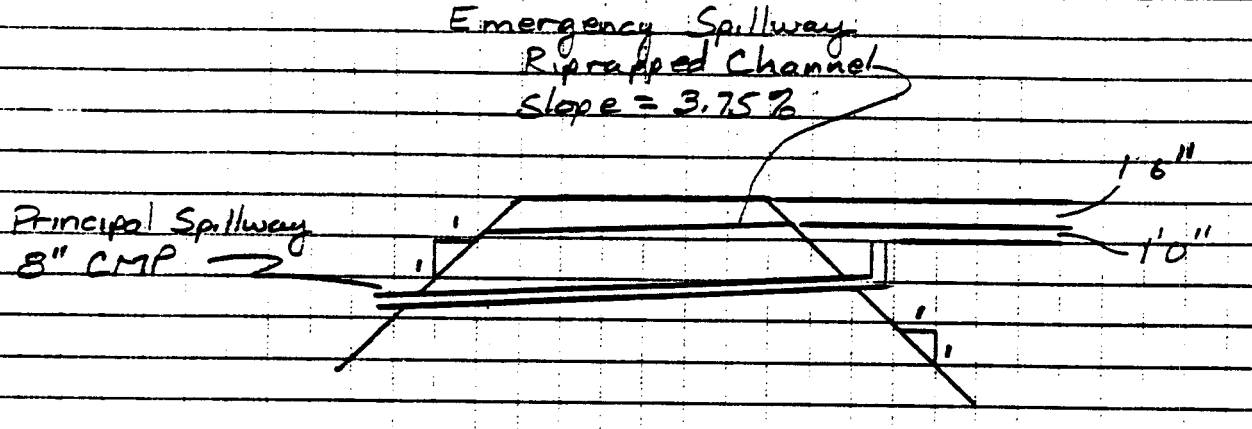
Lower Pond Storage Capacity

Level	Area	Ave	Cum. Volume
0	.012		
		.014	
1	.015		.014
		.017	
2	.019		.031
		.021	
3	.023		.052
		.025	
4	.027		.077
		.028	
5	.030		.105
		.032	
6	.034		.137
		.036	
7	.038		.173
		.040	
8	.042		.213
		.044	
9	.046		.257
		.048	



SEDIMENT POND CONTOURS

EST. BY CP DATE 9/24/85



Typical Pond Embankment

Principal Spillway Capacity (8"ϕ CMP)

$Q = C' a \sqrt{2gh}$

where
$C' = 0.6$
$a = .35\ ft^2$
$g = 32.2\ ft/sec^2$
$h = 1'$

$Q = 1.7$ cfs

Emergency Spillway

$Q = 7.2 - 1.7$ cfs $= 5.5$ cfs

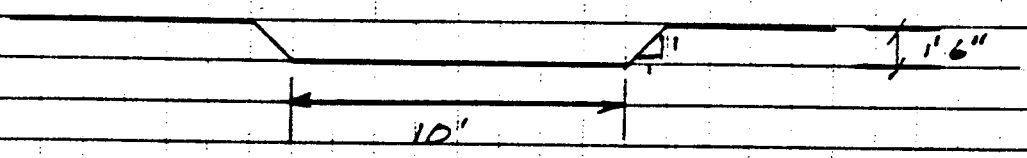
$V = (1.49/n) R^{.667} S^{1/2}$

where $n = 0.035$
$R = 0.24$
$S = 0.0375$

$V = 2.83$ ft/sec Depth = 2.5 inches

$Q = 6.0$ cfs

EST. BY CH DATE 9/24/85



Emergency Spillway Cross Section

Depth of flow = 0.21' (25yr, 24 hour storm)

Freeboard = 1.29' (25 yr, 24 hour storm)

Flow Velocity = 2.8 ft/sec

With these flow velocities, riprap protection of the channel is not required and energy dissipaters are not needed.

1. In order to minimize the potential for sediment contribution to mud creek, a riprap blanket with D_{50} = 15 will be provided down stream of the lower pond spillway to the first grade break.

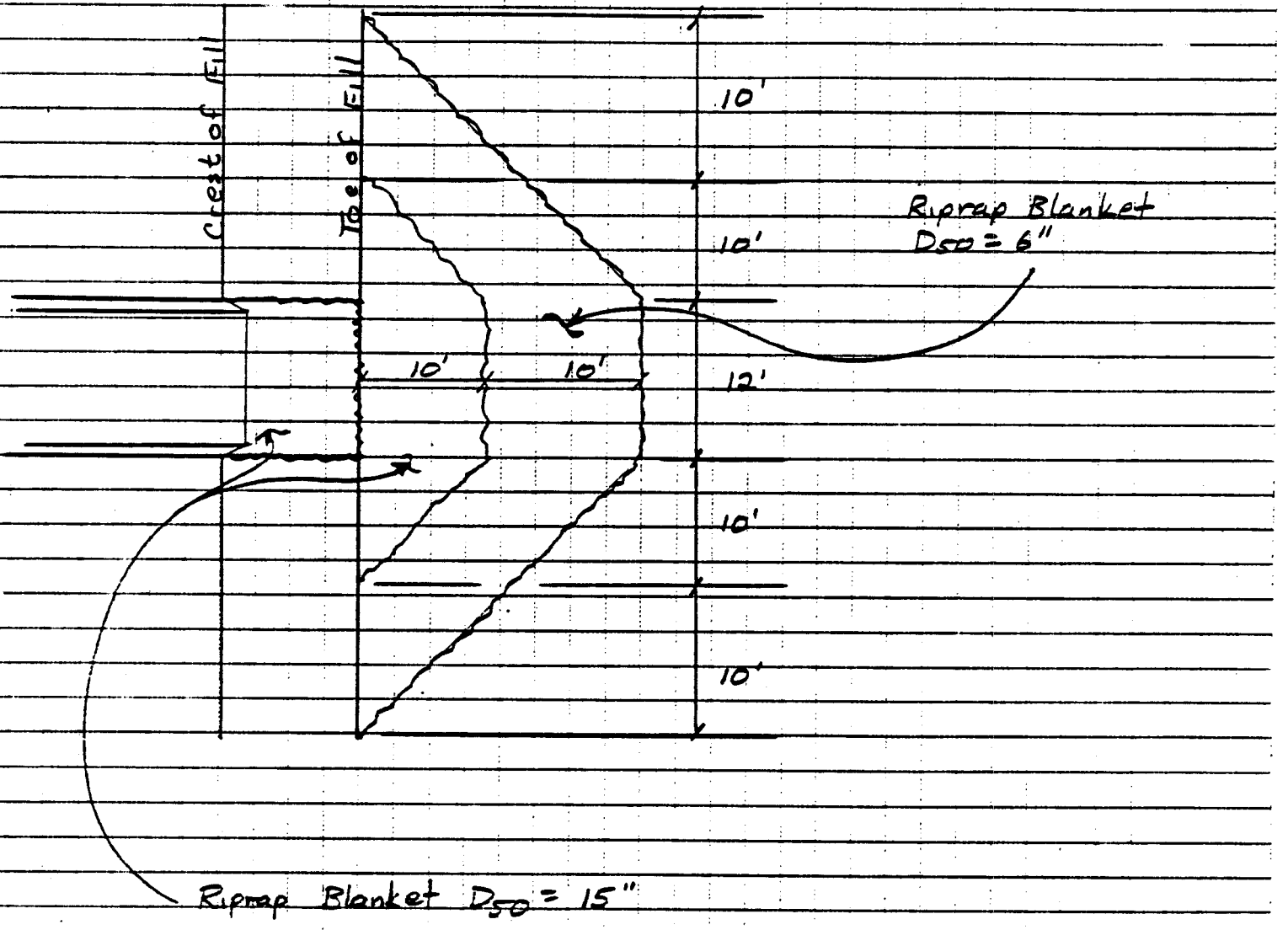
2. The spillway from the upper pond to the lower pond will be re-constructed to meet the lines and dimensions shown here.

3. A riprap blanket w/ D_{50} = 15" will be provided from the discharge of the lower pond principal spillway to the first grade break.

4. An energy dissipating apron will be installed at the "grade break" at the lower pond emergency spill outflow. The apron will conform to the dimensions shown on the following page.

EST. BY C HP DATE 9/24/85

Lower Pond Outflow Energy Dissipater



Principal Spillway Energy Dissipator

$Q = 1.7$ cfs

Provide 5' wide riprap blanket

slope = 1

$V = 1.49/n \, R^{2/3} S^{1/2}$

$n = .035$

$V = 6.5$ ft/sec

Riprap Size

$$D_{50} = 12 (1180 Q S_b^{17/6} r/p)^{2/5}$$

where

$Q = 1.7$

$S_b = 1$

$r = .051$

$p = 5.09$

$D_{50} = 15$ inch

WATERSHED IDENTIFICATION CODE

NAE BLAZON NO. 1 MINE SEDIMENT POND FLOW CALCULATION

****

**********INPUT VALUES**********

STORM DURATION	=	24.00	HOURS
PRECIPITATION DEPTH	=	2.92	INCHES

1

* *
JUNCTION 1, BRANCH 1, STRUCTURE 1
* *

*** HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	AREA ACRES	CURVE NUMBER	TC HR	TT HR	ROUTING COEFFICIENTS K-HRS	X	UNIT HYDRO
1	10.06	64.00	.050	.000	.001	.00	.0
2	1.34	90.00	.050	.000	.001	.00	.0

* * * COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS * * *

WATERSHED	PEAK FLOW (CFS)	RUNOFF (INCHES)
1	4.70	.43
2	2.49	1.91

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATI

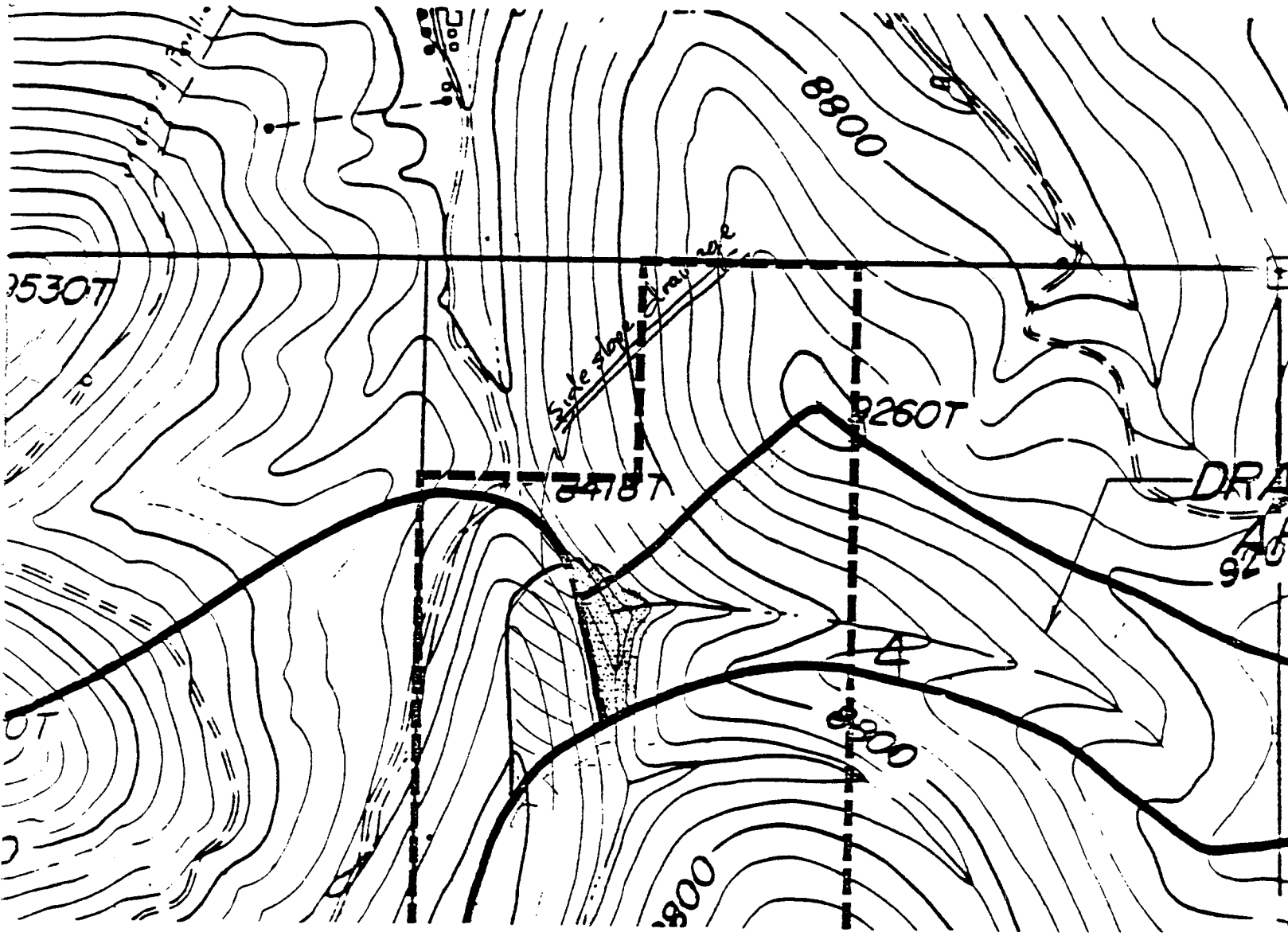
***** SUMMARY TABLE FOR TOTAL WATERSHED *****

RUNOFF VOLUME	=	.5774	ACRE-FT
PEAK DISCHARGE	=	7.1952	CFS
AREA	=	11.4000	ACRES
TIME OF PEAK DISCHARGE	=	12.00	HRS

* * * * * * * * * * * *
NULL STRUCTURE
* * * * * * * * * * * *

CULVERT CALCULATIONS

R. 7 E.



R. 7 E.

Road Culvert Calculations

Area Per Map= 15 ac

Hydraulic Length= 700'

Drainage Height= 240'

LC_{25} = 1000

LC_{50} = 950

LC_{25} = 600

Ave Slope= 23.4 %

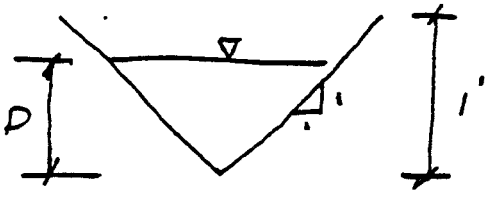
Q max = 3.11 using CN= 64, precipitation = 2.45in.

3 culverts are distributed along road

therefore Qeach= 1.04cfs

24" existing culverts are capable of carrying 11 cfs ⇒ culverts are overdesigned

Ditch



D = 0.7'
n = .035
slope= 3.5%
V = 3.15 ft/sec

Q= 1.54

The ditch is capable of carrying the 1.04 cfs

CULVERT D, D' AND CHANNEL A

NAE has calculated the peak flows per the attached calculations. The design event has been determined to be the 50-year, 24-hour precipitation event based on the fact that no channel diversion exists. Culverts B and C are capable of passing the design event as demonstrated in the attached calculations. Culverts B and C will be left in place. The existing culvert D will be supplemented by the installation of a parallel culvert identified as Culvert D'. Culvert D' will be a 42" diameter corrugated metal pipe. Design calculations for Culver D' can be found in Figure 1, Culvert D' Calculations.

Drainage areas for culverts B, C, D/D' are presented on the Drainage Basin Map (Map 23A).

The calculations for Culvert D indicate that a 42" culvert with headwall will carry the required 36 cfs remaining after the 24" diameter culvert discharges the 26 cfs.

The discharge from Culvert D will require that extra care be taken in the channel of Mudd Creek to ensure that excess erosion does not take place due to the culvert discharge. Calculations for discharge velocity from Culvert D indicate that riprap reinforcement in the area of the culvert discharge will be adequate if riprap with a D_{50} of 24" is installed in this area. Figure 2, Culvert D' Outlet Details shows the configuration of the riprap to be installed in the Mudd Creek channel at the outlet of the 42" diameter culvert.

In order to comply with 817.44, the development waste stockpile (area 24 on Map 8) will be removed to the original ground surface. The area will be regraded with the channel equivalent to the undisturbed channel abovea the disturbed area. The area will be reseeded per the revegetation plan. Straw bales will be installed through the length of the restored channel area as needed to provide temporary sediment control.

Culvert A

Culvert A will be removed. The channel configuration in the area of the removed Culvert A will be as shown on the Figure 3, Culvert A Channel Restoration. The channel configuration determined for the restored channel in the vicinity of Culvert A was determined from Figure 4, Culvert A Channel Calculations.

Figure 1

CULVERT D' CALCULATIONS

Hydrologic input parameters

Area = 135 ac

CN = 64 (Ref CN for Mudd Creek)

T_c = .2923 hrs

Hydrologic length = 4700'

Avg slope = 69.5

50-yr, 24-hr event = 3.29 in

Storm = SCS Type 2

AMC Condition II

Existing 24" culvert with H/D = 2

= 26 cfs from culvert nomograph

Required flow = 129-26 = 123 cfs

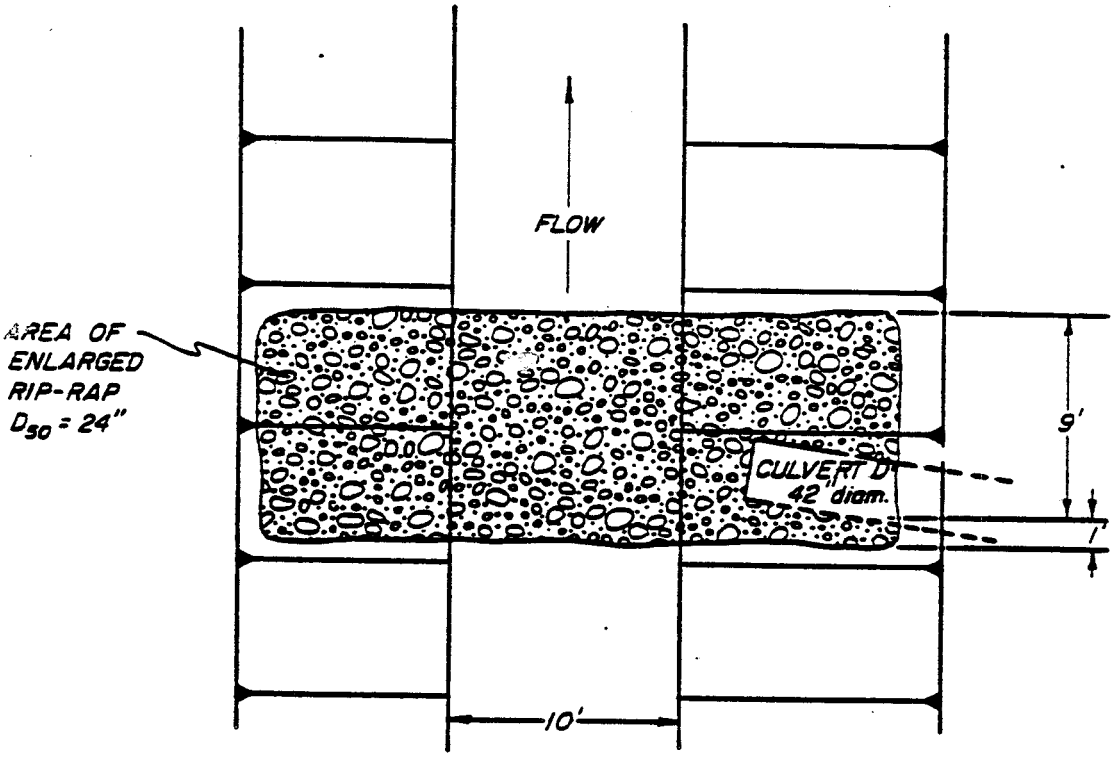
Use H/D = 2

42" culvert next to 24" culvert will carry required flow, from culvert nomograph

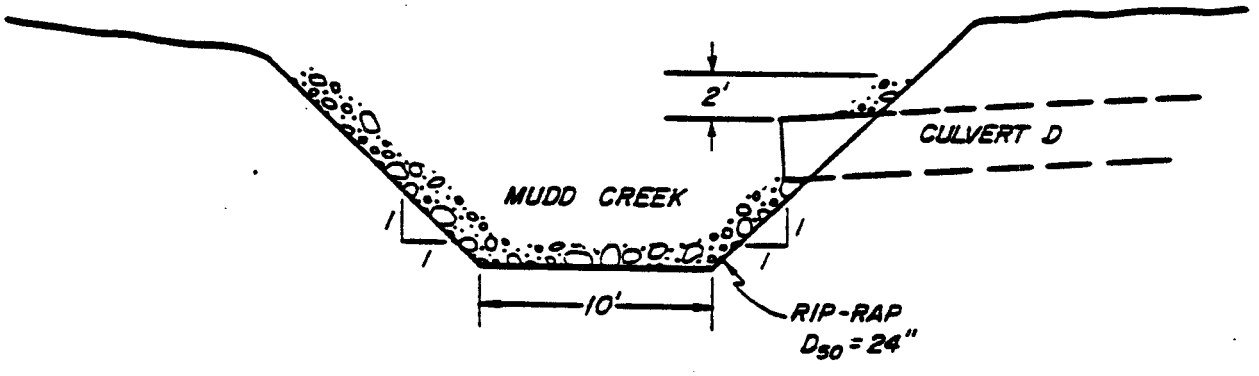
Discharge Velocity, 42" culvert

V = Q/A = 126/9.62 = 13.0 ft/sec

Riprap D_{50} = 24" for small area around culvert discharge



PLAN VIEW
NO SCALE



CROSS SECTION
NO SCALE

CULVERT D' OUTLET DETAILS

FIGURE 2

Figure 3

Culvert A Channel Calculations

Channel Slope = 0.035 = 3.5%

$n = .035$
$Q = 480$ cfs

$D = (Qn/K s^{1/2})^{.375}$

Use $K = 11.1$

$D = 2.25$ ft

Velocity check

$V = (1.49/n) R^{.667} s^{.5}$

$R = \frac{a}{wp} = \frac{41.3}{23.1} = 1.78$

$V = 11.7$ ft/sec

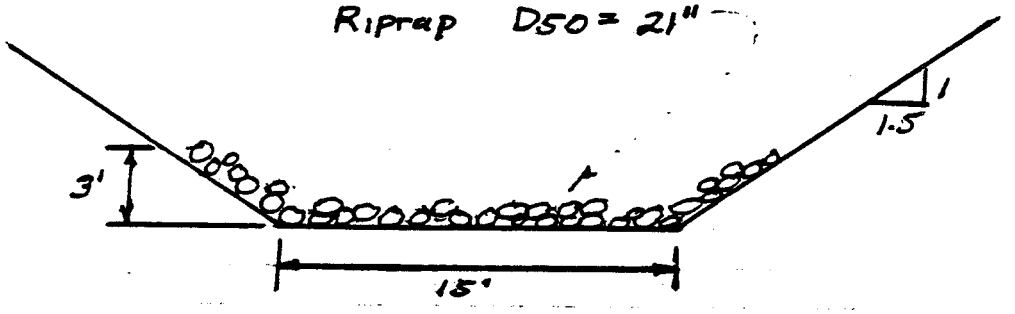
Riprap Sizing

With $V = 11.7$

Riprap $D_{50} = 21"$

Figure 4

Culvert A Channel Restoration



Channel Section

Channel Slope = 3.5%

NAE does not believe there will be aproblem in the Mud Creek Channel and floodplain and its ability to pass the 100-year, 24-hour precipitation event. The valley in the area of the Blazon operation is quite wide and should have no problem handling a 100-year, 24-hour precipitation event.

NAE does not believe that the Mud Creek channel has been altered. Three (3) culverts (A, B, and c) have been placed in the Mud Creek channel to facilitate access to the actual mining site; however, NAE does not believe that the stream channel was altered in any substantial way.

NAE has completed calculations to demonstrate that the Mudd Creek channel, as it currently exists, is capable of passing the 50-year, 24-hour precipitation event. Please see the attached calculations for Mudd Creek.

EST. BY CHP DATE 9/23/05

Culverts B & C

Peak flow, 50 year, 24 hour event = 479 cfs

Culvert diameter = 60"
Culvert Headwall = 65"

H/D = 1.81

Culvert nomograph indicates that this culvert will pass the design flow.

The headwalls and outlets of these culverts will be examined for stability of existing protection measures.

The culvert protection will be enhanced or repaired if inspection shows deficiencies.

STEAMBOAT SPRINGS, CO

JOB NAE

EST. BY CIP DATE 9/21/85

Mudd Creek Peak Flows, 50 year, 24 hour event

Inputs

Precipitation = 3.29 inches
Drainage Area = 2131 acres
Average Slope = 37.79 %
AMC = 2
Hydraulic length = 14,400 ft
Time of Concentration = .98 hours
Curve Number[1] = 64

Peak flow = 479 cfs

1 Curve number determined from Table 11-10 Rangeland Hydrology by F.A. Branson, GF Gifford, K.G. Renard and RF Hadley. Input parameters were:

Cover = 77 %
Soil Group = C
Cover type = Forest

STEAMBOAT SPRINGS, CO

JOB NAE
EST. BY CHP
DATE 9/21/85

Mudd Creek Flow

Typical Section

$$\text{Depth} = D = ((Q\,n)/KS^{1/2})^{.375}$$

where
- $Q = 479$ cfs
- $n = .045$
- $K = 5.09$
- $S = 0.049$

$D = 3.0'$

$$\text{Velocity} = V = (1.49/n)R^{.667}S^{.5}$$

Where
- $n = .045$
- $R = 2.11$
- $S = 0.049$

$V = 12.1$ ft/sec

Riprap Sizing

$$D_{50} = 12\,(118\,QS^{2.17}\,R/P)^{.4}$$

where
- $Q = 479$ cfs
- $S = 0.049$
- $R = 2.11$ ft
- $P = 18.5$ ft

$D_{50} = 29$ inches

Mudd Creek Flow, Worst Case

$$V = (1.49/n) R^{.667} S^{1/2}$$

Where

$n = .045$

$R = 2.28$ $(A = 36.68, p = 16.06)$

$S = 5.2\%$

$V = 13.08$ ft/sec

Riprap Sizing

$$D_{50} = 12 (11 B Q S^{2.17} R/p)^{.4}$$

$D_{50} = 33.6$ inches

STEAMBOAT SPRINGS, CO

EST. BY CHP DATE 9/23/85

Mudd Creek Channel Work

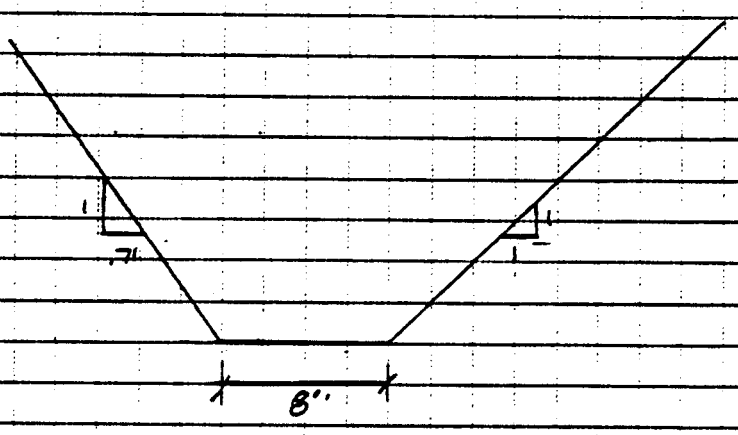
1. Check channel to insure that it is adequately riprapped to a depth of 3.3 ft

2. Check critical section at sediment pond outslope to insure that the channel is adequately riprapped to a depth of 3.2 ft

3. Repair or supplement any riprap found to be deficient.

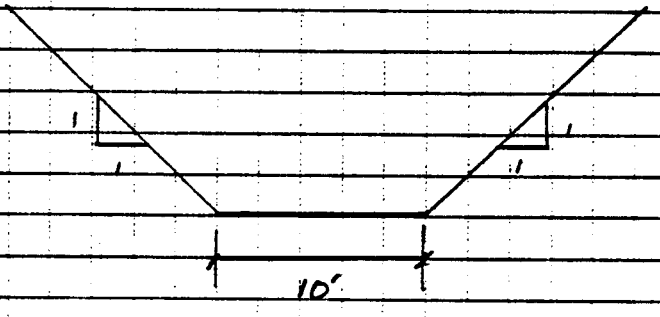
Mudd Creek Cross Sections

Worst Case



Total Channel Side Slope = 1.9H : 1V

Typical Section



BERM A CALCULATIONS

STEAMBOAT SPRINGS, CO

JOB 169

EST. BY CHP DATE 9/28/85

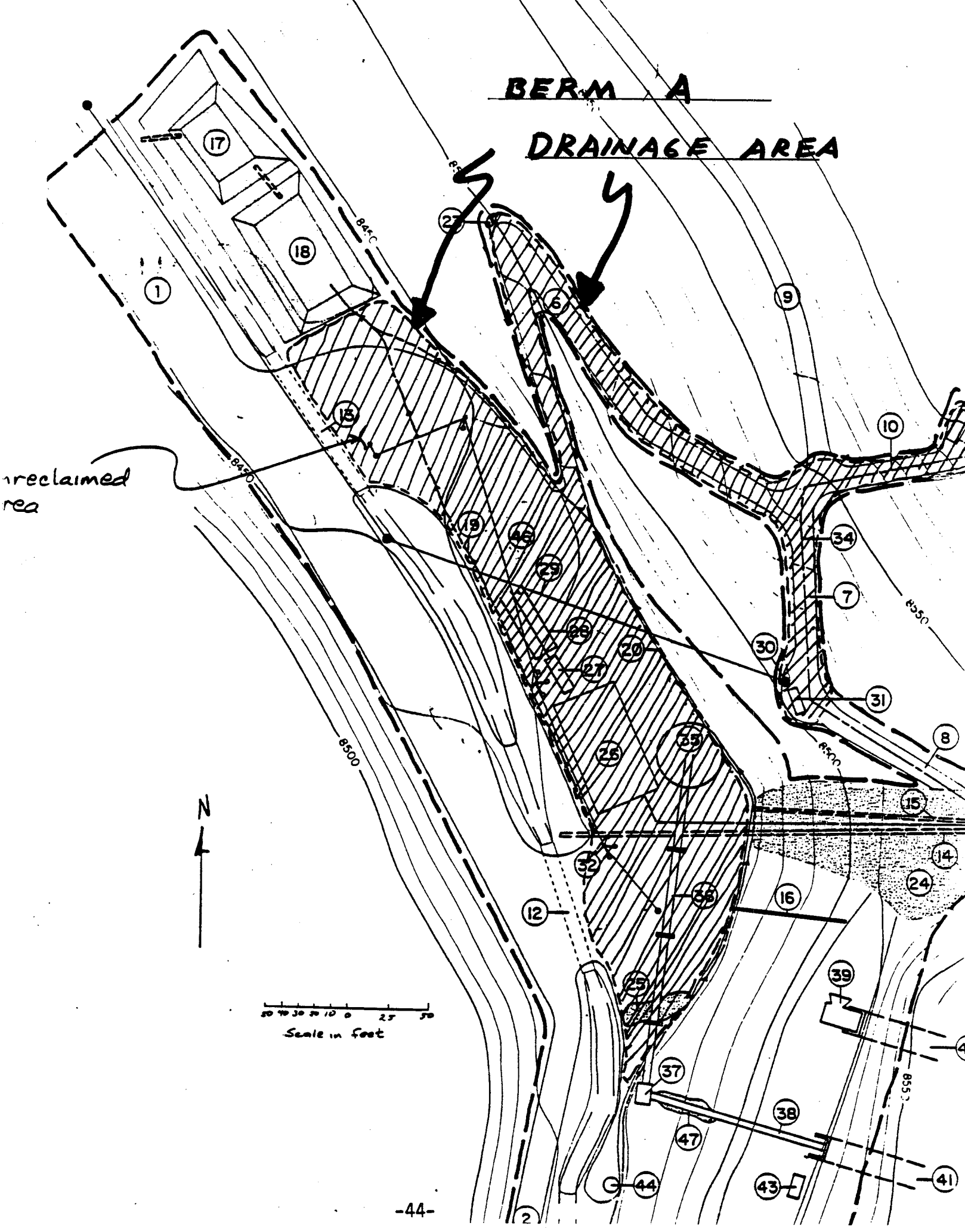
NAE BERM A

BERM A Contains runoff from the lower pad area which is an area which slopes gently in the direction of the sediment ponds.

Design event = 10yr 24 hour Storm = 2.45"

Berm Height = 9".

Since the pad area is relatively flat normal to the berm, the berm is more than sufficient to contain a storm which will drop 2.45 inches of precipitation in 24 hours.


BERM A
DRAINAGE AREA
reclaimed
rea
8500
8450
N
Scale in feet

TRANSFORMER ROAD

Road Drainage Calculations

TIME OF CONCENTRATION T_c
Revised 10/21/86 DJK
$T_c = 0.045$

PEAK FLOW
Revised 10/21/86 DJK
= 1.09 CFS

Hydrology

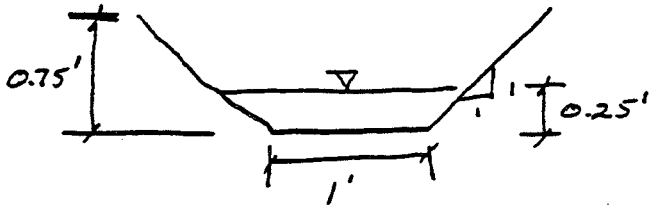
Drainage Area	4.27 ac
Drainage Height	080'
Hydraulic length	1400'

$T_c = (.0078 L^{.77} (L/H)^{.385})/60 = \frac{0.045}{\cancel{0.08}}$ hrs

Peak flow = $\frac{1.09}{\cancel{1.04}}$ cfs from attached Sedimot II calculations

Hydraulics

Revised Ditch Section



Slope = 0.083 = 8.3%

$V = (1.49/n) R^{.667} S^{.5}$

V = 3.96 ft/sec

where
d = 0.25'
A = 0.31 ft²
R = 0.183
wp = 1.71

Velocity is less than 4 ft/sec therefore no channel protection is required.