cotter

Am#1

September 24, 2012

San Miguel County Clerk and Recorder
305 West Colorado Avenue
Telluride, Colorado 81435

RE: Notice of Permit Amendment for the SR-11 Mine, Permit No. M-1977-451

To Whom It May Concern:

This letter serves as notice that Cotter Corporation has submitted an amendment for the SR-11 Mine, existing permit #M-1977-451. The SR-11 Mine is located at or near, Sections 17 and 18 Township 43 North, Range 19 West, New Mexico Principal Meridian, in San Miguel County, Colorado.

The SR-11 Mine is currently permitted as a 112d operation. The purpose of the amendment is to incorporate an Environmental Protection Plan (EPP) into the existing mining permit.

Cotter Corporation is providing a copy of the EPP for the SR-11 Mine to the San Miguel County Clerk and Recorder's office in Telluride for review. Enclosed is a formal notice of the amendment application.

If you have questions or comments regarding this Amendment Application please call me at Cotter's Nucla office, 970-864-7347.

Respectfully,

Glen Williams
Vice President of Mining
Cotter Corporation

RECEIVED
9-24-2012
B Gld

SR-11 EPP County Clerk -Recorder ltr

Cotter Corporation - West Slope Operations
P.O. Box 700, 28151 DD Road, Nucla, CO 81424 USA

Telephone (970) 864-7347
Fax (970) 864-7287

STATE OF COLORADO

DIVISION OF RECLAMATION, MINING AND SAFETY
Department of Natural Resources

1313 Sherman St., Room 215
Denver, Colorado 80203
Phone: (303) 866-3567
FAX: (303) 832-8106

COLORADO DIVISION OF RECLAMATION MINING & SAFETY

REGULAR (112d) DESIGNATED MINING OPERATION

RECLAMATION PERMIT

APPLICATION FORM

CHECK ONE: ☐ New Application (Rule 1.4.5) ☑ Amendment Application (Rule 1.10)

☐ Conversion Application (Rule 1.11)

Permit No. M-1977-451 (provide for amendments and conversions of existing permits)

The application for a Regular (112d) Designated Mining Operation Reclamation Permit contains three major parts: (1) the application form; (2) Exhibits A-T, Geotechnical Stability Exhibit, the Emergency Response Plan, and Addendum 1, as required by the Office, and outlined in Rules 6.1, 6.2, 6.3, 6.4.19, 6.5, 8.0, and 1.6.2(1)(b); and, (3) the application fee. When you submit your application, be sure to include one (1) **signed and notarized original** and four (4) copies of the application form, five (5) copies of Exhibits A-T, Rule 6.5 Geotechnical Stability Exhibit, the Emergency Response Plan, Addendum 1, and a check for the appropriate application fee (described under Section (4) on Page 2). Exhibits should not be bound or in a 3-ring binders; maps should be folded to 8 ½" X 11" or 8 ½" X 14" size. To expedite processing, please provide the information in the format and order described in this form.

GENERAL OPERATION INFORMATION

Type or print clearly, in the space provided, all information described below.

1. **Applicant/operator or company name (name to be used on permit)**:
   Cotter Corporation (N.S.L.) ("Cotter Corporation")
   - 1.1 Type of organization (corporation, partnership, etc.): Corporation
   - 1.2 I.R.S. Tax ID No. or Social Security Number: 85-0125530
2. **Operation name (pit, mine or site name)**: SR-11
3. **Permitted acreage**: (new or existing site) 13.3 permitted acres
   - 3.1 Change in acreage (+) -2.19 acres
   - 3.2 Total acreage in Permit area 11.11 acres

4. **Fees**:

4.1	**New** 112d(1) Application (affecting less than 50 acres and extracting less than 1 million tons per year) application fee	**$4,025.00**
4.2	**New** 112d(2) Application (larger than above but affecting less than 100 acres and extract less than 5 million tons per year	**$6,900.00** application fee
4.3	**New** 112d(3) Application (any other operation)	**$9,200.00** application fee
4.4	**Existing** 112d(1) Amendment Fee	**$2,300.00** amendment fee
4.5	**Existing** 112d(2) Amendment Fee	**$4,025.00** amendment fee
4.6	**Existing** 112d(3) Amendment Fee	**$7,475.00** amendment fee
4.7	**New** 112d(1) Amendment Fee	**$2,875.00** amendment fee
4.8	**New** 112d(2) Amendment Fee	**$4,600.00** amendment fee
4.9	**New** 112d(3) Amendment Fee	**$8,050.00** amendment fee
4.10	Conversion Fee	see above application fees

5. **Primary commoditie(s) to be mined**: Uranium Vanadium

6. **Name of owner of surface of affected land**: The Bureau of Land Management

7. **Name of owner of subsurface rights of affected land**: U.S. Department of Energy
   If 2 or more owners, refer to Exhibit O.

8. **Type of mining operation**: ☐ Surface ☑ Underground

9. **Location Information**: the center of the area where the majority of mining will occur lies in:

COUNTY: San Miguel

PRINCIPAL MERIDIAN (check one): ☐ 6th (Colorado) ☑ 10th (New Mexico) ☐ Ute

SECTION (write number): S 18

TOWNSHIP (write number and check direction): T 43 ☑ North ☐ South

RANGE (write number and check direction): R 19 ☐ East ☑ West

QUARTER SECTION (check one): ☑ NE ☐ NW ☐ SE ☐ SW

QUARTER/QUARTER SECTION (check one): ☐ NE ☐ NW ☑ SE ☐ SW

GENERAL DESCRIPTION (miles and direction from nearest town and approximate elevation):

From Highway 141, turn right at the Slick Rock Bridge onto County Road S8 & follow for approximately 2.3 miles. Turn right onto County Road Q1 & follow for approximately 8.5 miles. Turn left onto County Road 4Q & follow this road for 2.5 miles to the portal. The SR-11 Mine is located approximately 7000 feet in elevation.

10. **Primary Mine Entrance Location (report in either Latitude/Longitude OR UTM):**

Latitude/Longitude:
Example: (N) 39° 44′ 12.98″
(W) 104° 59′ 3.87″

Latitude (N): deg 37 min 59 sec 28.50 (2 decimal places)

Longitude (W): deg 108 min 59 sec 38.16 (2 decimal places)

OR

Example: (N) 39.73691°
(W) -104.98449°

Latitude (N) _____._____ (5 decimal places)

Longitude (W) -_____._____ (5 decimal places)

OR

Universal Tranverse Mercator (UTM)

Example: 201336.3 E NAD27 Zone 13
4398351.2 N

UTM Datum (specify NAD27, NAD83 or WGS 84) Nad 83 Zone 13

Easting _____

Northing _____

11. **Primary future (Post-mining) land use** (check one):

☐ Cropland(CR) ☐ Pastureland(PL) ☐ General Agriculture(GA)
☐ Rangeland(RL) ☐ Forestry(FR) ☑ Wildlife Habitat(WL)
☐ Residential(RS) ☐ Recreation(RC) ☐ Industrial/Commercial(IC)
☐ Developed Water Resources(WR) ☐ Solid Waste Disposal(WD)

12. **Primary present land use** (check one):

☐ Cropland(CR) ☐ Pastureland(PL) ☐ General Agriculture(GA)
☐ Rangeland(RL) ☐ Forestry(FR) ☑ Wildlife Habitat(WL)
☐ Residential(RS) ☐ Recreation(RC) ☐ Industrial/Commercial(IC)
☐ Developed Water Resources(WR)

13. **Method of Mining**: ☐ Quarry (QR) ☐ Solution (SO)

13.1 Other: Briefly explain mining method (e.g. Placer, truck/shovel): _____

Underground. Ore will be mined using a modified room and pillar system, i.e. split shooting is used in conjunction with leaving waste pillars wherever necessary for roof support.

Correspondence Information:

APPLICANT/OPERATOR (name, address, and phone of name to be used on permit):

Contact's Name: Glen Williams Title: Manager

Company Name: Cotter Corporation N.S.L.

Street: 28151 Dd Road P.O. Box: 700

City: Nucla

State: Colorado Zip Code: 81424

Telephone Number: (970) - 864-7347

Fax Number: ( ) -

PERMITTING CONTACT (if different from applicant/operator above):

Contact's Name: Title:

Company Name:

Street: P.O. Box:

City:

State: Zip Code:

Telephone Number: ( ) -

Fax Number: ( ) -

INSPECTION CONTACT:

Contact's Name: Glen Williams Title: Manager

Company Name: Cotter Corporation N.S.L.

Street: 28151 Dd Road P.O. Box: 700

City: Nucla

State: Colorado Zip Code: 81242

Telephone Number: (970) - 864-7347

Fax Number: ( ) -

CC: STATE OR FEDERAL LANDOWNER (if any):

Agency: U.S. Department of Energy

Street: 11025 Dover Street, Suite 1000

City: Westminster

State: Colorado Zip Code: 80021

Telephone Number: (720) - 377-9683

CC: STATE OR FEDERAL LANDOWNER (if any):

Agency:

Street:

City:

State: Zip Code:

Telephone Number: ( ) -

15. **On Site Processing**:

☐ Solution (SO) ☐ Chemical (CH) ☐ Thermal (TH)

☐ Heap Leach (HL) ☐ Vat Leach (VL)

List any designated chemicals or acid-producing materials to be used or stored within permit area: _____

Description of Amendment:

If you are amending or converting an existing operation, provide a brief narrative describing the proposed change(s):

Cotter Corporation is amending the original 112 permit to include an Environmental Protection Plan. Cotter Corporation is also requesting an acreage change to increase the area around a vent hole and access road. Cotter Corporation is requesting the release of the 2 acres associated with the IKE No. 1 Mine.

Responsibilities as a Permittee:

Upon application approval and permit issuance, this application becomes a legally binding document. Therefore, there are a number of important requirements which you, as a permittee, should fully understand. These requirements are listed below. Please read and initial each requirement, in the space provided, to acknowledge that you understand your obligations. If you do not understand these obligations then please contact this Office for a full explanation.

JL 1. Your obligation to reclaim the site is not limited to the amount of the financial warranty. You assume legal liability for all reasonable expenses which the Board or the Office may incur to reclaim the affected lands associated with your mining operation in the event your permit is revoked and financial warranty is forfeited;

JL 2. The Board may suspend or revoke this permit, or assess a civil penalty, upon a finding that the permittee violated the terms or conditions of this permit, the Act, the Mineral Rules and Regulations, or that information contained in the application or your permit misrepresent important material facts;

JL 3. If your mining and reclamation operations affect areas beyond the boundaries of an approved permit boundary, substantial civil penalties, to you as permittee can result;

JL 4. Any modification to the approved mining and reclamation plan from those described in your approved application requires you to submit a permit modification and obtain approval from the Board or Office;

JL 5. It is your responsibility to notify the Office of any changes in your address or phone number;

JL 6. Upon permit issuance and prior to beginning on-site mining activity, you must post a sign at the entrance of the mine site, which shall be clearly visible from the access road, with the following information (Rule 3.1.12):

a. the name of the operator;

b. a statement that a reclamation permit for the operation has been issued by the Colorado Mined Land Reclamation Board; and,

c. the permit number.

JL 7. The boundaries of the permit boundary area must be marked by monuments or other markers that are clearly visible and adequate to delineate such boundaries prior to site disturbance.

JL 8. It is a provision of this permit that the operations will be conducted in accordance with the terms and conditions listed in your application, as well as with the provisions of the Act and the Mineral Rules and Regulations in effect at the time the permit is issued.

JL 9. Annually, on the anniversary date of permit issuance, you must submit an annual fee **($1,150)**, and an annual report which includes a map describing the acreage affected and the acreage reclaimed to date (if there are changes from the previous year), any monitoring required by the Reclamation Plan to be submitted annually on the anniversary date of the permit approval. Annual fees are for the previous year a permit is held. For example, a permit with the anniversary date of July 1, 1995, the annual fee is for the period of July 1, 1994 through June 30, 1995. Failure to submit your annual fee and report by the permit anniversary date may result in a civil penalty, revocation of your permit, and forfeiture of your financial warranty. It is your responsibility, as an operator, to continue to pay your annual fee to the Office until the Board releases you from your total reclamation responsibility.

Certification:

As an authorized representative of the applicant, I hereby certify that the operation described has met the minimum requirements of the following terms and conditions:

1. This mining operation will not adversely affect the stability of any significant, valuable and permanent man-made structure(s) located within two hundred (200) feet of the affected lands. (However, where there is an agreement between the applicant/operator and the persons having an interest in the structure that damage to the structure is to be compensated for by the applicant/operator (Section 834-32-115(4)(d), C.R.S. 1984, as amended), then mining may within 200 feet. Proof of an agreement must be submitted to the Office prior to the decision date.)

2. No mining operation will be located on lands where such operations are prohibited by law (Section 34-32-115(4)(f), C.R.S. 1984, as amended).

3. As the applicant/operator, I do not have any mining/prospecting operations in this state of Colorado currently in violation of the provisions of the Mined Land Reclamation Act (Section 34-32-120, C.R.S. 1984, as amended) as determined through a Board finding. *(See below.)

4. I understand that statements in the application are being made under penalty of perjury and that false statements made herein are punishable as a Class 1 misdemeanor pursuant to Section 18-8-503, C.R.S. 1984, as amended.

This form has been approved by the Mined Land Reclamation Board pursuant to Section 34-32-112, C.R.S., of the Mined Land Reclamation Act. Any alteration or modification of this form shall result in voiding any permit issued on the altered or modified form and subject the operator to cease and desist orders and civil penalties for operating without a permit pursuant to Section 34-32-123, C.R.S.

Signed and dated this 19th day of September, 2012.

Cotter Corporation (N.S.L.)
Applicant/Operator Name

Signature: [signature]

Title: PRESIDENT

If Corporation Attest (Corporate/ County Seal)

By: Jennifer A. Sear

Assistant
Corporate Secretary or Equivalent
Town/City/County Clerk

State of CALIFORNIA)
)ss.
County of SAN DIEGO)

The foregoing instrument was acknowledged before me this 19th day of September, 2012.

by KEN MUSHINSKI as PRESIDENT of COTTER CORPORATION (N.S.L.).

[signature]
Notary Public

CHRIS J. LANGER
COMM. #1834150
Notary Public - California
San Diego County
My Comm. Expires Jan. 30, 2013
NRO1 NRO1

My Commission expires: 1/30/2013

SIGNATURES MUST BE IN BLUE INK

*An exception is that the Mined Land Reclamation Board ("Board") issued Findings of Fact, Conclusions of Law, and Order, in the matter of Cotter Corporation's Possible Violations, Cease and Desist Order, Corrective Actions, and Civil Penalties, File No. M-1977-300, Notice of Violation No. MV-2010-018, dated August 11, 2010, as amended September 2012, relating to the Schwartzwalder Mine. This exception, however, is being resolved through an Agreement between Cotter Corporation (N.S.L.) and the Colorado Division of Reclamation, Mining and Safety entered into on September 12, 2012 ("Agreement") for addressing conditions at the Schwartzwalder Mine and through Application Amendment 4 to Mine Permit M-1977-300. The Board has approved the foregoing Agreement. In that Agreement, Cotter made no admissions.

Division of Reclamation, Mining, and Safety

Fee Receipt for M1977451

Cotter Corporation

000000000

Receipt #: 13945
Date: 10/16/2012
Permit: M1977451

Payment Method	Revenue Code	Fee Description/Notes	Amount
235422 jwd	4300-03	Minerals Amendment Fees M-1977-451	$2,300.00
		Receipt Total:	**$2,300.00**

Maps and Exhibits:

Five (5) complete, unbound application packages must be submitted. One complete application package consists of a signed application form and the set of maps and exhibits referenced below as Exhibits A-T, the Geotechnical Stability Exhibit, the Emergency Response Plan, and Addendum 1. Each exhibit within the application must be presented as a separate section. Begin each exhibit on a new page. Pages should be numbered consecutively for ease of reference. If separate documents are used as appendices, please reference these by name in the exhibit.

With each of the five (5) signed application forms, you must submit a corresponding set of the maps and exhibits as described in the following references to Rules 6.4, 6.5, 8, and 1.6.2(1)(b):

EXHIBIT A - Legal Description
EXHIBIT B - Index Map
EXHIBIT C - Pre-Mining and Mining Plan Map(s) of Affected Lands
EXHIBIT D - Mining Plan
EXHIBIT E - Reclamation Plan
EXHIBIT F - Reclamation Plan Map
EXHIBIT G - Water Information
EXHIBIT H - Wildlife Information
EXHIBIT I - Soils Information
EXHIBIT J - Vegetation Information
EXHIBIT K - Climate Information
EXHIBIT L - Reclamation Costs
EXHIBIT M - Other Permits and Licenses
EXHIBIT N - Source of Legal Right-To-Enter
EXHIBIT O - Owners of Record of Affected Land (Surface Area) and Owners of Substance to be Mined
EXHIBIT P - Municipalities Within Two Miles
EXHIBIT Q - Proof of Mailing of Notices to County Commissioners and Conservation District
EXHIBIT R - Proof of Filing with County Clerk and Recorder
EXHIBIT S - Permanent Man-Made Structures
EXHIBIT T - Designated Mining Operation Environmental Protection Plan
RULE 6.5 - Geotechnical Stability Exhibit
RULE 8 - Emergency Response Plan
ADDENDUM 1 - Notice Requirements (sample enclosed) (Rule 1.6.2(1)(b)

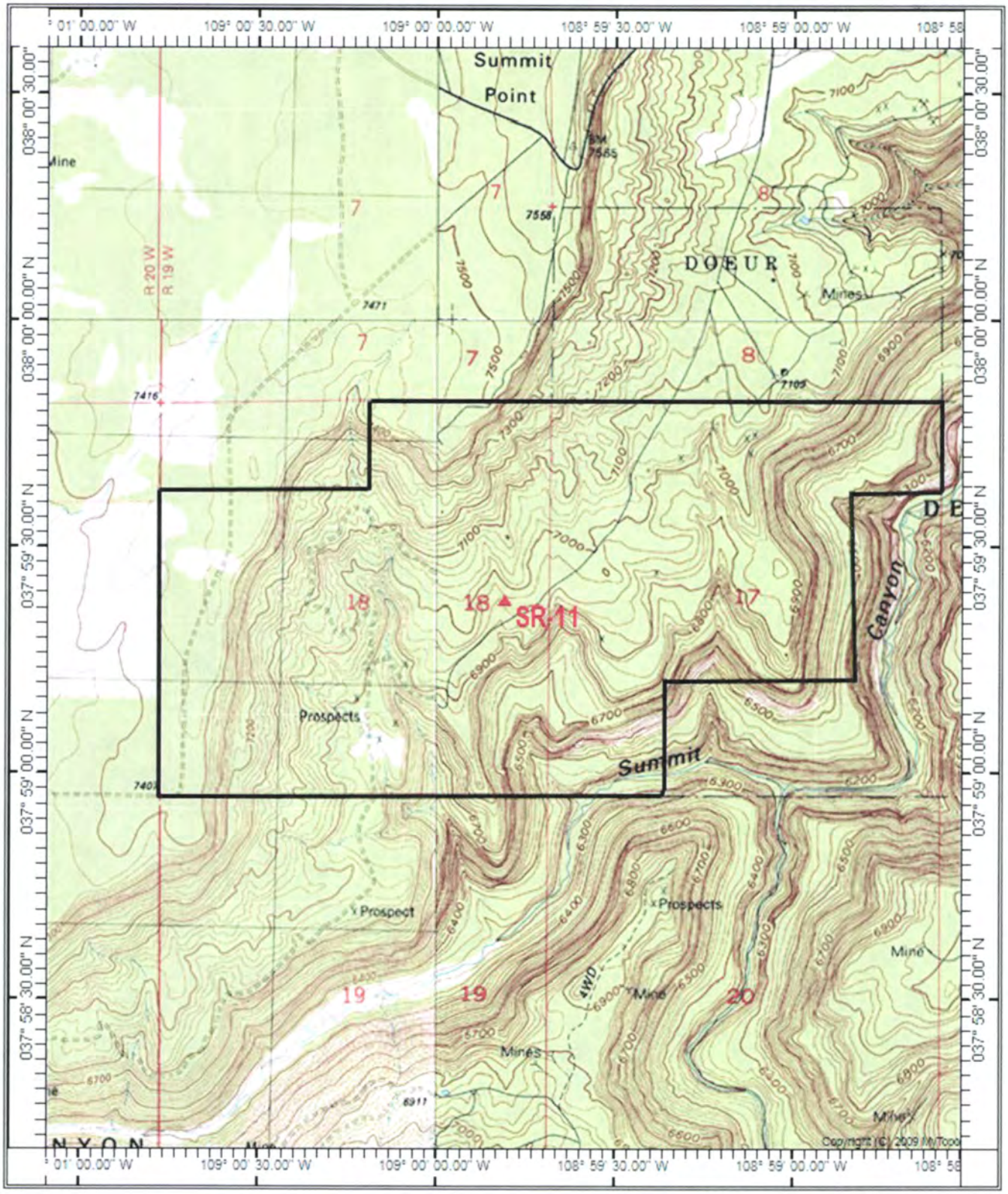
The instructions for preparing Exhibits A-T, the Geotechnical Stability Exhibit, the Emergency Response Plan, and Addendum 1, are specified under Rule 6.4, 6.5, 8, and 1.6.2(1)(b) of the Mineral Rules and Regulations. If you have any questions on preparing the Exhibits or content of the information required, or would like to schedule a pre-application meeting you may contact the Office at 303-866-3567.

Exhibit A
Legal Description and Location Map
SR-11 Mine Permit Amendment
M-1977-451

The main entrance for SR-11 is located at 37°59'28.50"N 108°59'38.16"W at 7005 feet in elevation. From Highway 141, turn right at the Slick Rock Bridge onto County Road S8 for approximately 2.3 miles. Turn right onto County Road Q1 for approximately 8.5 miles. Turn left onto County Road 4Q and follow this road for 2.5 miles to the portal.

Permitted acreage for SR-11 is located within the following quarter-quarter sections of T43N R19W NMPM, San Miguel County, Colorado:

Section	Quarter-Quarter	Disturbance	Acreage
17	SW ¼ NW ¼	Road	0.13
18	SE ¼ NE ¼	Road	0.15
18	SE ¼ NE ¼	Road	0.28
18	SE ¼ NE ¼	Surface Facilities, Portal, Waste Area	6.0
18	NE ¼ SE ¼	Surface Facilities, Portal, Waste Area	4.30
18	NE ¼ NE ¼	Venthole	0.25
			11.11



SCALE 1:24000

0 1000 2000 3000 4000 5000 6000

FEET

COTTER CORPORATION
MINE SR-11 INDEX MAP
PREPARED BY:
O'CONNOR DESIGN GROUP, INC.

7011 1570 0002 3195 7407

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City, State PO Box 29
Norwood, Colorado 81424

PS Form

SR-11

112d APPLICATION AMENDMENT
COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY

September 2012

PREPARED BY COTTER CORPORATION (N.S.L.)

AND

O'Connor Design Group, Inc.

2350 G Road ~ Grand Junction, CO 81505 ~ (970) 241-7125

SR-11
HARDROCK/METAL 112d REQUEST FOR AMENDMENT
PERMIT NO. M-1977-451

TABLE OF CONTENTS

APPENDICIES

MAPS

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SR-11 Mine
Permit No. M-1977-451
Request for Application Amendment

Introduction

The SR-11 Mine also known as the Ike No. 1 Mine is located approximately 22 miles northeast of Egnar, Colorado. It is owned and operated by Cotter Corporation (N.S.L.) as a 112 Hardrock/Metal Mining Permit No. M-1977-451, originally approved by the Mined Land Reclamation Board in October, 1977. Cotter is also the lessee of Mining Lease No. AT(05-1)-ML-60.8-C-SR-11 issued by the U.S. Department of Energy on April 20, 2008. This lease covers 1,303.22 acres and gives Cotter the right to explore, develop, mine and remove ore deposits of uranium, vanadium and associated minerals.

The original permit for the Ike No.1 Mine was a 110 category permit covering the old Ike No. 1 Mine located in the NW ¼ of SE ¼ of Section 8, T43N, R19W. Reclamation of the original permit area was completed in 2000 and the SR-11 was converted to a 112 category permit to cover the current mining operation located primarily in Section 18, T43N, R19W.

Cotter is amending the original permit in order to comply with the Division of Reclamation, Mining and Safety's request. Under the new rule and regulations for Hard Rock Mining, all uranium mines are classified as Designated Mining Operations (DMOs), and require Environmental Protection Plans. Also included as part of this amendment, Cotter is requesting an increase in acreage for the venthole site. Cotter is requesting a release for the originally permitted 2 acres that include the Ike No. 1 Mine.

Cotter submits the attached exhibits and maps to provide clarifying information for this request.

STATE OF COLORADO

DIVISION OF RECLAMATION, MINING AND SAFETY
Department of Natural Resources

1313 Sherman St., Room 215
Denver, Colorado 80203
Phone: (303) 866-3567
FAX: (303) 832-8106

COLORADO DIVISION OF RECLAMATION MINING & SAFETY

DESIGNATED MINING

REGULAR (112d) OPERATION

RECLAMATION PERMIT APPLICATION PACKAGE

APPLICABILITY:

This application package is for a Designated Mining Operation (DMO) which affects 10 acres or more or extracts 70,000 tons or more of mineral, overburden or combination of the two per calendar year and uses or stores designated chemicals or acid-producing materials or has the potential to cause acid mine drainage. If you plan to conduct a mining operation which meets these criteria, please follow the instructions provided in this package and Rules 1.4.1, 1.4.5, 6.0, 7.0, and 8.0, as required, of the Mineral Rules and Regulations.

FILING REQUIREMENTS:

The Mineral Rules and Regulations (the Mined Land Reclamation Act, Section 34-32-101, et seq., C.R.S., and 2 CCR 407-1) of the Colorado Mined Land Reclamation Board (the "Board") regulate the permitting, operational, and reclamation requirements for all non-coal mining operations in Colorado. It is your obligation to comply with the Act and Regulations. You are encouraged to obtain and review a copy of the Rules, available for $8.00 from the Division of Reclamation, Mining and Safety (the "Office"). In order to submit your application properly, it is recommended that you review the Act and:

Rule 1.1	Definitions;
Rule 1.4.1	General Provisions of the Application Review and Consideration Process;
Rule 1.4.5	Specific Requirements for Regular 112 and 112d Mining Operations;
Rule 1.6	Public Notice Procedures;
Rule 3.1	Reclamation Performance Standards;
Rule 3.3.1	Operating without a Permit - Penalty;
Rule 4	Performance Warranties and Financial Warranties;
Rule 6	Permit Application Exhibit Requirements;
Rule 6.2	General Requirements of Exhibits;
Rule 6.4	Specific Permit Application Exhibit Requirements;
Rule 6.5	Geotechnical Stability Exhibit;
Rule 7	Designated Mining Operations; and,
Rule 8	Emergency Response Plan for Designated Mining Operations.

To apply for a Reclamation Permit for a Regular Designated Mining Operation, one (1) completed signed and notarized Original and four (4) copies (Section 34-32-112(1)(a), C.R.S. 1984, as amended) of the Regular (112d) Designated Mining Operation Application Form, five (5) copies of Exhibits A-S, any required sections of Exhibit T, Geotechnical Stability Exhibit (Rule 6.5), as required, Addendum 1 - Notice requirements (described in Rule 1.6.2(1)(b), an example of this notice is attached for your use), the Emergency Response Plan, and an application fee MUST be submitted to the Office. This package contains the required application form and directions for preparing Exhibits A-T (as outlined and described in Rule 6.4), Geotechnical Stability Exhibit (Rule 6.5), the Emergency Response Plan(Rule 8), and Addendum 1 (Rule 1.6.2(1)(b). Review of the application and exhibits will **NOT** begin until all required information is submitted. The Office will then review the submitted information for adequacy.

It is recommended that you contact the agencies listed under "Compliance With Other Laws" prior to submitting the application to the Office. You must send a notice, on a form approved by the Board, to the local board of county commissioners and, if the mining operation is within the boundaries of a conservation district, to the board of supervisors of the conservation district, prior to filing the application. A copy of these "Notice of Filing Application" forms have been attached for your use. You must include proof of such mailings with the application at the time the application is submitted to the Office for filing (Rules 1.6.2 and 1.6.5).

Upon filing the application, place for public review a copy of the application, less confidential items, with the clerk and recorder of the county or counties in which the affected land is located. Any changes or additions made to an application following submittal must be filed with the county clerk and recorder. You must also provide the Office with an affidavit or receipt demonstrating that the change was filed with the county clerk and recorder no later than the close of business on the day the change was filed with the Office (Rule 1.8.1). The copy of the application and any changes or additions placed at the office of the county clerk and recorder shall not be recorded, but shall be retained there for at least sixty (60) days after a decision on the application by the Office and be available for inspection during this period. At the end of this period, the application may be reclaimed by the applicant or destroyed (Rule 1.6.2(2)).

Prior to the Office making an approval decision (consideration of the application), you must submit proof of publication and proof of all required notices. Proof of notice may be by submitting return receipts of a certified mailing or by proof of personal service (Rules 1.6.2 and 1.6.5).

Application Review Procedures:

When the Office receives the application form, Exhibits A-T, Geotechnical Stability Exhibit, Emergency Response Plan, Addendum 1, and the application fee, the Office will set a date for consideration of the application. This date will be within 90 days of the date of submittal. The date set for consideration may be extended, pursuant to Rule 1.4.5(3), if you change or make additions to the application (Rule 1.8).

The Office may schedule an informal conference on the application. You may also request an informal conference. Please consult Rule 1.4.6 for the procedures on informal conferences.

During the 90-day review period, the Office will review your application to determine if it is technically adequate and meets the requirements of the Act and Mineral Rules and Regulations. You will be notified if any deficiencies exist and will be asked to respond prior to the date set for consideration of the application.

The Office will issue its decision on or before the date set for consideration of the application. The decision will be either to: (1) approve; (2) approve with conditions; (3) deny; or, (4) set the application for a hearing before the Board. Any conditions upon approval, unless agreed to by the applicant, shall be treated as a denial. The grounds for denial, approval with conditions, or approval over an objection will be set forth in writing (Rule 1.4.8).

A hearing will automatically be scheduled if the Office's decision is: (1) denial; (2) approval when objections have been received; (3) approval with conditions when these are unacceptable to the applicant; or, (4) the Office chooses to set a hearing because of a decision requiring Board policy.

In the event the Office sets an application for a hearing without issuing a decision, the Office will issue a recommendation to the Board and will identify the issues raised in the adequacy review or by objections filed with the Office. The Office will mail a copy of the recommendation to all parties to the hearing (Rule 1.4.5(6)).

Performance and Financial Warranties:

A performance warranty and a financial warranty, in an amount determined as a part of the application review, must be submitted to the Office prior to permit issuance. If the applicant is a unit of state or county government, then only a performance warranty is required. Several different types of financial warranties are allowed by the law. Please review Rule 4 to determine which type of financial warranty you desire to use. You may obtain the appropriate forms during the application review period. A financial warranty should not be submitted until a decision on the application has been made.

Compliance with Other Laws:

Compliance with the Act and Rules and Regulations of the Mined Land Reclamation Board does not in any way relieve you of the responsibility to comply with all other applicable state and federal laws (Section 34-32-115(4)(c) and 109(5), C.R.S. 1984, as amended). At a minimum, you MUST contact the following agencies to determine whether or not you need to comply with their legal requirements:

- The Colorado Historical Society regarding properties of historical significance including the need for an archeological survey, procedures for requesting a file search, and inventory forms to identify structures;
- Colorado Division of Water Resources with regard to the administration of water rights;
- Colorado Department of Health, Water Quality Control Division, with regard to the discharge of pollutants into the waters of the State;
- Colorado Department of Health, Air Pollution Control Division, with regard to the need for a fugitive dust permit;
- U.S. Bureau of Land Management or the U.S. Forest Service for proposed operations on federal lands;
- U.S. Army Corps of Engineers regarding a dredge and fill (404) permit; and
- The County Planning Department for the county or counties in which the proposed operation is located. (Section 34-32-109(6), C.R.S. 1984, as amended) requires a mining operator to be responsible for assuring that the mining operation and the post-mining land use comply with local land use regulations and any master plan for extraction adopted pursuant to Section 34-1-304.)

Permit Approval:

An applicant will not be issued a reclamation permit until notified by the Office that this application and the required performance and financial warranties have been approved. Alternatively, an automatic approval will occur where the Office fails to notify the applicant/operator that the application has been denied. This decision must be made one hundred twenty (120) calendar days from the date the application was submitted. However, the performance and financial warranties must be submitted and approved by the Office before the permit will be issued even if you receive an automatic approval. NO MINING OPERATIONS SHALL BEGIN UNTIL A PERMIT IS ISSUED (Rule 4.1(2)).

Notice Requirements:

Within ten (10) days after filing, mail or personally serve a copy of the notice described in Rule 1.6.2(1)(c) to all owners of record of surface rights to the affected land and all owners of record of lands that are within 200 feet of the boundary of the affected land (Rule 1.6.2(1)(d)(I) and (ii)). In addition, you must publish four consecutive times in a newspaper of general circulation, in the locality of the proposed mining operation, the notice described in Rule 1.6.5. A copy of a form which includes all required information for the notice has been attached for your use. You will need to provide the Office proof of notice prior to the decision date. Proof of notice may be by submitting return receipts of a certified mailing or by proof of personal service (Rules 1.4.1(4), 1.4.2(4)(c) and 1.6.2(1)(d)).

NOTE TO COMMENTORS/OBJECTORS:

It is likely there will be additions, changes, and deletions to this document prior to final decision by the Office. Therefore, if you have any comments or concerns you must contact the applicant or the Office prior to the decision date so that you will know what changes may have been made to the application document.

The Office is not allowed to consider comments, unless they are written, and received prior to the end of the public comment period. You should contact the applicant for the final date of the public comment period.

If you have questions about the Mined Land Reclamation Board and Office's review and decision or appeals process, you may contact the Office at (303) 866-3567.

Completion of Mining:

Upon completion of any phase of reclamation, you should consult Rule 3.1 for reclamation standards and 4.16 for details on how to request a reclamation responsibility release from the Board.

Exhibit D
Mining Plan
SR-11 Mine Permit Amendment
M-1977-451

Background

SR-11 was originally permitted for its uranium/vanadium reserves in 1977. In October 1990, the Cotter Corporation added 11.3 acres to the permit when it was converted to a 112 (the original permit only covered 2 acres). These two acres have since been fully reclaimed and Cotter is requesting they be released (see Exhibit C - Figure C1). Construction of the portal and waste dump was initiated in 2005 followed by the development of the main drift. Operations are currently suspended.

Mineralization on the C-SR-11 lease block occurs within the upper sandstone, or top rim portion, of the Salt Wash Member of the Jurassic Morrison Formation. On the property, ore bodies within this unit range between 150 to 500 feet in depth, ranging from 1 to 4.5 feet in thickness, and lay within a northeastern-southwest trending "belt". Mineralization occurs throughout the rock unit, but is mostly concentrated within the lower portions. The top rim is underlain by approximately 30 feet of mudstone. (For a full description of the area Geology, see Exhibit U - EPP.)

The uranium and vanadium bearing material will be sent to a mill to be separated into concentrates of U_3O_8 and V_2O_5.

Timeline

The area to be worked at any one time will not appreciably increase after the initial disturbance around the portal area. Small amounts of additional acreage may be involved as the waste dump grows or additional roads for ventholes and development drilling are needed. This land has been accounted for in the affected acreage.

Areas involved that may be classified as major disturbances include the waste dump and soil stockpile. Moderate disturbances include the area required for stabilization of the waste dump, and grading of the areas used for parking, structures, and storage equipment and other materials.

Once enough development is completed that stoping can commence, both stoping and further development will be conducted simultaneously.

Considering that the SR-11 property has not been fully explored, and that economic factors may affect the quantity of material mined from the underground workings, the timetables for the various phases are very rough estimates. The completion of the decline to the ore horizon is anticipated to be 6 to 12 months. Ongoing development and mining of ore is anticipated to be 8 + years. Due to the erratic nature of the Uravan Mineral Belt's ore deposits and past mining experience in this area, the life of this mine may be

extended. This extension will be determined, in part, as a result of further delineating ore reserves by surface drilling and underground longhole drilling from development headings.

Mine Access

The main portal is located on top of a slight incline in the northern portion of the permitted area. The portal is secured by a locked steel gate attached to steel sets.

Underground Operations

Entry to the central ore body will be provided by a conventional 9 ft. high x 11 ft. wide decline driven for 1,380 ft. at a 13% grade. The decline development will be done by conventional drill/blast techniques. Load/haul/dump equipment and trucks will be used for material removal. Ground support will be steel sets with back and side lagging installed as necessary. In the more competent rock, rock bolts with steel mats will be the more prevalent rock support system. When the decline bottoms out at the ore horizon, development drifting will continue in the general direction of the ventilation hole location, and then continue on into the ore body (see Exhibit C - Maps for location).

Once the mine development has progressed into the ore body, the ore will be mined using a modified room-and pillar system. The random room-and-pillar stoping method is similar to the one presently used in the Uravan Mineral Belt, i.e. split-shooting is used in conjunction with leaving waste pillars and ore pillars wherever necessary for roof support. This method of split-shooting involves the assessment of each face as the stopes advance by the mine geologist, engineer, mine foreman, or experienced lead-miner. Since the grades and thickness of the typical Salt Wash uranium-vanadium deposits are highly variable, they are usually unpredictable from one round to the next. A round is a complete mining cycle of drill-blast-muck-ground support, if needed-ready to drill again. A normal round advances a working face about 6 feet.

Typically, the thickness of the mineralized material is less than the height needed to advance the stope. As the stope face is being drilled, the blast holes are probed with a Geiger Counter in order to estimate the U_3O_8 grade. The uranium-vanadium mineralization is usually dark gray to black. The mineralization sometimes rolls, pinches or swells, or follows cross-beds within the sandstone. Therefore, the miner will also use drill cutting color as criteria to help guide blast hole direction and spacing. This irregular habit of the deposit can result in holes collared in mineralized material ending in waste, or, conversely, holes collared in waste may penetrate mineralized material much of their length.

Based on the results of the assessment of the blast holes drilled in the face, the drilled rounds may be loaded and shot in two or more stages. Depending on the location and thickness of the mineralized material in the face (there may be multiple mineralized layers), the miners will attempt to blast either only mineralized material or only waste rock. They will muck the blasted rock out as completely as possible, then shoot the

remaining rock and muck it cleanly. The amount of waste rock shot before or after the mineralized material results in typical stope heights of eight-to-nine feet.

To date the decline has reached 300 ft. and it is estimated that another 1100 ft. will be necessary to reach the ore body. It is estimated that this mine will be viable for up to 10 years.

Surface and Underground Mining Equipment

A representative list of the mining equipment to be used includes a skidsteer loader, a LHD (front end loader, 1 to 2 yd), 5 to10 ton underground mine truck (buggy) and jackleg drills.

Initially, explosives will be stored above ground, west of the portal. As mining progresses, explosives will be moved to underground storage areas that will move as mining progresses. Mining equipment and supplies will also be stored underground, and include, but are not limited to, roof bolts, mats, vent tubing, hoses, lubricants, air compressors, transformers, and ventilation fans. Equipment and supplies will then be moved as logistics require.

Table of Surface Disturbances

All sections below are located in T43N. R19W. NMPM, San Miguel County, Colorado.

Section	Quarter-Quarter	Disturbance	Acreage
17	SW ¼ NW ¼	Road	0.13
18	SE ¼ NE ¼	Road	0.15
18	SE ¼ NE ¼	Road	0.28
18	SE ¼ NE ¼	Surface Facilities, Portal and Dump	6.0
18	NE ¼ SE ¼	Surface Facilities, Portal and Dump	4.30
18	NE ¼ NE ¼	Venthole	0.25
			11.11

Surface Facilities (List)

a. Waste rock pile
b. Ore stockpile
c. Soil excavation and stockpile areas
d. Surface drainage control structures
e. Fuel and oil storage areas
f. Shop/dry and maintenance shops
g. Roads and associated pads
h. Utilities
i. Ventilations shafts

a. Waste Rock Pile

A sloped area of 5.34 acres will be used for the waste rock pile (see Exhibit C, Figure C4, labeled "waste rock dump"). The toe of the pile will be on a relatively flat, south-sloping bench underlain by thick colluvium and weathered mudstones and sandstones of the basal part of the Brushy Basin Member of the Morrison formation. The waste rock pile will be built out in order to accommodate the ore storage pad. Berms will be maintained along the edge of the pad.

Available topsoil and other material suitable for coverage during reclamation has been stripped from this area and stockpiled east of the waste pile. As stopes become mined-out, as much waste as possible will be gobbed in the mined-out stopes. In combination with gobbing, it is expected that the surface storage area will be sufficient for all future mining operations and the maximum expected size of the waste rock pile will be 5.34 acres.

Berms and ditches have been constructed around the entire perimeter of the waste rock pile. These were constructed in 2005 and have proven functional in diverting stormwater away from the waste pile area and into the retention pond located at the toe of the waste storage pile area (see Photo 1 in Appendix I - Photos).

A description of the Drainage Design Plan (Engineered Stormwater Management Plan) is presented in Appendix III.

b. Ore Stockpile

As mining progresses, the waste rock will be dumped over the edge of the existing pad, expanding the pad. Once ore is reached, it will be stockpiled on this pad pending shipment offsite (see Exhibit C – Mining Plan Maps). During active mining the ore will be piled up to a workable stockpile and hauled to the mill using a first in, first out system. Ore will be stored onsite for no more than 30 days after mining operations cease.

Design components (BMPs) will be employed to prevent cumulative collection and infiltration of potential constituents of concern into the substrata. These design components include a clay liner, limited contact time, and surface water controls (ditches and berms). (For a description of the ore pad liner, see Exhibit U - EPP).

Once the mine permit amendment is approved and the ore pad is constructed, all berms, ditches, and retention ponds will be constructed to divert water around the ore pile and handle a 100-year, 24-hour, storm event (see Appendix III - Drainage Design Plan).

A contractor will be used to haul the ore from the surface ore stockpile area to the mill. The ore haulage contractor will be responsible for a spill control plan.

c. Soil Excavation and Stockpile Areas

All available topsoil and other materials suitable for coverage during reclamation were stripped prior to the construction of the waste and ore stockpile areas, and are stored on the east side of the stockpile area. The soil material is also being used to construct the berms surrounding the entire area. Enough soil has been salvaged to cover all affected areas with approximately 3 to 8 inches of soil.

Stormwater is diverted around the soil stockpile via ditches and berms. In addition, some vegetation further protects the soil stockpile from erosion.

d. Surface Drainage Control Structures

Berms and ditches have been constructed around the entire perimeter of the waste rock, ore, and soil storage area to prevent stormwater runoff. All runoff from these stockpiles will by caught by the retention pond located at the base of the storage area.

For a detailed description of all stormwater diversion structures and maps, see Appendix III - Drainage Design Plan.

e. Fuel and Oil Storage Areas

There will be a 500-gallon diesel fuel tank brought onsite and located east of the portal (see Exhibit C, Figure C4 - Maps). A lined catchment basin will be constructed beneath the fuel tank for secondary containment.

No large quantities of oil will be stored onsite. During mining activity it may be necessary to store small quantities (5-gallon buckets) of antifreeze, motor oil, gear oil, hydraulic oil, rock drill oil, etc. This will be stored in the compressor shed directly above the portal. Used oil will be hauled offsite and disposed of properly.

f. Shop/Dry and Maintenance Shops

There will be two buildings on site. The first one, approximately 40 ft. x 80 ft. x18 ft., will house the shop, warehouse, change room and office. The other building, approximately 20 ft. x 30 ft. x 12 ft. will house the compressor and electrical generator.

A water storage tank is located on the hill behind the office, as well as a diesel tank, a compressor, a propane tank, and a generator set located east of the portal (see Exhibit C, Figure C4 - Maps).

All structures will be temporary.

g. Roads and Associated Pads

An access road was built to access the mine from County Road Q1, and the total surface disturbance for this road is 0.47 acres.

Other surface disturbances will include building a ramp from the portal elevation to the base of the waste rock pile.

Previously reclaimed drill roads will be used as much as possible to access the top of the venthole, although approximately 200 feet of new road will need to be constructed to complete access.

Roads and storage pads will be sprayed with magnesium chloride or water as needed to control fugitive dust. The magnesium chloride tank will not be stored onsite, but rather brought in as needed.

h. Utilities

Electrical power will be provided by a diesel-powered 100 KVA generator producing 480 volts for surface and underground. Additional generators will be brought in as needed as mining progresses.

There will be no overnight accommodations for employees. Bottled water will be brought in for drinking, and portable toilets and shower facilities will be provided for workers. Wastewater will be disposed of through an approved septic tank system and leach field.

Potable water will be hauled in by truck and distributed to the building through a CDPHE approved system.

i. Ventilation Shafts

During the driving of the decline and the development drift to the ventilation bore hole location, fresh air will be delivered by a surface fan to the working face via a ventilation tube.

Currently there is one ventilation shaft planned. This ventilation hole will require a casing and concrete pad (approximately 9 x 9 feet and 2-3 feet thick) to accommodate the fan. A water tank and pipe into the mine may also be located within the same 0.25 acres permitted for this venthole.

Radon levels will be monitored and records kept in accordance with MSHA regulations. In addition, the ventilation exhaust discharge will be monitored as

necessary to assure compliance with EPA standards regulating radon emissions from underground uranium mines.

Exhibit E
Reclamation Plan
SR-11 Mine Permit Amendment
M-1977-451

Cotter Corporation will restore the affected areas in accordance with DOE lease requirements. The land will be reclaimed for range and wildlife habitat to meet DOE's directives to return the land as closely as possible to the pre-mining land use.

The current land use is predominantly mining and grazing, as is the majority of the land in the vicinity of the mine site. The proposed post-mining land use for range and wildlife habitat should improve forage and habitat for both wildlife and stock.

Timeline

Due to the small area involved and the underground nature of the mine, constant use of the disturbed area is necessary, and reclamation cannot begin until all mining activity has ceased. Except for stockpiling and stabilization of topsoil (if applicable), the reclamation process will not begin while mining is in-progress. Once reclamation begins, it should be completed within 5 years. See the table below for estimated times for each phase of the reclamation process.

PHASE	TIME
Sealing of adits, shafts, ventholes, etc.	Within 12 months of finalizing mining operations
Removal of surface buildings	Same as above
Grading of waste dump and other affected lands	6 months
Preparation of seedbed, where applicable	2 months
Re-vegetation, where applicable	2-3 years

Northern Mining Area

The previously mined and reclaimed 2 acres associated with the Ike mine are fully reclaimed and Cotter is requesting their release.

Southern Mining Area

Surface disturbances in this area include:

A. Mine portal
B. Parking area
C. Mining support buildings
D. Haulage ramps and roads
E. Ventilation shafts
F. Berms and ponds
G. Waste rock pile
H. Ore stockpile

(For a list of acreages associated with surface disturbances see Exhibit D - Mining Plan)

It is estimated that there are enough reserves to continuously mine SR-11 for up to 10 years. Once reclamation begins, it should be completed within 5 years. The dirt work, including backfilling, grading, sealing portal and vents, and reseeding, will take approximately 6-12 months, whereas re-vegetation is expected to be complete after 2-3 years.

A. Mine portal

The portal will be backfilled with waste materials to a depth where competent rock is encountered (approximately 50-100 feet). It will then be graded to create final contours that blend with the surrounding topography. Soil material will be replaced, and the area will be pocked and seeded.

B. Parking area

The parking area was not stripped of soil but rather compacted; it will only need to be ripped and seeded.

C. Mining buildings

The office trailer, fuel tank, water tank, propane tank, and generator set will be hauled off site. The compressor shed will be dismantled and hauled offsite. Its foundation will be broken up and deposited into the portal prior to backfilling the portal. The soil will then be ripped and seeded.

D. Haulage ramps and roads

The access road will be scarified and seeded. Large rocks will be placed at the start of the road to discourage access.

The haulage ramps accessing the ore and waste stockpiles, as well as any roads built for access to the ventilation shafts, will similarly be ripped, soil will be distributed where needed based on availability, and the areas will be seeded.

Existing roads for public access (County Road Q4) will be left in serviceable condition.

E. Ventilation shafts

At the venthole, surface structures will be removed. The cement pad will be broken up and placed into the shaft. The shaft will then be plugged using either polyurethane foam with a thickness of 10 feet or concrete with a thickness of 3 feet, that is placed far enough down the hole so that a minimum of several feet of mine waste and one foot of soil cover can be placed on top of this plug. This

cover material will be slightly mounded so that after natural compaction, there will not be a depression remaining to collect surface water. This area will then be scarified and seeded.

F. Berms and ponds

Permanent stormwater runoff controls will remain in place after reclamation.

G. Waste rock pile

The upper edge of the waste pile will be graded into the existing hillside with the lower edge being graded to a slope reflecting the surrounding topography with maximum slopes no steeper than 3H:1V using a D-6 dozer or equivalent. Once the re-contouring is completed, the area will be covered with topsoil to the maximum depth possible (3 inches - 8 inches) using the soil salvaged from this area during construction. The south facing slope will then be pocked using a Cat 315 excavator, or equivalent, and seeded using the recommended seed mixture.

H. Ore stockpile

Ore will be removed prior to reclamation. The underlying waste rock pad will then be graded to obtain a slope no steeper than 3H:1V. This will then be covered with soil and seeded.

Topsoil

Topsoil has been stripped from the waste storage area and stockpiled east of it. It is anticipated that this stockpile will be sufficient for all reclamation efforts. In the case that more is needed, additional topsoil could be salvaged from the catchment pond at the base of the waste pile area.

Re-vegetation

The current DOE recommended seed mix will be used to reseed affected areas.
The following seed mixture was developed in consultation with the U.S Bureau of Land Management (BLM), and is generally approved for use within the Slick Rock, Naturita, Uravan and Gateway, Colorado areas. Seed selection criteria were based on climate and elevation ranges within these areas. Recognizing that surface and soil conditions, nutrients, and available moisture can vary within these areas, successful establishment of six or more of the twelve species is considered adequate. If the total number of species seeded is less than that specified below, the seeding rates for the individual species must be adjusted accordingly. Seed tags must be submitted to DOE for verification prior to the seeding application.

Current DOE Recommended Seed Mix

Scientific Name	Common Name	Lbs/acre
Pascopyrum smithii	Arriba western wheatgrass	4.0
Elymus trachycaulus ssp	Slender wheatgrass	2.0
Oryzopsis hymenoides	Poloma indian ricegrass	4.0
Bouteloua gracilis	Hachita blue grama	2.0
Hilaria jamesii (florets)	Galleta grass	2.0
Stipa comata	Needle and thread grass	1.0
Stipa viridula	Lodorm green needle grass	2.0
Linum lewisii	Lewis flax	1.0
Penstemon palmeri	Cedar palmer penstemon	0.5
Sphaeralcea coccinea or Sphaeralcea parvifolia	Scarlet or Parvifolia Globemallow	0.3
Atriplex canescens	Rincon fourwing saltbrush	3.0
Ceratoides lanata	Winterfat	1.0
	Total pounds per acre	22.8

*The rates above are based on broadcast seeding methods.

Seed shall be broadcast at the specified application rate and covered (except "pocked" surfaces) using a drag bar, chain link, or packer wheels. If seed is drilled, one-half (1/2) the broadcast rate will be used.

Timing for the placement of seed will be directly following placement of the soil cover, prior to the cover material forming a hard crust. Preferably this will be in either the spring or fall, but experience indicates that getting the seed on the soil cover material soon after placement of the soil cover material is more important than the time of year the seed is placed to the success of the seeding effort.

Re-vegetation efforts on the disturbed areas will be considered satisfactory when:

- Soil erosion resulting from the operation has been stabilized; and
- A vegetative cover at least equal to that present prior to the disturbance has been established.

Exhibit G
Water Information
SR-11 Mine Permit Amendment
M-1977-451

There are no perennial rivers or streams within 2 miles of the existing SR-11 mine site. This includes the major receiving drainage, Summit Canyon, which is an intermittent stream tributary of the Dolores River, joining it approximately 8 miles downstream.

No significant groundwater was encountered during exploration drilling. Mining will take place within the upper sand unit of the Salt Wash Member of the Morrison Formation. This target sand is not known to be an aquifer. (See Exhibit U - EPP for full discussion of the water issues at SR-11 as well as the drill hole data).

If isolated perched water is encountered during development or mining activities, it will be diverted to an underground storage sump.

Effect on Surface or Groundwater Systems

The proposed mining and reclamation program will have no detectable effect upon the prevailing hydrologic balance of the affected land or the surrounding surface and groundwater systems. See Exhibit U - EPP for a full discussion of water issues at the SR -11 Mine.

Project Water Requirements

Domestic Use	6,000 gallons/month
Development	10,000 gallons/month
Mining	10,000 gallons/month
Reclamation	None anticipated

Exhibit H
Wildlife Information
SR-11 Mine Permit Amendment
M-1977-451

The Colorado Parks and Wildlife (CPW) has found that the impact on wildlife in the proposed mining operation, SR-11, will be moderate. Any future impact will be largely due to increased human activity and a minimal amount of vegetation removal.

Wildlife species inhabiting the general area include mule deer, bighorn sheep, coyotes, bobcats, cottontail rabbits, raptors, jackrabbits, and prairie dogs, as well as 10 different species of bats and other small birds and mammals. While the Thompsons Big Eared Bat is considered a species of special concern, there are no known threatened or endangered species in the area.

Seasonal use of land includes limited elk and deer use throughout the year, as well as limited bighorn sheep use at all times of year.

The recommendations made by CPW, such as improving current roads instead of building new ones and controlling weeds, will be followed as closely as possible.

For the full report from the CPW, see the following.

COLORADO PARKS & WILDLIFE

2300 S. Townsend Avenue • Montrose, Colorado 81401
Phone: 970 252-6000 • FAX: 970 252-6053
wildlife.state.co.us • parks.state.co.us

June 18, 2012,

Karen Fischer
O'Connor Design Group
2350 G Road
Grand Junction, CO 81505

Re: SR-11 Mine, Cotter Corporation

Dear Ms. Fischer

Thank you for the opportunity to comment on the proposed SR-11 Mine in San Miguel County.

The Colorado Parks and Wildlife (CPW) has reviewed the location of the proposed mine. The area receives limited deer and elk use throughout the year, as well as limited desert bighorn sheep use. Summit Canyon near the mine site receives heavy bighorn sheep use at all times of the year. Impacts to these animals should be minimal.

There are approximately 10 different species of bats that inhabit the area. One species in particular, the Thompsons Big Eared Bat is considered a species of special concern in Colorado. Active mines have been shown to have little to no impact on bats due to continuous human activity in and around active mines. However, inactive mines are often used by bats as either winter roost sites or summer breeding areas. Many of these inactive mines have "bat gates" on them, allowing bats access and denying human disturbance. If bat gates are encountered on any mine shafts, the CPW strongly suggests contacting our field personnel to determine the time of year bats inhabit the area.

There are several existing roads in the area, and the CPW recommends improving existing roads and using those to access the mine sites versus creating new roads. This would help to minimize habitat fragmentation as well as disturbance to existing wildlife.

With the increased human activity at the SR-11 Mine, the spread and control of noxious weeds becomes a concern for wildlife. Invasive plants endanger the ecosystem by disturbing natural processes and jeopardizing the survival of native plants and the wildlife that depends on them. Colorado law requires that invasive noxious weeds are managed and controlled through standard weed maintenance and controls. We recommend that Cotter Corporation continually control noxious weeds near the mine site on any and all roads used.

The Dolores River contains three BLM-designated Sensitive Species of fish that are also of great concern to CPW: bluehead sucker, flannelmouth sucker, and roundtail chub. These species are declining and are sensitive to any additional water depletions or changes in water quality in the Dolores River Basin. If any water is necessary for mining operations, or if any discharge of water from the mine is encountered, please contact the BLM and the CPW to discuss how to manage your operations to provide adequate protection for these species.

Thank you again for the opportunity to comment on the proposed SR-11 Mine. If necessary please contact the BLM and the CPW to recommend suitable off-site habitat enhancement projects to mitigate for direct and indirect losses of big game severe winter range habitat. Our field personnel are available to assist you with designing these projects and selecting a location with the highest potential for success.

If you have further questions please contact myself or District Wildlife Manager Tony Bonacquista at (970) 864-7109.

Sincerely

Renzo DelPiccolo
Area Wildlife Manager
970.252.6010

cc: Tony Bonacquista-DWM, Tom Spezze-Southwest Region Manger

Exhibit I
Soils Information
SR-11 Mine Permit Amendment
M-1977-451

The major soil types found in the region of the SR-11 Mine as identified by the United States Department of Agriculture Web Soil Survey (USDA WSS) are:

1. 26- Borolls-Rock outcrop complex, 40 to 90 percent slopes
2. 45- Gladel-Bond-Rock outcrop complex, 1 to 50 percent slopes
3. 46- Gladel-Bond-Rock outcrop, cool, 3 to 25 percent slopes
4. 60- Monogram loam, 1 to 8 percent slopes
5. 61- Monticello-Witt loams, 1 to 3 percent slopes
6. 73- Paradox fine sandy loam, 1 to 4 percent slopes
7. 75- Pinion-Bowdish-Progresso loams, cool 1 to 12 percent slopes
8. 83- Pulpit-Bond, cool complex, 1 to 6 percent slopes
9. 87- Rock outcrop
10. 88- Rock outcrop-Orthents complex, 40 to 90 percent slopes.

The predominant soil types in the affected surface area are 75 and 88. All of the surface disturbance will occur in soil type 75.

<u>75- Pinion-Bowdish-Progresso loams, cool 1 to 12 percent slopes</u>

This map unit is on mesa tops and ridges. The native vegetation is mainly pinyon pine, Utah juniper, grasses and shrubs. Elevation is 6,800 to 7,400 ft. The average annual precipitation is 13 to 15 inches, the average annual air temperature is 45° - 47° F, and the average frost free period is 90 - 120 days.

This unit is 35% Pinion loam, 30% Bowdish loam, and 20% Progresso loam. The Pinion and Bowdish soils are under pinion-juniper, and the Progresso soil is under grasses and sagebrush. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10% rock outcrop, and 5% soils that are similar to this Pinion soil but have greater than 35% rock fragments in the control section. Also included are small areas of Monogram soils.

The Pinion soil is shallow and well-drained. It formed in residuum derived dominantly from interbedded sandstone and shale. Typically, the surface layer is brown loam five inches thick. The underlying material is pinkish white loam to a depth of sixteen inches. Hard sandstone is at a depth of sixteen inches. In some areas, the surface layer is gravelly loam.

Permeability of the Pinion soil is moderate. Available water capacity is very low. Effective rooting depth is ten to twenty inches. Runoff is moderate, and the hazard of water erosion is high.

The Bowdish soil is moderately deep and well-drained. It formed in residuum derived dominantly from interbedded sandstone and shale. Typically, the surface layer is reddish brown loam five inches thick. The upper part of the subsoil is reddish brown loam seven inches thick. The lower part is pinkish white gravelly loam eleven inches thick. Hard sandstone is at 23 inches. In some areas, the surface layer is fine sandy loam or sandy loam.

Permeability of the Bowdish soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is moderate and the hazard of water erosion is high.

The Progresso soil is moderately deep and well-drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is reddish brown loam seven inches thick. The subsoil is reddish brown clay loam seventeen inches thick. The subsoil is white sandy loam twelve inches thick. Hard sandstone is at a depth of 36 inches. In some areas, the surface layer is fine sandy loam.

Permeability of the Progresso soil is moderately slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is moderate and the hazard of water erosion is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Pinion and Bowdish soils is pinyon pine and Utah juniper with an understory of Indian ricegrass, muttongrass, and Gambel oak. The average annual production of air-dry understory vegetation is about 300 to 800 lbs. per acre.

If the condition of the understory deteriorates, cheatgrass, annual mustards and prickly pear cactus increase. Where the understory is in poor condition, these plants are dominant. Grazing should be managed so the desirable balance of species is maintained in the plant community. Removal of pinyon and juniper increases the production of understory forage. Range seeding should be done in conjunction with removal of the overstory. This would improve the understory while providing firewood and posts.

These Pinion and Bowdish soils are capable of producing nine to fifteen cords per acre in a stand which will average five inches in diameter at a height of one foot. Young pinyon pines are desirable as Christmas trees. The main limiting soil feature is the very high hazard of erosion. Minimizing the risk of erosion is essential in harvesting timber. The very low available water capacity of the soil and the limited rooting depth can influence seedling survival.

The potential plant community on the Progresso soils is mainly muttongrass, western wheatgrass, Indian ricegrass, and Wyoming big sagebrush. The average annual production of air-dry vegetation is about 1,100 lbs. per acre.

If the condition of the range deteriorates, cheatgrass broom snakeweed, and scattered pinyon pine and Utah juniper increases. Where the range is in poor condition, these plants are dominant. Grazing should be managed so the desirable balance of species is maintained in the plant community.

The management practices suitable for use on this unit are proper grazing use and a planned grazing system. Brush management improves deteriorated areas of range that are producing more woody shrubs than were present in the potential plant community.

This unit provides wildlife habitat for mule deer, rabbits, hawks and eagles.

This map unit is in capability subclass VIs, non-irrigated. Pinion soils and Bowdish soils are in the Pinion-Juniper woodland site and Progresso soils are in the Loamy Foothills #284 range site.

87- Rock outcrop

Rock outcrop consists of exposed bedrock which generally occupies positions higher on north or east facing slopes. Areas are steep to very steep. The bedrock is one to thirty feet thick and one to twenty feet long

This unit provides wildlife habitat for mule deer, elk, cottontail rabbits and raptors.

The present vegetation in most areas is scattered Douglas fir and pinyon pine with an understory of Gambel oak, Utah serviceberry, western wheatgrass, prairie junegrass, Indian ricegrass, and elk sedge.

This map unit is in capability subclass VIIe, non-irrigated. No site assigned.

88- Rock outcrop-Orthents complex, 40 to 90 percent slopes

This map unit is on side slopes of canyons and mesas. Areas are irregular in shape and are 40 to 2,000 acres in size. The native vegetation is mainly Pinyon Pine and Douglas fir trees with an understory of Gambel oak, Utah serviceberry, western wheatgrass, prarie junegrass, Indian ricegrass, and elk sedge. Elevation is 6,600 to 9,200 ft. The average annual precipitation is fifteen to twenty-two inches, the average annual air temperature is 38° - 42° F, and the average frost-free period is 65-110 days.

This unit is 45% Borolls, and 40% Rock Outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

The Borolls are shallow to deep and well-drained. They formed in residuum and colluvium-derived dominantly from sandstone and shale. Borolls are highly variable. No single profile of Borolls is typical, but one commonly observed in the survey area has a surface layer of dark grayish brown stony loam about ten inches thick. The upper three inches of subsoil are brown stony sandy clay loam. The next twenty-two inches are brown very cobbly clay loam and clay. The lower part to a depth of sixty inches or more is brown very gravelly clay.

Permeability of the Borolls soil is moderate. Available water capacity is moderate. Effective rooting depth is sixty inches. Runoff is very rapid and the hazard of water erosion is very high.

Other Soils

For a description of all the secondary soil types in the affected area see the soil report and map below.

MAP LEGEND

- **Area of Interest (AOI)**
  - Area of Interest (AOI)
- **Soils**
  - Soil Map Units
- **Special Point Features**
  - Blowout
  - Borrow Pit
  - Clay Spot
  - Closed Depression
  - Gravel Pit
  - Gravelly Spot
  - Landfill
  - Lava Flow
  - Marsh or swamp
  - Mine or Quarry
  - Miscellaneous Water
  - Perennial Water
  - Rock Outcrop
  - Saline Spot
  - Sandy Spot
  - Severely Eroded Spot
  - Sinkhole
  - Slide or Slip
  - Sodic Spot
  - Spoil Area
  - Stony Spot
  - Very Stony Spot
  - Wet Spot
  - Other
- **Special Line Features**
  - Gully
  - Short Steep Slope
  - Other
- **Political Features**
  - Cities
  - PLSS Township and Range
  - PLSS Section
- **Water Features**
  - Streams and Canals
- **Transportation**
  - Rails
  - Interstate Highways
  - US Routes
  - Major Roads
  - Local Roads

MAP INFORMATION

Map Scale 1 27,700 if printed on A size (8 5" × 11") sheet

The soil surveys that comprise your AOI were mapped at 1 24 000

Please rely on the bar scale on each map sheet for accurate map measurements

Source of Map Natural Resources Conservation Service
Web Soil Survey URL http //websoilsurvey nrcs usda gov
Coordinate System UTM Zone 12N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below

Soil Survey Area San Miguel Area Colorado Parts of Dolores, Montrose, and San Miguel Counties
Survey Area Data Version 7, May 3, 2011

Date(s) aerial images were photographed 7/14/2006 8/28/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps As a result some minor shifting of map unit boundaries may be evident

Map Unit Legend

San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties (CO675)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
26	Borolls-Rock outcrop complex, 40 to 90 percent slopes	95 6	3.7%
45	Gladel-Bond-Rock outcrop complex, 1 to 50 percent slopes	109 4	4.3%
46	Gladel-Bond-Rock outcrop complex, cool, 3 to 25 percent slopes	619 4	24 3%
60	Monogram loam, 1 to 8 percent slopes	29 6	1 2%
61	Monticello-Witt loams, 1 to 3 percent slopes	98 9	3 9%
73	Paradox fine sandy loam, 1 to 4 percent slopes	55 1	2 2%
75	Pinon-Bowdish-Progresso loams, cool, 1 to 12 percent slopes	723 5	28.4%
83	Pulpit-Bond, cool complex, 1 to 6 percent slopes	62 1	2.4%
87	Rock outcrop	495 9	19.5%
88	Rock outcrop-Orthents complex, 40 to 90 percent slopes	258 8	10 2%
Totals for Area of Interest		**2,548.3**	**100.0%**

San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties

26—Borolls-Rock outcrop complex, 40 to 90 percent slopes

Map Unit Setting
Elevation: 6,600 to 9,200 feet
Mean annual precipitation: 15 to 22 inches
Mean annual air temperature: 38 to 42 degrees F
Frost-free period: 65 to 110 days
Map Unit Composition
Borolls and similar soils: 45 percent
Rock outcrop: 40 percent
Minor components: 15 percent
Description of Borolls
Setting
Landform: Mesas, canyons
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium and residuum from sandstone and shale
Properties and qualities
Slope: 40 to 90 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.8 inches)
Interpretive groups
Land capability (nonirrigated): 7e
Typical profile
0 to 10 inches: Very stony loam
10 to 13 inches: Very stony sandy clay loam
13 to 35 inches: Very cobbly clay
35 to 60 inches: Very stony clay
Description of Rock Outcrop
Setting
Landform: Canyons, mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone and shale
Properties and qualities
Slope: 40 to 90 percent
Custom Soil Resource Report
12
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.00 in/hr)
Interpretive groups
Land capability (nonirrigated): 8s
Typical profile

0 to 60 inches: Unweathered bedrock
Minor Components
Ceek
Percent of map unit: 10 percent
Specie
Percent of map unit: 5 percent

45—Gladel-Bond-Rock outcrop complex, 1 to 50 percent slopes

Map Unit Setting
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 110 to 130 days
Map Unit Composition
Gladel and similar soils: 35 percent
Rock outcrop: 30 percent
Bond and similar soils: 30 percent
Minor components: 5 percent
Description of Gladel
Setting
Landform: Structural benches, mesas, escarpments
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 1 to 50 percent
Depth to restrictive feature: 5 to 15 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Custom Soil Resource Report
13
Available water capacity: Very low (about 1.1 inches)
Interpretive groups
Land capability (nonirrigated): 7e
Typical profile
0 to 8 inches: Sandy loam
8 to 12 inches: Unweathered bedrock
Description of Bond
Setting
Landform: Escarpments, mesas, structural benches
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 1 to 50 percent
Depth to restrictive feature: 6 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 2.6 inches)
Interpretive groups
Land capability (nonirrigated): 7s
Typical profile
0 to 3 inches: Fine sandy loam
3 to 16 inches: Clay loam
16 to 20 inches: Unweathered bedrock
Description of Rock Outcrop
Setting
Landform: Escarpments, mesas, structural benches
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 1 to 50 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.00 in/hr)
Interpretive groups
Land capability (nonirrigated): 8s
Typical profile
0 to 60 inches: Unweathered bedrock
Custom Soil Resource Report
14
Minor Components
Paradox
Percent of map unit: 5 percent
Landform: Alluvial fans

46—Gladel-Bond-Rock outcrop complex, cool, 3 to 25 percent slopes

Map Unit Setting
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 45 to 47 degrees F
Frost-free period: 100 to 120 days
Map Unit Composition
Gladel, cool, and similar soils: 35 percent
Bond, cool, and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Description of Gladel, Cool
Setting
Landform: Ridges, mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 3 to 25 percent
Depth to restrictive feature: 5 to 15 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 1.1 inches)
Interpretive groups
Land capability (nonirrigated): 6e
Typical profile
0 to 8 inches: Sandy loam
8 to 12 inches: Unweathered bedrock
Custom Soil Resource Report
15
Description of Bond, Cool
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 3 to 25 percent
Depth to restrictive feature: 6 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 2.6 inches)
Interpretive groups
Land capability (nonirrigated): 7s
Typical profile
0 to 3 inches: Fine sandy loam
3 to 16 inches: Clay loam
16 to 20 inches: Unweathered bedrock
Description of Rock Outcrop
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 3 to 25 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.00 in/hr)
Interpretive groups
Land capability (nonirrigated): 8s
Typical profile
0 to 60 inches: Unweathered bedrock
Minor Components
Monticello
Percent of map unit: 5 percent
Pinon, cool

Percent of map unit: 5 percent
Custom Soil Resource Report
16

60—Monogram loam, 1 to 8 percent slopes

Map Unit Setting
Elevation: 6,800 to 7,300 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 45 to 47 degrees F
Frost-free period: 90 to 120 days
Map Unit Composition
Monogram and similar soils: 85 percent
Minor components: 15 percent
Description of Monogram
Setting
Landform: Mesas, structural benches
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits
Properties and qualities
Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 70 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: High (about 10.1 inches)
Interpretive groups
Land capability (nonirrigated): 4e
Ecological site: Loamy Foothills (R034XY284CO)
Typical profile
0 to 3 inches: Loam
3 to 14 inches: Loam
14 to 28 inches: Loam
28 to 60 inches: Sandy clay loam
Minor Components
Evanston
Percent of map unit: 5 percent
Custom Soil Resource Report
17
Progresso
Percent of map unit: 5 percent
Ackmen
Percent of map unit: 5 percent

61—Monticello-Witt loams, 1 to 3 percent slopes

Map Unit Setting
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 45 to 47 degrees F
Frost-free period: 100 to 120 days
Map Unit Composition

Monticello and similar soils: 60 percent
Witt and similar soils: 30 percent
Minor components: 10 percent
Description of Monticello
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sandstone
Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 9.0 inches)
Interpretive groups
Land capability (nonirrigated): 3c
Ecological site: Loamy Foothills (R036XY284CO)
Typical profile
0 to 10 inches: Loam
10 to 30 inches: Loam
30 to 74 inches: Loam
Custom Soil Resource Report
18
Description of Witt
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sandstone, reworked by water
Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 45 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 11.2 inches)
Interpretive groups
Land capability (nonirrigated): 6c
Ecological site: Loamy Foothills (R036XY284CO)
Typical profile
0 to 9 inches: Loam
9 to 31 inches: Clay loam
31 to 60 inches: Loam
Minor Components

Pulpit
Percent of map unit: 5 percent
Bowdish, cool
Percent of map unit: 5 percent

73—Paradox fine sandy loam, 1 to 4 percent slopes

Map Unit Setting
Elevation: 4,900 to 6,500 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 47 to 49 degrees F
Frost-free period: 120 to 140 days
Map Unit Composition
Paradox and similar soils: 85 percent
Minor components: 15 percent
Custom Soil Resource Report
19
Description of Paradox
Setting
Landform: Valley floors, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone
Properties and qualities
Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.2 inches)
Interpretive groups
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 6e
Ecological site: Semidesert Sandy Loam (R035XY326CO)
Typical profile
0 to 5 inches: Fine sandy loam
5 to 19 inches: Fine sandy loam
19 to 60 inches: Loam
Minor Components
Ustic torriorthents
Percent of map unit: 10 percent
Landform: Drainageways
Gypsiorthids
Percent of map unit: 3 percent
Landform: Knobs
Begay
Percent of map unit: 2 percent
Landform: Knobs

75—Pinon-Bowdish-Progresso loams, cool, 1 to 12 percent slopes

Map Unit Setting
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 13 to 15 inches

Mean annual air temperature: 45 to 47 degrees F
Custom Soil Resource Report
20
Frost-free period: 90 to 120 days
Map Unit Composition
Pinon, cool, and similar soils: 35 percent
Bowdish, cool, and similar soils: 30 percent
Progresso, cool, and similar soils: 20 percent
Minor components: 15 percent
Description of Pinon, Cool
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from interbedded sandstone and shale
Properties and qualities
Slope: 1 to 12 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.0 inches)
Interpretive groups
Land capability (nonirrigated): 7s
Typical profile
0 to 5 inches: Loam
5 to 16 inches: Gravelly loam
16 to 20 inches: Unweathered bedrock
Description of Bowdish, Cool
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from interbedded sandstone and shale
Properties and qualities
Slope: 1 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Custom Soil Resource Report
21
Available water capacity: Low (about 3.0 inches)
Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 5 inches: Loam
5 to 12 inches: Loam
12 to 23 inches: Gravelly loam
23 to 27 inches: Weathered bedrock
Description of Progresso, Cool
Setting
Landform: Mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone
Properties and qualities
Slope: 1 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.3 inches)
Interpretive groups
Land capability (nonirrigated): 6c
Ecological site: Loamy Foothills (R034XY284CO)
Typical profile
0 to 7 inches: Loam
7 to 14 inches: Clay loam
14 to 24 inches: Clay loam
24 to 36 inches: Sandy loam
36 to 40 inches: Unweathered bedrock
Minor Components
Rock outcrop
Percent of map unit: 10 percent
Ustochreptic calciorthids
Percent of map unit: 5 percent

83—Pulpit-Bond, cool complex, 1 to 6 percent slopes

Map Unit Setting
Elevation: 6,800 to 7,400 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 45 to 47 degrees F
Frost-free period: 100 to 120 days
Map Unit Composition
Pulpit and similar soils: 50 percent
Bond, cool, and similar soils: 30 percent
Minor components: 20 percent
Description of Pulpit
Setting
Landform: Mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sandstone
Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.6 inches)
Interpretive groups
Land capability (nonirrigated): 4e
Ecological site: Loamy Foothills (R036XY284CO)
Typical profile
0 to 8 inches: Loam
8 to 20 inches: Clay loam
20 to 25 inches: Loam
25 to 29 inches: Unweathered bedrock
Description of Bond, Cool
Setting
Landform: Mesas
Custom Soil Resource Report
23
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 1 to 6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Very low (about 2.6 inches)
Interpretive groups
Land capability (nonirrigated): 7s
Typical profile
0 to 3 inches: Fine sandy loam
3 to 16 inches: Sandy clay loam
16 to 20 inches: Unweathered bedrock
Minor Components
Gladel, cool
Percent of map unit: 10 percent
Monticello
Percent of map unit: 10 percent

87—Rock outcrop

Map Unit Setting
Elevation: 4,700 to 10,000 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 40 to 49 degrees F

Frost-free period: 65 to 140 days
Map Unit Composition
Rock outcrop: 90 percent
Minor components: 10 percent
Description of Rock Outcrop
Setting
Landform: Canyons, mesas
Down-slope shape: Linear
Custom Soil Resource Report
24
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 40 to 120 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.00 in/hr)
Interpretive groups
Land capability (nonirrigated): 8s
Typical profile
0 to 60 inches: Unweathered bedrock
Minor Components
Orthents
Percent of map unit: 10 percent
Landform: Draws

88—Rock outcrop-Orthents complex, 40 to 90 percent slopes

Map Unit Setting
Elevation: 4,700 to 9,200 feet
Mean annual precipitation: 10 to 19 inches
Mean annual air temperature: 43 to 49 degrees F
Frost-free period: 70 to 140 days
Map Unit Composition
Rock outcrop: 50 percent
Orthents and similar soils: 45 percent
Minor components: 5 percent
Description of Rock Outcrop
Setting
Landform: Canyons, mesas, structural benches
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone
Properties and qualities
Slope: 40 to 90 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.00 in/hr)
Interpretive groups
Land capability (nonirrigated): 8s
Typical profile
0 to 60 inches: Unweathered bedrock
Custom Soil Resource Report
25
Description of Orthents
Setting
Landform: Structural benches, canyons, mesas
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Colluvium and residuum from sandstone and shale
Properties and qualities
Slope: 40 to 90 percent
Depth to restrictive feature: 10 to 80 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.2 inches)
Interpretive groups
Land capability (nonirrigated): 8e
Typical profile
0 to 1 inches: Stony loam
1 to 14 inches: Gravelly loam
14 to 24 inches: Very cobbly loam
24 to 60 inches: Very cobbly loam
Minor Components
Pinon
Percent of map unit: 5 percent
Custom Soil Resource Report
26

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
SECTION II-E TECHNICAL GUIDE

ECOLOGICAL SITE DESCRIPTION
PINYON JUNIPER WOODLAND
_____, COLORADO FIELD OFFICE

Ecological Site Name: Shallow & Sandy Loam PJ #112

Ecological Site Number: GF - 034BY112CO

Date: 03/01/96

Author's initials: JWK/LJJ/JEM

PART A: PHYSICAL CHARACTERISTICS

1. Soil Narrative:

a. The surface soils of this site are dominated by fine sandy loams and sandy loams. Some surface textures may include rock fragments. The subsoils range from sandy loams to clay loams. The subsoils may also include rock fragments. Depth is shallow to moderately deep, but in some cases is deep. When soils are deep they are usually stone, gravel or cobble filled which causes the soil to act more like a shallow soil because of water holding capacity. Hazard of water erosion ranges from low to very high. Runoff ranges from slow to very rapid.

b. List of Soil Series or Taxonomic Units included in this site:

SSA	Soil Series	Surface Texture	Slope Range	Phase
675 MU45	Gladel	sandy loam	1-50	none
677 MU30	Frontier	sandy loam	3-20	none
677 MUX31	Lonti	cobbly sandy clay loam	10-50	none
680 MU65	Bowdish	fine sandy loam	3-12	none
680 MU119	Ildefonso	ex gravelly sandy loam	6-30	none
682 MU37B	Unnamed37B	very gravelly sandy loam	6-25	none
682 MU12	Sadgran	fine sandy loam	12-35	none
682 MU23	Mellenthin	fine sandy loam	3-12	none
682 MU65	Progresso	fine sandy loam	3-12	none
682 MU14	Roygorge	sandy loam	5-35	none
682 MU26	Berto	gravelly sandy loam	5-15	none
682 MU26	Roygorge	sandy loam	5-15	none
682 MU62	Mellenthin	fine sandy loam	12-35	none
682 MU62	Seis	ex. gravelly sandy loam	12-35	none

2. Landscape Factors:

a. Physiography:

1. Elevation: Low: 5500 ft High: 7600 ft

2. Percent Slope: Low: 3% High: 35%

3. This site occurs on nearly level to strongly sloping mesa summits, benches, sideslopes, footslopes, toeslopes, and knoll tops

3. Climate Factors:

a. Hard freeze free period: *

b. Freeze-free period: *

c. Frost-free period: 110 to 140 days (32°F)

d. Mean annual precipitation: 10 to 14 (inches)

e. Mean annual air temperature: 43 to 50 (°F)

f. Mean annual soil temperature: 47 to 54 (°F)

g. Moisture and temperature distribution:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PPT HIGH	*											
MEAN	0.9	0.8	1.0	1.0	0.7	0.6	0.7	1.5	1.6	1.6	1.2	0.9
LOW	*											
PERCENT	7	5	7	7	7	5	12	11	11	11	8	7
TEMP HIGH	*											
MEAN	23	27	34	42	51	61	66	64	57	46	34	25
LOW	*											

*Reliable data is not available at this time.
Climatic data is taken from the following NWS Climate Station(s):

4. Vegetation Factors - Climax Plant Community:

a. Site Description Narrative:

The appearance of this site when the tree canopy cover is low (about 0 to 15%), is a shrub-grass community. Plants common to the site with this tree canopy cover include bottlebrush squirreltail, western wheatgrass, galleta, Indian ricegrass, Sandberg bluegrass, black sagebrush, and Wyoming big sagebrush with only an occasional Utah juniper

tree. When the tree canopy cover increases to 15 to 35 percent, the same plants are present, however, the amounts of grasses and shrubs have decreased. Utah juniper trees have increased and are larger in size.
As tree canopy cover increases to greater than 35 percent, the trees become dominant, and are larger in size. The tree size and density is directly correlated to precipitation. There is almost no understory production at all. A few invader species such as mustards, Russian thistle, and kochia become established on the site at this level of tree canopy cover.

b. Percent Cover:

Ground cover and structure:

tree canopy 0-15%	% Canopy cover vertical view	Average height (ft)	% Basal area cover
Grasses, Grasslikes	15	1.0	10
Forbs	1	.5	1
Shrubs	2	3.5	1
Trees	10	5.0	<1

tree canopy 15 — 35%	% Canopy cover vertical view	Average height (ft)	% Basal area cover
Grasses, Grasslikes	8	1.0	5
Forbs	1	.5	1
Shrubs	1	2.0	1
Trees	20	8.0	3

tree canopy 35+%	% Canopy cover vertical view	Average height (ft)	% Basal area cover
Grasses, Grasslikes	1	1.0	1
Forbs	1	.5	1
Shrubs	1	1.5	1
Trees	40	12.0	5

c. Vascular plant community composition and production (by air-dry weight):

1. Herbaceous

a. Grasses and grasslike

Plant Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 35%	35 + %
PASM	WESTERN WHEATGRASS	1 - 5	1 - 5	0 - 1
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	5 - 10	3 - 5	0 - 1
HIJA	GALLETA	0 - 10	0 - 10	0 - 1
ORHY	INDIAN RICEGRASS	5 - 10	5 - 10	0 - 1
POSE	SANDBERG BLUEGRASS	0 - 7	0 - 5	0 - 1
STCO4	NEEDLEANDTHREAD	0 - 5	0 - 5	0 - 1
KOMA	PRAIRIE JUNEGRASS	1 - 5	1 - 5	0 - 1
PSSPS	*BLUEBUNCH WHEATGRASS	0 - 3	0 - 3	0 - 1
BOGR2	BLUE GRAMA	0 - 3	0 - 3	0 - 1

b. Forbs

Plant Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 35%	35 + %
LODI	FERNLEEF BISCUITROOT	0 - 1	0 - 1	0 - 1
STCO6	HEARTLEAF TWISTFLOWER	0 - 1	0 - 1	0 - 1
PHLO2	LONGLEAF PHLOX	0 - 1	0 - 1	0 - 1
CANU3	SEGO LILY	0 - 1	0 - 1	0 - 1
ALAC4	TAPERTIP ONION	0 - 1	0 - 1	0 - 1
ASMO7	WOOLY LOCOWEED	0 - 1	0 - 1	0 - 1
PECR5	CRANDALL PENSTEMON	0 - 1	0 - 1	0 - 1
CRFE3	FENDLER CRYPTANTHA	0 - 1	0 - 1	0 - 1
SEFLF	THREADLEAF GROUNDSEL	0 - 1	0 - 1	0 - 1
PEPU7	ROCK GOLDENROD	0 - 1	0 - 1	0 - 1

2. Woody

a. Shrubs & Halfshrubs

Plant Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 35%	35 + %
KRLA2	WINTERFAT	0 - 3	0 - 1	0 - 1
ARNO4	BLACK SAGEBRUSH	5 - 10	1 - 3	0 - 1
GUSA2	BROOM SNAKEWEED	0 - 1	0 - 1	0 - 1
AMUT	UTAH SERVICEBERRY	1 - 5	0 - 2	0 - 1
ARTRW8	WYOMING BIG SAGEBRUSH	10 - 20	5 - 10	0 - 1
STACA	STEMLESS GOLDENWEED	0 - 3	0 - 1	0 - 1
OPPO	PLAINS PRICKLYPEAR	1 - 5	1 - 5	0 - 1
CEMO2	TRUE MOUNTAIN MAHOGANY	1 - 3	0 - 2	0 - 1
ATCA2	FOURWING SALTBRUSH	0 - 3	0 - 1	0 - 1
EPVI	GREEN EPHEDRA	0 - 3	0 - 1	0 - 1
CEIN5	LITTLELEAF MOUNTAIN MAHOGONY	0 - 1	0 - 1	0 - 1

* Occurs almost exclusively north of the Colorado River.

b. Trees

Plant Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 35%	35 + %
PIED	PINYON PINE	1 - 5	5 - 10	10 - 15
JUOS	UTAH JUNIPER	1 - 15	30 - 55	85 - 95

5. **Total Annual Production:**

a. In average years, the approximate total annual production (air-dry) is as follows:

Tree canopy cover	0 to 15%	350 to 600 lbs/acre
Tree canopy cover	15 to 35%	300 to 525 lbs/acre
Tree canopy cover	35% +	100 to 450 lbs/acre

b. Growth Curves for this site.

Identity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
foothill zone	0	0	0	11	37	42	0	0	4	6	0	0
foothill PJ	0	0	0	0	50	45	1	2	2	0	0	0

6. **Guide to Initial Stocking Rates:**

To determine a beginning carrying capacity on this site, use 50 percent of the preferred species, 35 percent of the desirable species and 5 percent of the undesirable species by weight can be counted as usable forage for the target animal(s) using the area. Use 900 pounds airdry weight as the amount of forage required to support one animal unit month (AUM). From the available forage, calculate the number of acres needed to support each AU for the length of the planned grazing season.

7. **Wildlife Species List:**

mule deer	Rocky Mountain elk	bobcat
coyote	mountain lion	rock squirrel
cottontail	white-tailed jackrabbit	gopher snake
bushy tailed rat	side blotched lizard	sagebrush lizard
golden eagle	red-tailed hawk	chukar
sage grouse	ash-throated flycatcher	mourning dove
pinyon jay	western blue bird	plain titmouse
rock wren	hairy woodpecker	

8. **Site Degradation:**

If this site is overgrazed by cattle, palatable grasses will decline in relative abundance while shrubs and forbs increase. If overgrazing continues, trees will become dominant and eventually will exclude almost all other plants. In the extreme

case, the only plants on the site will be Utah juniper, a few pinyon pine, with a very small amount of invaders such as mustard, kochia, and Russian thistle.

9. Typical Locations:

a. 660' S & 2560' W of NE corner Sec 19, T12S, R103W, Mesa Co
b. 2620' E & 2430' N of SW corner Sec 35, T12S, R104W, Mesa Co
c. 1800' E & 600' S of NE corner Sec 8, T14S, R99W, Mesa Co
d. 1500' E & 500' N of SW corner Sec 12, T49N, R18W, Mesa Co
e. 2000' N & 500' E of SW corner Sec 16, T49N, R18W, Mesa Co
f. 1200' N & 1200' E of SW corner Sec 17, T50N, R18W, Mesa Co
g. 1100' S & 1300' W of NE corner Sec 22, T12S, R104W, Mesa Co
h. 1350' E & 2250' S of NW corner Sec 31, T12S, R103W, Mesa Co

PART B MAJOR USES AND INTERPRETATIONS FOR:

1. Grazing:

This site can be of good grazing value for cattle and sheep when canopy cover is in the 0 to 15% range. When the site is dominated by trees, canopy cover greater that 35%, the site has very little if any grazing value. Over grazing of the site by any animals including big game will ultimately increase the proportion of tree production and reduce grass and forb production on the site. Even without grazing of any kind, trees will over time dominate the site unless fire or other thinnig methods are used. Due to the slow growth of trees on this site, the use of fire or other thinning methods needs to occur at 40 to 80 year intervals. At the extreme, the vegetation consists of Utah juniper and a few pinyon trees with almost no understory production. When this occurs, erosion becomes excessive.

2. Guide to Forage Palatability: 1/

PLANT SYMBOL	COMMON NAME	ANIMAL PREFERENCE C S H	E D P	G S S B B M
GRASSES AND GRASSLIKES				
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	D D D	D D D	D D D
PASM	WESTERN WHEATGRASS	P D P	D D D	U D D
HIJA	GALLETA	D D P	D U D	U U D
ORHY	INDIAN RICEGRASS	P P P	P D D	D P P
POSE	SANDBERG BLUEGRASS	D D D	P P P	P D D
PSSPS	BLUEBUNCH WHEATGRASS	P P P	P P P	P P P
BOGR2	BLUE GRAMA	U U U	U U U	N N N
STCO4	NEEDLEANDTHREAD	U U U	U U U	N N N
KOMA	PRAIRIE JUNEGRASS	D D D	D D D	N N N

FORBS				
LODI	FERNLEAF BISCUITROOT	D D U	P P P	U U U
STCO6	HEARTLEAF TWISTFLOWER	U D U	U D D	U U U
PHLO2	LONGLEAF PHLOX	U U U	U U U	U U U
CANU3	SEGO LILY	D P D	D D D	D D D
ALAC4	TAPERTIP ONION	P P U	D U U	U U U
ASMO7	WOOLY LOCOWEED	U U U	U U U	D D D
PECR5	CRANDALL PENSTEMON	U D U	U D D	D D D
CRFE3	FENDLER CRYPTANTHA	U U U	U D D	U D D
SEFLF	THREADLEAF GROUNDSEL	D D U	D D D	U D D
PEPU7	ROCK GOLDENROD	U U U	U U U	U U U
SHRUBS AND HALF SHRUBS				
ARNO4	BLACK SAGEBRUSH	D P D	P P P	P D D
GUSA2	BROOM SNAKEWEED	U U U	U U D	U U U
KRLA2	WINTERFAT	P P P	P P D	D D P
AMUT	UTAH SERVICEBERRY	D D U	D D U	D D D
ARTRW8	WYOMING BIG SAGEBRUSH	U P U	D P P	P D P
STACA	STEMLESS GOLDENWEED	U U U	U D U	U D D
OPPO	PLAINS PRICKLYPEAR	U U U	U U U	U U U
ATCA2	FOURWING SALTBRUSH	D D D	D D D	N N N
CEMO2	TRUE MOUNTAIN MAHOGANY	D P D	P P P	N N N
EPVI	GREEN EPHEDRA	U U U	U U U	U U U
CEIN5	LITTLELEAF MOUNTAIN MAHAGONY	D P U	D P P	D D P
TREES				
PIED	PINYON PINE	U U U	U U U	P P P
JUOS	UTAH JUNIPER	U U U	D D U	D P D

1/ Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutrient value, stage of growth and season of use.

Animal Class Symbols:			Animal Peference Symbols
C - Cows	S - Sheep	H - Horses	P - Preferred
E - Elk	D - Deer	P - Pronghorn	D - Desirable
G _ Upland	S _ Songbirds	S _ Small	U - Undesirable
B _ Gamebirds	B	M _ Mammals	N - Not Determined

3. Major Poisonous Plants to Livestock:

PLANT NAME	LIVESTOCK AFFECTED	TYPE OF POISONING	SEASON SERIOUS
Utah juniper	cattle	may be poisoned if large quantities of berries are eaten	only when more desirable forage is not available

4. Wood Products:

This site does not produce trees for lumber. There is a potential for use of the trees as fence posts and fire wood when the site is producing enough trees to be in the 15+% canopy class However, the greatest fence post and firewood production is naturally in areas where the canopy class exceeds 30% since there are more trees and they are much larger. There may be a few trees in this canopy class that may be used as Christmas trees. When the canopy class is 0 to 15%, there are very few trees that are large enough for fence posts, however, there will be a few trees that are of value for firewood and some of which can be used for Christmas trees.

5. Wildlife Values:

Harvesting, chaining, and burning of juniper trees and shrubs can improve big game forage. Some blocks of juniper should be left undisturbed to provide cover for wildlife species. In large areas where sagebrush and other shrubs become dominant, manipulation that restores a mix of grasses and forbs is beneficial for many wildlife species. Areas of sagebrush along drainages and south and west facing slopes should be left undisturbed to provide critical winter forage for mule deer. Water developments for livestock and wildlife can be a useful management tool on this site.

6. Hydrological Interpretations:

Most of the Soils in this site are grouped into the "C or D" hydrologic groups, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979 Handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to NRCS National Engineering Handbook, Section 4, and Peak Flows in Colorado Handbook for more information.

7. Recreation and Natural Beauty:

The site provides cover for wildlife and may be a good area for hunting big game during the fall season. Other recreational persuits, such as hiking and sight seeing, are available on this site.

8. Endangered Plants and Animals:

Bald eagles can be found on this site during the winter season. The spineless hedgehog cactus grows on this site. It was observed under juniper trees where the canopy cover of the trees was approximately 20%. It was not observed where the trees had been chained or where the canopy cover was very high.

9. Scientific Names of Plants Listed According to NRCS "PLANTS" Database:

Plant Symbol	Common Name	Scientific Name
GRASSES AND GRASSLIKES		
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	ELYMUS ELYMOIDES
PASM	WESTERN WHEATGRASS	PASCOPYRUM SMITHII
HIJA	GALLETA	HILARIA JAMESII
ORHY	INDIAN RICEGRASS	ORYZOPSIS HYMENOIDES
POSE	SANDBERG BLUEGRASS	POA SECUNDA
PSSPS	BLUEBUNCH WHEATGRASS	PSEUDOROEGNERIA SPICATA ssp. SPICATA
BOGR2	BLUE GRAMA	BOUTELOUA GRACILIS
STCO4	NEEDLEANDTHREAD	STIPA COMATA
KOMA	PRAIRIE JUNEGRASS	KOELERIA MACRANTHA
FORBS		
LODI	FERNLEAF BISCUITROOT	LOMATIUM DISSECTUM
STCO6	HEARTLEAF TWISTFLOWER	STREPTANTHUS CORDATUS
PHLO2	LONGLEAF PHLOX	PHLOX LONGIFOLIA
CANU3	SEGO LILY	CALOCHORTUS NUTTALLII
ALAC4	TAPERTIP ONION	ALLIUM ACUMINATUM
ASMO7	WOOLY LOCOWEED	ASTRAGALUS MOLLISSIMUS
PECR5	CRANDALL PENSTEMON	PENSTEMON CRANDALLII
CRFE3	FENDLER CRYPTANTHA	CRYPTANTHA FENDLERI
SEFLF	THREADLEAF GROUNDSEL	SENECIO DOUGLASII LONGILOBUS
PEPU7	ROCK GOLDENROD	PETRADORIA PUMILA
SHRUBS AND HALF SHRUBS		
KRLA2	WINTERFAT	KRASCHENINNIKOVIA LANATA
ARNO4	BLACK SAGEBRUSH	ARTEMISIA NOVA
GUSA2	BROOM SNAKEWEED	GUTIERREZIA SAROTHRAE
AMUT	UTAH SERVICEBERRY	AMELANCHIER UTAHENSIS
ARTRW8	WYOMING BIG SAGEBRUSH	ARTEMISIA TRIDENTATTA SSP. WYOMINGENSIS
STACA	STEMLESS GOLDENWEED	STENOTUS ACAULIS ssp. ACAULIS
OPPO	PLAINS PRICKLYPEAR	OPUNTIA POLYACANTHA
ATCA2	FOURWING SALTBUSH	ATRIPLEX CANESCENS
EPVI	GREEN EPHEDRA	EPHEDRA VIRIDIS
CEIN5	LITTLELEAF MOUNTAIN MAHAGONY	CERCOCARPUS INTRICATUS

Plant Symbol	Common Name	Scientific Name
TREES		
PIED	PINYON PINE	PINUS EDULIS
JUOS	UTAH JUNIPER	JUNIPERUS OSTEOSPERMA

10. Counties in which this Ecological Site is Located:

Mesa
Garfield
Ric Blanco
Montrose
Ouray
San Miquel
Moffat
Eagle

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
SECTION II-E TECHNICAL GUIDE

ECOLOGICAL SITE DESCRIPTION
PINYON JUNIPER WOODLAND
_____, COLORADO FIELD OFFICE

Ecological Site Name: Semidesert Juniper Loams #113

Ecological Site Number: GF - 034BY113CO
GF - 035XY113CO

Date: 03/01/96

Author's initials: JWK/LJJ/JEM

PART A: PHYSICAL CHARACTERISTICS

1. Soil Narrative:

   a. Surface soils are gravelly sandy loams and fine sandy loams, with stone in the soil profile and on the surface. Soils are mostly shallow or moderately deep. All are high in calcium.

   b. List of Soil Series or Taxonomic Units included in this site:

SSA	Soil Series	Surface Texture	Slope Range	Phase
677 MU14	Montwel fmly	sandy clay loam	3-20	none
677 MU14	Farb fmly	sandy loam	3-20	none
677 MUX14	Farb fmly	sandy loam	12-60	none
680 MU84A	Unnamed	fine sandy loam	6-35	none
682 MU78	Pennell	gravelly sandy clay loam	3-12	none

2. Landscape Factors:

   a. Physiography:

      1. Elevation: Low: 5200 ft High: 6600 ft

      2. Percent Slope: Low: 5% High: 35%, some over 35%

      3. Topography is gently sloping to steep slopes on mesa tops, sideslopes, and footslopes.

3. Climate Factors:

a. Hard freeze free period:*

b. Freeze-free period:*

c. Frost-free period: 110 to 150 days (32°F)

d. Mean annual precipitation: ~~8 to 10~~ 9 – 13 (inches) ~~10-13~~

e. Mean annual air temperature: 46 to 50 (°F)

f. Mean annual soil temperature: 50 to 54 (°F)

g. Moisture and temperature distribution:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PPT HIGH	*											
MEAN	0.5	0.6	0.8	0.8	0.7	0.4	0.5	1.1	1.3	1.0	0.8	0.8
LOW	*											
PERCENT	5	7	8	8	7	5	5	12	14	10	8	8
TEMP HIGH	*											
MEAN	27	34	43	52	61	71	78	75	66	54	41	30
LOW	*											

*Reliable data is not available at this time.
Climatic data is taken from the following NWS Climate Station(s):

4. Vegetation Factors - Climax Plant Community:

a. Site Description Narrative:

The appearance of this site is a widely scattered stand of Utah juniper with a sparce understory of grass, forbs, and shrubs.

b. Percent Cover:

1. Ground cover and structure:

tree canopy 0-15%	% Canopy cover vertical view	Average height (ft)	% Basal area cover
Grasses, Grasslikes	20	1.0	8
Forbs	2	0.5	1
Shrubs	10	1.5	4
Trees	5	8.0	2

c. Vascular plant community composition and production (by air-dry weight):

1. Herbaceous

a. Grasses and grasslike

Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 30%	30%+
BOGR2	BLUE GRAMA	0 - 5	1 - 5	0 - 3
PSSPS	*BLUEBUNCH WHEATGRASS	0 - 3	0 - 3	0 - 1
KOMA	PRAIRIE JUNEGRASS	0 - 5	0 - 3	0 - 1
STCO4	NEEDLEANDTHREAD	10 - 15		
ORHY	INDIAN RICEGRASS	10 - 15		
HIJA	GALLETA	10 - 20		
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	5 - 10		
ARLO3	RED THREEAWN	0 - 5		

b. Forbs

Symbol	Common Name	Productivity by Canopy Class 0 - 15%
SPCO	SCARLET GLOBEMALLOW	0 - 3
HAAC	STEMLESS GOLDENWEED	0 - 2
STPI	DESERT PRINCESPLUME	0 - 1
SEDOL	THREADLEAF GROUNDSEL	0 - 1
PHHO	HOODS PHLOX	0 - 3
CHDO	DUSTY MAIDEN	0 - 1
ANRO2	ROSE PUSSYTOES	0 - 3
MASP4	IRONPLANT GOLDENWEED	0 - 2
HEVI4	HAIRY GOLDASTER	0 - 3
MIMU	COLORADO FOUR O'CLOCK	0 - 2

2. Woody

a. Shrubs & Halfshrubs

Symbol	Common Name	Productivity by Canopy Class 0 - 15%	15 - 30%	30%+
KRLA2	WINTERFAT	1 - 5	1 - 3	0 - 2
ATCO	SHADSCALE	5 - 10		
CHHU2	LOW RABBITBRUSH	0 - 5		
GUSA2	BROOM SNAKEWEED	0 - 5		
EPVI	GREEN EPHEDRIA	0 - 4		
ARARN	BLACK SAGEBRUSH	0 - 5		
CEIN5	LITTLELEAF MOUNTAIN MAHOGONY	0 - 1		
YUGL	SMALL SOAPWEED	0 - 2		
EREF	SPREADING BUCHWHEAT	0 - 4		
ARTRW8	WYOMING BIG SAGEBRUSH	5 - 10		
OPPO	PLAINS PRICKLYPEAR	0 - 5		
CHDE2	DWARF RABBITBRUSH	0 - 4		

* This grass occurs almost exclusively North of the Colorado River.

b. Trees

Symbol	Common Name	Productivity by Canopy Class 0 - 15%
JUOS	UTAH JUNIPER	5 - 20
PIED	PINYON PINE	0 - 5

5. Total Annual Production:

a. In an average year, the approximate total annual production (air-dry) is as follows:

Tree Canopy Cover 0 - 15% 200 to 300 lbs/acre

b. Growth Curves for this site.

Identity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Semidesert zone	0	0	20	30	30	10	0	0	5	5	0	0

6. Guide to Initial Stocking Rates:

To determine a beginning carrying capacity on this site, use 50 percent of the preferred species, 35 percent of the desirable species and 5 percent of the undesirable species by weight can be counted as usable forage for the target animal(s) using the area. Use 900 pounds airdry weight as the amount of forage required to support one animal unit month (AUM). From the available forage, calculate the number of acres needed to support each AU for the length of the planned grazing season.

7. Wildlife Species List:

mule deer	Rocky Mountain elk	bobcat
coyote	mountain lion	rock squirrel
cottontail	white-tailed praire dog	gopher snake
bushy tailed rat	white-tailed jackrabbit	sagebrush lizard
golden eagle	side blotched lizard	chukar
bald eagle	red-tailed hawk	mourning dove
pinyon jay	ash-throated flycatcher	plain titmouse
rock wren	western blue bird	

8. Site Degradation:

When this site is overgrazed by cattle, the grasses and forbs will decrease in pounds per acre. Shrubs and Utah juniper trees may increase slightly. Total annual production decreases greatly. If the site is overgrazed by sheep, the grasses, forbs, and shrubs will decrease in pounds per acre. Fires in this area are generally small since production is so low. There is not enough fuel to carry a fire in normal years. Plants that can become a part of the site when in a low condition class include clasping pepperweed, kochia, Russian thistle, cheatgrass and other annuals.

9. Typical Locations:

a. 1200' W & 1300' S of NE corner Sec 8 T13S, R99W Mesa county
b. E & N side of Sleeping Ute Mtn., non-sectionalized T33 1/2N, R18W, Montezuma county

PART B MAJOR USES AND INTERPRETATIONS FOR:

1. Grazing:

The site is only of low value for grazing due to low production. It is best used during the late fall, winter, and early spring months when snow still covers higher elevation grazing lands. Care needs to be exercised to prevent site deterioration when grazing. Many areas are short of livestock water so these places must be used during times when snow can provide the animals with a source of water.

2. Guide to Forage Palatability: 1/

PLANT SYMBOL	COMMON NAME	ANIMAL PREFERENCE: CSH	EDP	GBB	SBM	SMM
GRASSES AND GRASSLIKES						
BOGR2	BLUE GRAMA	P P P	D D D	D	P	D
PSSPS	BLUEBUNCH WHEATGRASS	P P P	P D D	P	D	P
KOMA	PRAIRIE JUNEGRASS	P P P	D D D	D	D	D
STCO4	NEEDLEANDTHREAD	P D P	P D D	U	D	D
ORHY	INDIAN RICEGRASS	P P P	P D D	D	P	P
HIJA	GALLETA	D D P	D U U	U	U	D
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	D D D	D D D	D	D	D
ARLO3	RED THREEAWN	U U U	U U U	U	D	D
FORBS						
SPCO	SCARLET GLOBEMALLOW	D D D	P P P	D	P	P
HAAC	STEMLESS GOLDENWEED	U U U	U D U	U	D	D
STPI	DESERT PRINCESPLUME	U U U	U U U	U	U	U
SEDOL	THREADLEAF GROUNDSEL	D D U	D D D	U	D	D
PHHO	HOODS PHLOX	U U U	U U U	U	U	U
CHDO	DUSTY MAIDEN	U U U	U U U	U	U	U
ANRO2	ROSE PUSSYTOES	U P U	U D U	U	U	U
MASP4	IRONPLANT GOLDENWEED	U U U	U D D	U	U	U
HEVI4	HAIRY GOLDASTER	U D U	U D D	D	D	D
MIMU	COLORADO FOUR O'CLOCK	U D U	U D D	D	D	D
SHRUBS AND HALF SHRUBS						
KRLA2	WINTERFAT	P P P	P P D	D	D	P
ATCO	SHADSCALE	D P U	D P P	D	D	P
CHHU2	LOW RABBITBRUSH	U D U	U D N	D	D	D
GUSA2	BROOM SNAKEWEED	U U U	U U D	U	U	U
EPVI	GREEN EPHEDRIA	U U U	U U U	U	U	U
ARARN	BLACK SAGEBRUSH	D P D	P P P	P	D	D
YUGL	SMALL SOAPWEED	D D D	D D D	P	P	P

EREF	SPREADING BUCHWHEAT	U U U	U U U	U U U
ARTRW8	WYOMING BIG SAGEBRUSH	U P U	D P P	P D P
OPPO	PLAINS PRICKLYPEAR	U U U	U U D	D D P
CHDE2	DWARF RABBITBRUSH	U D D	D D D	U D D
CEIN5	LITTLELEAF MOUNTAIN MAHAGONY	D P U	D P P	D D P

TREES

JUOS	UTAH JUNIPER	U U U	D D U	D P D
PIED	PINYON PINE	U U U	U U U	P P P

1/ Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutrient value, stage of growth and season of use.

Animal Class Symbols:

C - Cows	S - Sheep	H - Horses
E - Elk	D - Deer	P - Pronghorn
G - Upland Gamebirds	S - Songbirds	S - Small Mammals

Animal Preference Symbols

P - Preferred
D - Desirable
U - Undesirable
N - Not Determined

3. Major Poisonous Plants to Livestock:

PLANT NAME	LIVESTOCK AFFECTED	TYPE OF POISONING	SEASON SERIOUS
desert princesplume	horses sheep cattle	animals walk into objects, blind staggers, hoofs grow abnormally, hair falls out	early spring when other feed is scarce
broom snakeweed	cattle sheep	poisoning not common but will occur on overgrazed rangeland, causes abortions and weak underweight calves	when forage is scarce
threadleaf groundsel	cattle horses	degeneration of the liver, depression, weakness, diarrhea, darkly stained urine	early spring when forage is short or on over grazed ranges
Utah juniper	cattle	poisoned if large quantaties of berries are eaten	when animals lack desirable forage

4. Wood Products:

The site does produce scattered Utah juniper trees. The trees grow very slowly and scrubby however, so are of very low value for fence posts and firewood.

5. Wildlife Values:

Due to the low productivity of this site, very little manipulation of the vegetation is recommended. If areas of juniper or sagebrush are dense enough to create monoculture situations then some form of chemical or mechanical brush management should be considered. If adequate fuel is available prescribed burning may be considered. In areas where sagebrush and other shrubs have become dominant, manipulation that restores a mix of grasses and forbs is beneficial for many wildlife species. Areas of sagebrush along drainages and south and west facing slopes should be left undisturbed to provide critical winter forage for mule deer. Water developments for livestock and wildlife can be a useful management tool on this site.

6. Hydrological Interpretations:

Soils in this site are mostly grouped into the "B & C" hydrologic groups, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979 Handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to NRCS National Engineering Handbook, Section 4, and Peak Flows in Colorado Handbook for more information.

7. Recreation and Natural Beauty:

The site occurs at lower elevations so is accessable for recreation nearly year round. It offers beauty in the spring with blooming forbs and hunting in the fall.

8. Endangered Plants and Animals:

Bald eagles can be found on this site during the winter season. The spineless hedgehog cactus occurs on this site.

9. Scientific Names of Plants Listed According to NRCS "PLANTS" Database:

Plant Symbol	Common Name	Scientific Name
GRASSES AND GRASSLIKES		
BOGR2	BLUE GRAMA	BOUTELOUA GRACILIS
PSSPS	BLUEBUNCH WHEATGRASS	PSEUDOROEGNERIA SPICTA ssp. SPICATA
KOMA	PRAIRIE JUNEGRASS	KOELERIA MACRANTHA
STCO4	NEEDLEANDTHREAD	STIPA COMATA
ORHY	INDIAN RICEGRASS	ORYZOPSIS HYMENOIDES
HIJA	GALLETA	HILARIA JAMESII
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	ELYMUS ELYMOIDES
ARLO3	RED THREEAWN	ARISTIDA LONGISETA

Plant Symbol	Common Name	Scientific Name
FORBS		
SPCO	SCARLET GLOBEMALLOW	SPHARALCEA COCCINEA
HAAC	STEMLESS GOLDENWEED	HAPLOPAPPUS ACAULIS
STPI	DESERT PRINCESPLUME	STANLEYA ALBESCENS
SEDOL	THREADLEAF GROUNDSEL	SENECIO DOUGLASII LONGILOBUS
PHHO	HOODS PHLOX	PHLOX HOODII
CHDO	DUSTY MAIDEN	CHAENACTIS DOUGLASII
ANRO2	ROSE PUSSYTOES	ANTENNARIA ROSEA
MASP4	IRONPLANT GOLDENWEED	MACHAERANTHERA SPINULOSA
HEVI4	HAIRY GOLDASTER	HETEROTHECA VILLOSA
MIMU	COLORADO FOUR O'CLOCK	MIRABILIS MULTIFLORA
SHRUBS AND HALF SHRUBS		
KRLA2	WINTERFAT	KRASCHENINNIKOVIA LANATA
CEIN5	LITTLELEAF MOUNTAIN MAHAGONY	CERCOCARPUS INTRICATUS
ATCO	SHADSCALE	ATRIPLEX CONFERTIFOLIA
CHHU2	LOW RABBITBRUSH	CHRYSOTHAMNUS HUMILIS
GUSA2	BROOM SNAKEWEED	GUTIERREZIA SAROTHRAE
EPVI	GREEN EPHEDRIA	EPHEDRA VIRIDIS
ARARN	BLACK SAGEBRUSH	ARTEMISIA ARBUSCULA NOVA
YUGL	SMALL SOAPWEED	YUCCA GLAUCA
CHDE2	DWARF RABBITBRUSH	CHRYSOTHAMNUS DEPRESSUS
EREF	SPREADING BUCHWHEAT	ERIOGONUM EFFUSUM
ARTRW8	WYONING BIG SAGEBRUSH	ARTEMISIA TRIDENTATA WYOMINGENSIS
OPPO	PLAINS PRICKLYPEAR	OPUNTIA POLYCANTHA
TREES		
JUOS	UTAH JUNIPER	JUNIPERUS OSTEOSPERMA
PIED	PINYON PINE	PINUS EDULIS

10. Counties in which this Ecological Site is Located:

Mesa
Garfield
Rio Blanco
Montrose
San Miquel
Moffat
Ouray
Eagle
Montezuma

USDA, Soil Conservation Service
Section II-E

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
_____, COLORADO FIELD OFFICE

SEMIDESERT LOAM #325
RANGE SITE DESCRIPTION
MLRA - 35
April 1981

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

This site occurs on gently sloping mesas, benches, alluvial fans, toe slopes and valley bottoms. Slopes range from 1 to 30 percent. Elevation ranges from 5000 to 6500 feet (1524 to 1982 meters).

2. Climatic Features

a. Annual precipitation ranges from 10 to 14 inches (25 to 36 centimeters). About 60 percent of the precipitation occurs between April through September which causes warm season plants to be part of the composition. Summer thundershowers are common in July and August. May and June are the driest months. Year-long temperatures average about 48°F (9°C).

b. Plant growth begins late March to early April. Cool season plants start a dormancy period during June. When late summer and fall rains occur, warm season plants accelerate growth and some regrowth occurs on cool season species. Shrub species continue growth through the growing season. The frost-free period varies from 110 to 135 days.

3. Native (potential) Vegetation

The aspect of this site is a mixed grass-shrub community. Grasses make up 50 to 60 percent, while forbs are 5 to 10 percent and shrubs 25 to 30 percent, air-dry weight.

Galleta, New Mexico needlegrass, blue grama, Indian ricegrass, and bottlebrush squirreltail are the major grasses. Forbs are a minor part of the plant community with scarlet globemallow and plains pricklypear most often present. Wyoming big sagebrush is the dominant shrub. Fourwing saltbush is abundant in certain areas.

#325 Semidesert Loam MLRA 35

a. Relative percentage of total plant community by weight (air-dry):

SYMBOL	COMMON NAME	SCIENTIFIC NAME	PERCENT	
Grasses and Grass-like Plants				
BOGR2	Blue grama	Bouteloua gracilis	5-10	
SIHY	Bottlebrush squirreltail	Sitanion hystrix	5-10	
ARFE4	Fendler threeawn	Aristida fendleriana	2-5	
HIJA	Galleta	Hilaria jamesii	15-20	
ORHY	Indian ricegrass	Oryzopsis hymenoides	5-10	
STNE2	New Mexico feathergrass	Stipa neomexicana	15-20	
SPCR	Sand dropseed	Sporobolus cryptandrus	2-5	
AGSM	Western wheatgrass	Agopyron smithii	2-5	
Forbs				
PECR2*	Crandall penstemon	Penstemon crandallii	0-2	Total
SEMU4	Variable senecio	Senecio mutabilis	0-2	Allowable
SPCO	Scarlet globemallow	Sphaeralcea coccinea	0-2	Not to
CANU3	Sego (mariposa) lily	Calochortus nuttallii	0-2	Exceed a
LUAR3	Silvery lupine	Lupinus argenteus	0-1	Total of
ASLE8	Specklepod locoweed	Astragalus lentiginosus	0-1	7 percent
ERFL	Trailing fleabane	Erigeron flagellaris	0-2	
Shrubs				
ARTRW*	Wyoming big sagebrush	Artemisia tridentata wyomingensis	10-15	
XASA*	Broom snakeweed	Xanthocephalum sarothrae	0-5	Total
CHVIV*	Stickyleaf low rabbitbrush	Chrysothamnus viscidiflorus viscidiflorus	0-2	Allowable Not to
ATCA2	Fourwing saltbush	Atriplex canescens	2-5	Exceed a
EPVI	Green ephedra	Ephedra viridis	0-2	Total of
OPPO	Plains pricklypear	Opuntia polyacantha	0-2	27 percent
PELI2	Toadflax penstemon	Penstemon linarioides	0-2	
CELA2*	Winterfat	Ceratoides lanata	0-2	

*Not listed in the National List of Plant Names.

b. If ecological retrogression is cattle-induced, blue grama, Galleta, stickyleaf low rabbitbrush, winterfat, Wyoming big sagebrush, and Fendler threeawn increase. Western wheatgrass, bottlebrush squirreltail, Indian ricegrass and New Mexico feathergrass would decrease with early spring grazing. Galleta would decrease with summer grazing. If retrogression is caused by sheep, desirable forbs and grasses decrease. Winterfat and Wyoming big sagebrush would decrease with winter and early spring grazing. Plant species most likely to invade the site are: cheatgrass, sixweeks fescue, annual sunflower, mustard, sticktight, Russian thistle and broom snakeweed.

c. The approximate vegetative basal density is 10 to 15 percent.[1/]

4. Annual Production

In excellent condition, the approximate total annual production (air-dry) is:

Favorable years	800 pounds per acre (1000 kg/ha)
Normal years	600 pounds per acre (672 kg/ha)
Unfavorable years	400 pounds per acre (448 kg/ha)

Of this production 25 to 30 percent will likely be unpalatable to grazing animals.

5. Soils

a. The soils in this site are moderately deep to deep and well drained. The soils formed in aeolian and alluvial materials derived mainly from sandstone. The surface layer is light brown to reddish brown loamy fine sand to loam, 3 to 10 inches (8 to 26 cm) thick. The subsoil is reddish brown to brown clay loam to fine sandy loam, 5 to 17 inches (13 to 43 cm) thick. The underlying layers are light reddish brown to light brown loam to sandy loam 20 to 48 inches (51 to 122 cm) thick. The soils are mildly to moderately alkaline and calcareous to the surface. Subsoils may have pebbles or gravels present. Permeability ranges from moderate to moderately rapid. Water holding capacity is generally moderate. The runoff potential is slow to medium. The erosion hazard is slight.

b. The major soils associated with this site are:

70 - Potts fine sandy loam
X70 - Potts - Hagerman loams
30 - Progresso fine sandy loam
43 - Begay loamy fine sand
40 - Neville - Paradox fine sandy loam

B. MAJOR USES AND INTERPRETATIONS

1. Grazing

This site provides fall, winter and spring forage for livestock. Big sagebrush, broom snakeweed and Douglas rabbitbrush may increase with excessive grazing use.

1/ Vegetation density = basal area, which is the area of ground surface covered by the stem or stems. Usually, this is measured one inch above the soil in contrast to the full spread of foliage.

2. Wildlife

The site provides habitat for a variety of wildlife at least part of the year. Species include: rabbits, eagles, hawks, owls, coyote, songbirds, small mammals and reptiles. Mule deer and elk use the area during winter and spring.

3. Watershed (Hydrologic Interpretation)

Soils in this site are grouped into "B" hydrologic group, except for Hagerman and Progresso soils which are "C", as outlined in the "Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979" handbook. Field investigations are needed to determine hydrological cover conditions and hydrologic curve numbers. The hydrologic curve number for group B soils are about 61 and group C is about 74, when the hydrologic conditions are good, as shown in "Peak Flows in Colorado" handbook.

Refer to SCS National Engineering Handbook, Section 4, to determine runoff quantities from the curves.

4. Recreation and Natural Beauty

This site has fair to poor aesthetic appeal and natural beauty. During exceptional rainfall years, a profusion of flowering plants appear.

5. Threatened and Endangered Plants and Animals

(At the present time none are identified).

6. Major Poisonous Plants to Livestock

Common Name	Scientific Name	Season Dangerous	Animal Affected
Silvery lupine	Lupinus argenteus	when other forage is scarce & if hay contains immature lupine pods	all livestock are occasionally poisoned. Sheep are the most affected.

Effects Upon Animals

Lupine seeds are toxic to sheep when 0.25 to 1.5 percent of the animals body weight is consumed in one feeding. The toxin is not cumulative and small amounts ingested over a period of time create no difficulties.

Most characteristic symptom is labored breathing. Animals may vary from depression and coma to extreme activity. Animals may butt

objects and other animals or may stand with lowered head pressing against a solid object. Death from respiratory paralysis follows a short period of convulsions.

Common Name	Scientific Name	Season Dangerous	Animal Affected
broom snakeweed	Xanthocephalum sarothrae	when forage is scarce	Cattle and Sheep

Effects Upon Animals

Poisoning is not common but will occur on overgrazed ranges. Causes abortion in cattle or may produce weak underweight calves. Losses are sporadic and will occur when 10 to 20 percent of the body weight of green material is consumed in 1/2 to 20 weeks.

Common Name	Scientific Name	Season Dangerous	Animal Affected
Variable senecio	Senecio mutabilis	when palatable forage is scarce	mostly cattle and horses - some sheep

-- Effects Upon Animals

Symptoms are progressive and effects are cumulative. Weakness, diarrhea and darkly stained urine may be observed. Animals die quickly or wander aimlessly. Adequate feed or supplement during the spring will reduce the hazard.

7. Location of Typical Examples of this Eco Site

5 miles east of Bedrock, mile post 19, Highway 90.

8. Guide to Initial Stocking Rates 2/

Condition Class	Percent Climax Vegetation	ha/AUM	AUM/ha	AUM/ac	ac/AUM
excellent	76-100	.43-.32	2.3-3.2	.17-.15	5.7-7.1
good	51-75	.31-.21	3.2-5.0	.14-.09	7.1-12.5
fair	26-50	.20-.11	5.0-10.0	.08-.05	12.5-25.0
poor	0-25	.10-	10-20.0	.04-	25.0-50.0

9. Field Offices

Norwood

2/ Stocking rates are based on an average growing season. Based on 1200 pounds (540 kg) of forage (air-dry) per animal unit month. (This figure takes into account the vegetation that disappears through trampling, small herbivores, etc., which amounts to approximately 7.9 pounds (3.6 kg) per day [illegible])

10. Vegetation Palatability by Animal Class 3/

a. Grasses and Grass-like Plants

Common Name	Scientific Name	Animal Classes 4/ C	S	H	E	D	A	G B	S B	S M
		Animal Preference 5/								
blue grama	Bouteloua gracilis	H	H	H	M	M	M	M	H	M
bottlebrush squirreltail	Sitanion hystrix	M	M	M	M	M	M	M	M	M
Fendler threeawn	Aristida fendleriana	L	L	M	L	L	L	L	M	M
galleta	Hilaria jamesii	M	M	H	M	L	L	L	L	M
Indian ricegrass	Oryzopsis hymenoides	H	H	H	H	M	M	M	H	H
New Mexico feathergrass	Stipa neomexicana	M	L	M	L	L	L	L	L	M
sand dropseed	Sporobolus crytandrus	M	M	M	L	L	L	H	H	H
western wheatgrass	Agropyron smithii	H	M	H	M	M	M	L	M	M

b. Forbs

Crandall penstemon	Penstemon crandallii	L	M	L	L	M	M	M	M	M
variable senecio	Senecio mutabilis	L	M	L	L	M	M	L	L	L
scarlet globemallow	Sphaeralcea coccinea	M	M	M	H	H	H	M	H	H
sego (mariposa) lily	Calochortus nuttallii	M	H	M	M	M	M	M	M	M
silvery lupine	Lupinus argenteus	L	M	L	H	H	M	H	H	H
specklepod locoweed	Astragalus lentiginous	L	L	L	L	L	L	M	M	M
trailing fleabane	Erigeron flagellaris	L	M	L	L	M	M	L	L	L

c. Shrubs

Wyoming big sagebrush	Artemisia tridentata wyomingensis	L	H	L	M	H	H	H	M	H
broom snakeweed	Xanthocephalum sarothrae	L	L	L	L	L	M	L	L	L
stickyleaf low rabbitbrush	Chrysothamnus viscidiflorus	L	M	L	L	M	M	M	M	M
fourwing saltbush	Atriplex canescens	H	H	M	H	H	H	H	H	H
green ephedra	Ephedra viridis	L	L	L	L	L	L	L	L	L
plains prickly pear	Opuntia polyacantha	L	L	L	L	L	M	M	M	H
toadflax penstemon	Penstemon linarioides	L	M	L	M	M	M	M	M	M
winterfat	Ceratoides lanata	H	H	H	H	H	M	M	M	H

3/ Vegetative palatability per animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutritive value, stage of growth and season of use.

4/ Animal class symbols:
C - Cow
S - Sheep
H - Horses
E - Elk
D - Deer
A - Antelope
G B - Upland Gamebirds
S B - Songbirds
S M - Small Mammal

5/ Animal preference symbols:
H - High
M - Medium
L - Low

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Section II-E

RANGE SITE DESCRIPTION
----------, COLORADO FIELD OFFICE

Site Name: Semidesert Sandy Loam #326
Site Number: 034AY326CO
034BY326CO
MLRA: 34A & 34B
Date Approved: December 1988

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

This site occurs on gently sloping to moderately steep uplands and fans. Slopes range from 3 to 25 percent. Elevation for the site ranges from 5,000 to 6,100 feet above sea level. This site occurs on all aspects.

2. Climatic Features

a. The climate of this site is arid, with precipitation averaging between 9 and 11 inches annually. About 20% of this precipitation comes in the form of snow. About 60% of the precipitation comes during the growing season (mid March through mid October.) The average monthly precipitation (in inches) is as follows:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.6	0.8	0.9	0.6	0.7	0.5	0.6	1.3	1.5	1.1	0.7	0.8

b. The growing season for the native plants averages about 145 days. This usually starts about May 10 and goes until October 10. Cool season grasses start spring growth using moisture stored in the soil from snow melt and spring rains. Optimum growth continues until the soil profile is depleted of useable soil moisture. This usually occurs about mid June. A second growth period generally occurs between August and October corresponding with full precipitation peak.

c. The average annual air temperature is about 44°F. Summer temperatures can reach 95°F, and winter temperatures can dip to well below 0°F. Temperatures fall below the freezing mark much of the time in November through March. The average frost-free period occurs from June through September, lasting about 115 days.

d. Winter and spring winds cause this site to be even more droughty than the precipitation alone indicates. A fair amount of the snow sublimates eliminating its effectiveness.

3. Potential Plant Community (Climax Vegetation)

a. The plant community is about 55 percent grass, 10 percent forbs, and 35 percent shrubs (air-dry weight of current season's growth). Dominant grasses are needleandthread, streambank wheatgrass,salina wildrye, Indian ricegrass, galleta and blue grama.Less abundant grasses include Sandberg bluegrass, and red threeawn, sand dropseed and bottlebrush squirreltail.

Forbs present in the plant community include scarlet globemallow, wormwood, Hoods phlox, yellow cryptantha and littleleaf pussytoes. Shrubs and half-shrubs that occur on this site are Wyoming big sagebrush, small low rabbitbrush, broom snakeweed, fourwing saltbush, shadscale, and winterfat.

b. Relative percentage of total plant community by weight. air-dry:

PLANT SYMBOL	COMMON NAME	SCIENTIFIC NAME 1/	COMP. PERCENT
GRASS AND GRASSLIKE PLANTS			
STCO4	NEEDLEANDTHREAD	STIPA COMATA	10 - 25
ORHY	INDIAN RICEGRASS	ORYZOPSIS HYMENOIDES	5 - 10
AGDAR	STREAMBANK WHEATGRASS	AGROPYRON DASYSTACHYUM RIPARIUM	5 - 10
ELSA	SALINA WILDRYE	ELYMUS SALINA	5 - 10
BOGR2	BLUE GRAMA	BOUTELOUA GRACILIS	5 - 10
HIJA	GALLETA	HILARIA JAMESII	5 - 10
SIHY	BOTTLEBRUSH SQUIRRELTAIL	SITANION HYSTRIX	3 - 5
SPCR	SAND DROPSEED	SPOROBOLUS CRYPTANDRUS	2 - 5
POSA12	SANDBERG BLUEGRASS	POA SANDBERGII	2 - 5
ARLO3	RED THREEAWN	ARISTIDA LONGISETA	2 - 5
VUOC	SIXWEEKS FESCUE	VULPIA OCTOFLORA	0 - 1

PLANT SYMBOL ******	COMMON NAME **********	SCIENTIFIC NAME 1/ **********	COMP. PERCENT *******
FORBS			
SPCO	SCARLET GLOBEMALLOW	SHPAERALCEA COCCINEA	1 - 3
ARDR4	WORMWOOD	ARTEMISIA DRACUNCULUS	1 - 3
CRFL5	YELLOW CRYPTANTHA	CRYPTANTHA FLAVA	T - 2
PHHO	HOODS PHLOX	PHLOX HOODII	T - 2
ANMI1	LITTLELEAF PUSSYTOES	ANTENNARIA MICROPHYLA	T - 2
LYGR	LARGEFLOWER SKELETON PLANT	LYGODESMIA GRANDIFLORA	T - 2
PLPAG	WOOLY INDIAN WHEAT	PLANTAGO PATAGONICA	T - 2
	OTHER FORBS		T - 3
SHRUBS AND HALF-SHRUBS			
ARTRW*	WYOMING BIG SAGEBRUSH	ARTEMISIA TRIDENTATA WYOMINGENSIS	10 - 15
ATCA2	FOURWING SALTBUSH	ATRIPLEX CANESCENS	5 - 7
ATCO	SHADSCALE	ATRIPLEX CONFERTIFOLIA	5 - 7
CHVIP2*	SMALL LOW RABBITBRUSH	CHRYSOTHAMNUS VISCIDIFLORUS PUMILUS	2 - 5
EULA5	WINTERFAT	EUROTIA LANATA	2 - 5
GUSA2	BROOM SNAKEWEED	GUTIERREZIA SAROTHRAE	1 - 2
OPPO	PLAINS PRICKLYPEAR	OPUNTIA POLYCANTHA	1 - 2

1/ Names according to National List of Scientific Plant Names SCS-TP-159.
*Symbol not listed in National List of Scientific Plants.

c. If retrogression is sheep induced, palatable species such as Indian ricegrass, Salina wildrye, Wyoming big sagebrush, fourwing saltbush, shadscale, and winterfat will decrease. Less palatable species will increase in relative amounts. As retrogression continues, production declines due to lower plant vigor. Plants that invade the site include cheatgrass, mustard, Russian thistle, kochia, and scattered Utah juniper.

d. Basal area (the area of ground surface covered by perennial vegetation measured at ground level) is approximately 15 percent when near the potential plant community.

e. Annual Production

If the range is in excellent condition, the approximate total annual production (air-dry) is:

Favorable years	1000	pounds/AC
Normal years	800	pounds/AC
Unfavorable years	500	pounds/AC

Of this production, 30 percent will likely be unpalatable or out of reach to grazing animals.

4. **Wildlife**

Wildlife species associated with this site include desert cottontail, white-tailed jackrabbit, coyote, badger, American kestrel, turkey vulture, red-tailed hawk, ferruginous hawk, golden eagle, bald eagle and various song birds such as morning dove, sage sparrow, sage thrasher, and Bewick's wren. There is seasonal use by mule deer and pronghorn. During severe winters these areas are critical winter range for mule deer.

5. **Soils**

a. Soils on this site are deep and well to excessively drained. They formed in alluvium or eolian sands derived chiefly from sandstone. The surface is a light brown loamy sand 4 to 6 inches thick. The subsoil to a depth of 60 inches is a sandy loam, loamy sand, or sand in texture. Permeability of these soils is moderately rapid to rapid with low water holding capacity, slow runoff, and slight water erosion hazard. Rooting depth is 60 inches or more. The soils are not excessively salty. Wind erosion hazard is high.

b. Major soils which are associated with site:

SSA	MU	Soil Series	Surface Texture	Slope Range	Phase
680	93,90	Tricera	loamy fine sand	3-15	-
680	X122	Tricera	loamy sand	5-25	-
680	93,90	Wallson	fine sandy loam	3-15	-
675	70B	Barx	fine sandy loam	1-3	-
675	70C	Barx	fine sandy loam	3-6	-
675	70D	Barx	fine sandy loam	6-12	-
675	X70	Barx	fine sandy loam	3-12	-
675	43	Begay	fine sandy loam	1-6	-
675	40D	Mivida	fine sandy loam	5-15	-
675	40	Paradox	fine sandy loam	1-4	-

6. **Location of Typical Example of the Site**

a. NE 1/4 or SW 1/4, Section 12, T3N, R104W, approximately 0.4 miles SW of Dinosaur Public School.

B. MAJOR USES AND INTERPRETATIONS FOR

1. Grazing

a. This site provides good fall, winter and spring grazing for sheep. Heavy spring use every year will cause a decline in plant vigor and cause range condition to go down. Fields should be rested from spring grazing a minimum of once every four years to prevent this range condition decline.

b. Guide to Initial Stocking Rates

(1) Stocking rates given below are based on continuous use for the entire growing season, and are intended only as an initial guide. Forage needs are calculated on the basis of 900 lbs of air-dry forage per animal unit month (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., 35 percent of the palatable forage produced is considered available for grazing by large herbivores.

Condition Class	Percent Climax Vegetation	Ac/AUM	AUM/Ac
Excellent	76-100	4.1- 5.5	.24
Good	51-75	5.5- 8.2	.17
Fair	26-50	8.2-16.6	.10
Poor	0-25	16.6-20+	.05

(2) Adjustment to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game herbivores, inaccessibility, dormant season use, etc., stocking rate adjustments will be required.

(3) Depending on climatic condition, in some years palatable annuals such as cheatgrass may produce large amounts of forage that is available for only a short time. Intensive grazing programs on these areas followed by deferment is an excellent management tool to utilize these annuals but still allow recovery of the perennial vegetation normally associated with this site.

c. Vegetation Palatability by Animal Class 2/

COMMON NAME	ANIMAL PREFERENCE C S H	E D P	G/B S/B S/M
GRASS AND GRASSLIKE PLANTS			
BLUE GRAMA	H H H	M M M	M H M
BOTTLEBRUSH SQUIRRELTAIL	M M M	M M M	M M M
GALLETA	M M H	M L L	L L L
INDIAN RICEGRASS	H H H	H M M	M H H
NEEDLEANDTHREAD	H M H	H M M	L M M
RED THREEAWN	L L L	L L L	M M M
SALINA WILDRYE	H H H	H H M	H H H
SAND DROPSEED	M M M	L L L	H H H
SANDBERG BLUEGRASS	M M M	H H H	H M M
SIXWEEKS FESCUE	L L L	L L L	L M M
STREAMBANK WHEATGRASS	M M M	M M M	M M M
FORBS			
YELLOW CRYPTANTHA	L L L	L M M	L M M
HOODS PHLOX	L L L	L L L	L L L
LARGEFLOWER SKELETON PLANT	L L L	L L L	L L L
LITTLELEAF PUSSYTOES	U L L	L L U	L L L
SCARLET GLOBEMALLOW	M M M	H H H	M H H
WOOLY INDIAN WHEAT	L L L	L L L	L L M
WORMWOOD	L L L	L L L	L L L
SHRUBS AND SHRUB-LIKE PLANTS			
BROOM SNAKEWEED	L L L	L L M	L L L
FOURWING SALTBUSH	H H M	H H H	H H H
PLAINS PRICKLYPEAR	L L L	L L M	M M H
SHADSCALE	M H L	M H H	M M H
SMALL LOW RABBITBRUSH	L M L	L M M	M M M
WINTERFAT	H H H	H H M	M M H
WYOMING BIG SAGEBRUSH	L H L	M H H	H M H

2/ Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutrient value, stage of growth, and season of use.

Animal class symbols:

C - Cows
S - Sheep
H - Horses
E - Elk
D - Deer
P - Pronghorn

G/B Upland Gamebirds
S/B Songbirds
S/M Small Mammals

Animal preference symbols

H - High
M - Medium
L - Low

d. Major Poisonous Plants to Livestock

PLANT COMMON NAME	LIVESTOCK AFFECTED	TYPE POISONING	SEASON SERIOUS
broom snakeweed	cattle & sheep	Cumulative, selenium when growing on cretaceous or eocene shales	when forage is scarce and broom snakeweed greater than 10% of diet

2. **Wood Products**

This site has no potential for growing wood products commercially. Living snowfences and windbreaks may be grown with supplemental irrigation water. Species to consider for these purposes are juniper, pinyon, and Russian olive.

3. **Wildlife Values**

Range use that encourages shrub growth will improve critical winter habitat for mule deer. This however may not coincide with maintaining or improving range condition. In general, all range practices that promote good range use and maintain or improve range condition will improve or maintain wildlife habitat for all species.

4. **Hydrological Interpretations**

Soils in this site are grouped into "A" and "B" hydrologic groups, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to Peak Flows in Colorado handbook, and SCS National Engineering Handbook, Section 4, for hydrologic curve numbers and determining runoff quantities.

The full spread of the natural plant community canopy is about 40 to 50% when in excellent condition. As range condition declines, canopy cover declines rapidly. This normally does not increase runoff on this site due to surface soil textures. However rain drop splash erosion will increase as more surface soil is devoid of cover.

5. Recreation and Natural Beauty

A few flowering plants are present during spring and fall. Hunting pronghorn, coyotes and rabbits along with bird watching provide limited opportunities for recreation. The deer generally have not migrated to this site by deer hunting season.

6. Endangered Plants and Animals

It is probable that bald eagles and peregrine falcons use this site for food hunting.

7. Counties in Which this Range Site Occurs

081 Moffatt
103 Rio Blanco
113 San Miguel

8. Other Interpretations

This site is generally grazed during the winter and spring. It lends itself to "low frequency" grazing systems. Care needs to be exercised to prevent year after year use during the spring. This can be very detrimental to range condition. This site is subject to severe wind erosion if the vegetative cover has been grazed excessively.

9. COMPETING RANGE SITES

Sandy Saltdesert is slightly lower in elevation and slightly drier than this site. Sandy Foothills is slightly higher in elevation and slightly higher precipitation. It also has more Wyoming big sagebrush than the Semidesert Sandy Loam. Also antelope bitterbrush may be present on the Sandy Foothills when in high range condition.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Section II-E

RANGE SITE DESCRIPTION
----------, COLORADO FIELD OFFICE

Site Name: Semidesert Loam #327
Site Number: 034AY327CO
034BY327CO
MLRA: 34A & 34B
Date Approved: December 1988

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

This site occurs on gently sloping hillsides, benches, ridges, alluvial fans, and toeslopes. Slopes range from 1 to 45%. Elevations range from 5000 to 6500 feet. This site occurs on all aspects and may be intermingled with adjacent saltdesert range sites.

2. Climatic Features

a. The climate of this site is arid, with precipitation averaging between 9 and 11 inches annually. About 70% of this precipitation comes in the form of rain during the spring, summer and fall. The average monthly precipitation (in inches) is as follows:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.6	0.8	0.9	0.6	0.7	0.5	0.6	1.3	1.5	1.1	0.7	0.8

b. The growing season for the native plants averages about 145 days. This usually starts about mid April and goes until September. Cool season grasses start spring growth using moisture stored in the soil from snow melt and spring rains. Optimum growth continues until the soil profile is depleted of useable soil moisture, usually April through mid June. A second growth period generally occurs between August and October corresponding with the peak precipitation period.

c. The average annual air temperature is about 46°F. Summer temperatures can reach over 95°F, and winter temperatures can dip to well below 0°F. Temperatures fall below the freezing mark much of the time in November through March. The average frost-free period occurs from late May through mid September, lasting about 122 days.

d. Winter and Spring winds cause this site to be more droughty than the precipitation alone indicate. Some of the snow sublimates eliminating its effectiveness.

3. **Potential Plant Community (Climax Vegetation)**

a. The plant community is about 60 percent grass, 5 percent forbs, and 35 percent shrubs (air-dry weight of current season's growth). Dominant grasses are galleta, Indian ricegrass, needleandthread and western wheatgrass.Less abundant grasses are Nevada bluegrass, Sandberg bluegrass, and thickspike wheatgrass.

Forbs present in the plant community include phlox, sego lily and stemless spring parsley.Shrubs, half-shrubs, and trees that occur on this site are Wyoming big sage, shadscale and winterfat.

b. Relative percentage of total plant community by weight, air-dry:

PLANT SYMBOL	COMMON NAME	SCIENTIFIC NAME 1/	COMP. PERCEN
GRASS AND GRASSLIKE PLANTS			
HIJA	GALLETA	HILARIA JAMESII	10 - 15
ORHY	INDIAN RICEGRASS	ORYZOPSIS HYMENOIDES	10 - 15
STCO4	NEEDLEANDTHREAD	STIPA COMATA	10 - 15
AGSM	WESTERN WHEATGRASS	AGROPYRON SMITHII	10 - 15
PONE3	NEVADA BLUEGRASS	POA NEVADENSIS	5 - 10
POSA12	SANDBERG BLUEGRASS	POA SANDBERGII	5 - 10
AGDA	THICKSPIKE WHEATGRASS	AGROPYRON DASYSTACHYUM	5 - 10
ELSA	SALINA WILDRYE	ELYMUS SALINA	3 - 5
SIHY	BOTTLEBRUSH SQUIRRELTAIL	SITANION SYSTRIX	2 - 5
FORBS			
PHHO	HOODS PHLOX	PHLOX HOODII	2 - 3
PHLO2	LONGLEAF PHLOX	PHLOX LONGIFOLIA	1 - 2
CANU3	SEGO LILY	CALOCHORTUS NUTTALLII	1 - 2
CYAC	STEMLESS SPRING PARSLEY	CYMOPTERUS ACAULIS	1 - 2
ALAC4	TAPERTIP ONION	ALLIUM ACUMINATUM	0 - 1

PLANT SYMBOL	COMMON NAME	SCIENTIFIC NAME 1/	COMP. PERCENT
SHRUBS AND HALF-SHRUBS			
ARTW*	WYOMING BIG SAGEBRUSH	ARTEMISIA TRIDENTATA WYOMINGENSIS	20 - 25
ATCO	SHADSCALE	ATRIPLEX CONFERTIFOLIA	5 - 10
EULA5	WINTERFAT	EUROTIA LANATA	5 - 10
ARSP5	BUD SAGEBRUSH	ARTEMISIA SPINESCENS	1 - 2
ATCA2	FOURWING SALTBUSH	ATRIPLEX CANESCENS	1 - 2
ATGA	NUTTALL SALTBUSH	ATRIPLEX GARDNERI	1 - 2
OPPO	PLAINS PRICKLYPEAR	OPUNTIA POLYACANTHA	1 - 2
CHNAA	TALL RABBITBRUSH	CHRYSOTHAMNUS NAUSEOSUS CONSIMILIS	1 - 2

1/ Names according to National List of Scientific Plant Names SCS-TP-159.
*Symbol not listed in National List of Scientific Plants.

c. If ecological retrogression is cattle induced, the percentage and production of desirable plants such as western wheatgrass, Indian ricegrass, needleandthread, Nevada bluegrass, tapertip onion, winterfat, Nuttall saltbush and fourwing saltbush will decrease. If retrogression is sheep induced, the percentage and production of desirable plants such as Nevada bluegrass, Indian ricegrass, salina wildrye, tapertip onion, sego lily, Wyoming big sagebrush, winterfat, shadscale, fourwing saltbush, Nuttall saltbush, and bud sagebrush will decrease. With the decrease in desirable plants, there will be an increase in plants such as longleaf phlox, Hoods phlox, stemless spring parsley, tall rabbitbrush and plains pricklypear. Plant species likely to invade the site and increase in density include bulbous bluegrass, black greasewood, and annuals such as cheatgrass, Russian thistle, and perfoliated pepper weed. If area is left ungrazed by sheep for many years, the brushy species will increase. Occasionally Utah Juniper will invade this site.

d. Basal area (the area of ground surface covered by perennial vegetation measured at ground level) is approximately 15 percent when near the potential plant community.

Further evidence of retrogression may be sheet and rill erosion, bare areas, a large increase in annuals, absence of litter, absence of new seedlings, and highly unstable forage production from year to year.

e. Annual Production

If the range is in excellent condition, the approximate total annual production (air-dry) is:

Favorable years	**1100 pounds/AC**
Normal years	**800 pounds/AC**
Unfavorable years	**500 pounds/AC**

Of this production, 45 percent will likely be unpalatable or out of reach to grazing animals.

4. Wildlife

This site provides habitat which supports a resident animal community that is characterized by desert cottontail, white-tailed jackrabbit, coyote, badger, white-tailed prairie dog, mourning dove, red-tailed hawk, bald eagle, golden eagle and a variety of songbirds such as the sage thrasher, sage sparrow, and Bewick's wren. There is seasonal use by mule deer and pronghorn. During winters of severe snow accumulat -- these areas become critical winter range for deer. Heavy browsing of Wyoming big sagebrush, shadscale, and even tall rabbitbrush can occur.

5. Soils

a. Soils in this site are moderately deep to deep and well-drained. They formed in materials derived from shale and alluvium. They are influenced by loess. The surface layer is fine sandy loam, loam, or sandy clayloam 2 to 3 inches thick and is underlain by silty clay loam, clay loam, loam, or gravelly loam to a depth of 30 or 60 inches. Permeabilities are slow to moderately slow. Available water holding capacities are moderate to high. Runoff is medium and the water erosion hazard ranges from slight to high. The hazard for wind erosion is slight.

b. Major soils which are associated with site:

SSA	MU	Soil	Texture	Percent Slope	Phase
686	12D	Avalon Tax	fine sandy loam	1-12	-
686	202	Avalon Tax	loam	5-45	-
686	225	Pariette Tax	sandy clay loam	3-30	-
686	201	Pavillion	loam	3-20	-
675	82B	Abra	loam	1-3	-
675	82C	Abra	loam	3-6	-
675	82D	Abra	loam	6-12	-
675	50	Mikum	loam	1-6	-
675	X30	Progresso	loam	3-15	-
675	X70	Progresso	loam	3-12	-
675	74D	Progresso	loam	3-12	-
675	30B	Progresso	loam	1-3	-
675	30C	Progresso	loam	3-6	-
675	30D	Progresso	loam	6-12	-

6. Location of Typical Example of the Site

a. NE 1/4 SW 1/4, Section 9, T3N R103W, in western Moffat County

b. SE 1/4 SE 1/4, Section 36, T5N R99W, in western Moffat County

B. MAJOR USES AND INTERPRETATIONS FOR

1. Grazing

a. This site provides good fall, winter and spring forage for use by livestock. Heavy continuous spring grazing will cause a decline in plant vigor and seedling establishment, and a decrease in range condition. In order to maintain a high level of productivity, care must be exercised to avoid overgrazing. Hoarding of sheep and movement of cattle during early spring growth is necessary to avoid depleting of stored carbohydrates and photosynthetic material during the spring growth period. The site lies along historic trails used to move sheep between desert winter range and mountain summer range. For this reason, the site has historically been heavily grazed. A system of deferred grazing, which varies the season of grazing in fields during successive years, is needed to maintain a healthy well-balanced plant community. Rest during different seasons of the year benefits different plants. Fall and winter rest benefits shrubs such as fourwing saltbush, winterfat, shadscale, and Wyoming big sagebrush. Spring rest benefits cool-season plants such as western wheatgrass, thickspike wheatgrass, needleandthread thread, Indian ricegrass, Nevada bluegrass, and Salina wildrye. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs.

b. Guide to Initial Stocking Rates

(1) Stocking rates given below are based on continuous use for the entire growing season, and are intended only as an initial guide. Forage needs are calculated on the basis of 900 lbs of air-dry forage per animal unit month (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., 35 percent of the palatable forage produced is considered available for grazing by large herbivores.

Condition Class	Percent Climax Vegetation	Ac/AUM	AUM/Ac
Excellent	76-100	5	.20
Good	51-75	7	.14
Fair	26-50	10	.10
Poor	0-25	15	.07

(2) Adjustment to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game herbivores, inaccessibility, dormant season use, etc., stocking rate adjustments will be required.

(3) Depending on climatic condition, in some years palatable annuals such as cheatgrass may produce large amounts of forage that is available for only a short time. Intensive grazing programs on these areas followed by deferment is an excellent management tool to utilize these annuals but still allow recovery of the perennial vegetation normally associated with this site.

c. Vegetation Palatability by Animal Class 2/

COMMON NAME	ANIMAL PREFERENCE C S H	E D P	G B S B S M
GRASS AND GRASSLIKE PLANTS			
BOTTLEBRUSH SQUIRREL TAIL	M M M	M M M	M M M
GALLETA	M M H	M L L	L L M
INDIAN RICEGRASS	H H H	H M M	M H H
NEEDLEANDTHREAD	H M H	H M M	L M M
NEVADA BLUEGRASS	H H H	M M M	M M M
SALINA WILDRYE	H H H	H H M	H H H
SANDBERG BLUEGRASS	M M M	H H H	H M M
THICKSPIKE WHEATGRASS	M M M	M M M	M M M
WESTERN WHEATGRASS	H M H	M M M	L M M
FORBS			
HOODS PHLOX	L L L	L L L	L L L
LONGLEAF PHLOX	L L L	L L L	L L L
SEGO LILY	M H M	M M M	M M M
STEMLESS SPRING PARSLEY	L L L	L L L	L L L
TAPERTIP ONION	H H L	M L L	L L L

COMMON NAME	ANIMAL PREFERENCE C	S	H	E	D	P	G/B	S/B	S/M
SHRUBS AND SHRUB-LIKE PLANTS									
BUD SAGEBRUSH	M	H	M	M	M	H	M	M	H
FOURWING SALTBUSH	H	H	M	H	H	H	H	H	H
NUTTALL SALTBUSH	H	H	M	H	H	H	M	M	M
PLAINS PRICKLYPEAR	L	L	L	L	L	M	M	M	H
SHADSCALE	M	H	L	M	H	H	M	M	H
TALL RABBITBRUSH	L	L	L	L	L	L	L	L	L
WINTERFAT	H	H	H	H	H	M	M	M	H
WYOMING BIG SAGEBRUSH	L	H	L	M	H	H	H	M	H

2/ Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutrient value, stage of growth, and season of use.

Animal class symbols:

C - Cows
S - Sheep
H - Horses
E - Elk
D - Deer
P - Pronghorn

G/B Upland Gamebirds
S/B Songbirds
S/M Small Mammals

Animal preference

H - High
M - Medium
L - Low

d. Major Poisonous Plants to Livestock

No poisonous plants normally grow on this site.

2. Wood Products

No potential production.

3. **Wildlife Values**

Range management practices that promote proper grazing use and maintain the site in a good to excellent condition will improve or maintain wildlife habitat. Preservation of shrub species is important for providing critical winter range for mule deer and habitat for various song birds. However excess brush will reduce the habitat value for wildlife species such as cottontails, jackrabbits and rodents that support other predator species. For these species brush management and proper grazing use can be very beneficial.

4. **Hydrological Interpretations**

Soils in this site are grouped into "B" & "C" hydrologic groups, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to Peak Flows in Colorado handbook, and SCS National Engineering Handbook, Section 4, for hydrologic curve numbers and determining runoff quantities.

Generally, the canopy cover will be better when this site is in good to excellent condition. A high canopy cover is more efficient at reducing erosion. The exception to this rule occurs when the proportion of grass is high yetcondition class is low. In this case, the erosion control value is very high.

5. **Recreation and Natural Beauty**

This is not a site with appeal for camping or fishing so it is not used extensively for this. There is some potential for hunting of small game. When the forbs bloom in the spring, the site can be interesting for photographers and other visitors that enjoy vegetation.

6. **Endangered Plants and Animals**

It is probable that bald eagles and peregrine falcons use this unit occasionally. There is a very small possibility that black-footed ferrets could be found on this unit.

7. **Counties in Which this Range Site Occurs**

081 Moffat County

This site may be found in Rio Blanco County but it was not correlated to any soils mapped in Rio Blanco County SSA.

8. **Other Interpretations**

This site is located between the Loamy Saltdesert and the Rolling Loam range sites in the areas of elevation, precipitation and temperature.

Exhibit J
Vegetation Information
SR-11 Mine Permit Amendment
M-1977-451

Most of the affected area at SR-11 is classified as a Pinon-Juniper Woodland. Associated secondary species include:

Indian ricegrass	Gambel oak
Muttongrass	Prairie junegrass
Snakeweed	Western wheatgrass
Elk sedge	Douglas fir

None of these species is currently listed on the BLM Colorado Sensitive Species List found at www.blm.gov/co/st/en/BLM_Programs/botany/Sensitive_Species_List_.html.

The vegetation at SR-11 is relatively dense and well established. Most Pinion-Juniper stands do not reach over twenty feet in height. Shrubs, grasses and forbs remain closely cropped by grazing and wildlife use.

For a map of how the vegetation relates to the topography and soil types see Exhibit U - EPP.

The main type of soil to be disturbed at the SR-11 site is Pinion-Bowdish-Progresso loams (Soil map unit 75). Ecological site descriptions are not yet available in Colorado. However, a Rangeland Site Description associated with this soil type has been provided by the Department of Agriculture, Natural Resources Conservation Service, and is included in this exhibit. The Rangeland Site Description discusses coverage percentages for each species including the relationship of current vegetation to soil types associated with Pinyon-Juniper sites.

Exhibit K
Climate
SR-11 Mine Permit Amendment
M-1977-451

The closest weather station to the SR-11 Mine is in Northdale, Colorado, 12.33 miles SW from the mine entrance. Since Northdale's elevation is 6678 feet, only 327 feet lower than SR-11, and the topography between SR-11 and Northdale is relatively even, it is reasonable to assume that climate conditions will be very similar.

Below is the weather information for the Northdale weather station from the National Oceanic and Atmospheric Administration (NOAA).

Table 1

NORTHDALE, COLORADO (055970)

Period of Record Monthly Climate Summary

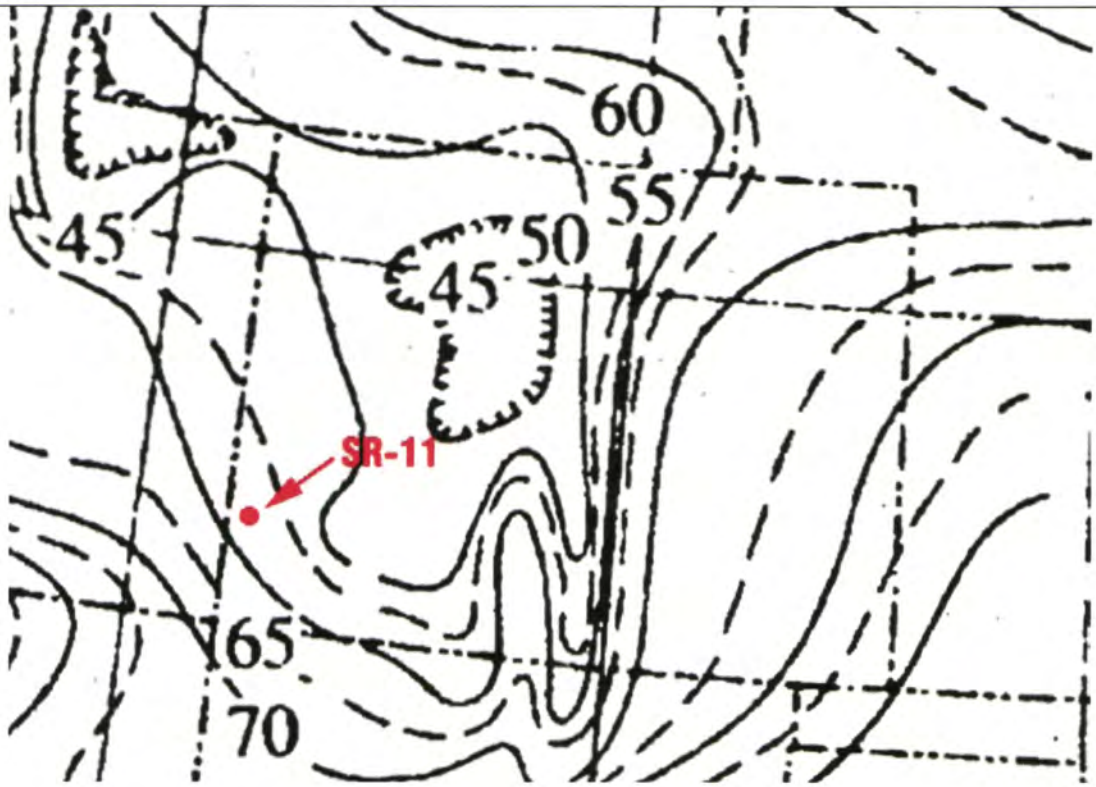
Period of Record : 6/ 1/1930 to 12/31/2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	36.5	41.0	48.9	59.4	69.6	80.6	86.5	83.6	76.0	63.7	48.5	38.7	61.1
Average Min. Temperature (F)	9.0	14.3	22.1	28.0	35.1	42.2	50.2	49.5	41.0	30.6	19.9	12.3	29.5
Average Total Precipitation (in.)	0.88	0.83	0.91	0.91	0.89	0.47	1.23	1.41	1.39	1.62	1.00	0.96	12.49
Average Total Snow Fall (in.)	12.0	7.5	6.2	1.8	0.0	0.0	0.0	0.0	0.1	0.9	3.7	8.7	40.9
Average Snow Depth (in.)	4	3	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record.
Max. Temp.: 98.5% Min. Temp.: 98.5% Precipitation: 98.9% Snowfall: 90.2% Snow Depth: 79.1%

Evaporation at the SR-11 Mine is approximately 53 inches per year as estimated by the National Weather Service. See map below.

Table 2



NOAA Technical Report NWS 33 and 34, Mean Monthly, Seasonal and Annual Pan Evaporation for the United States. December 1982.

Exhibit L
Reclamation Costs
SR-11 Mine Permit Amendment
M-1977-451

The SR-11 mine permit consists of three major parcels: the mine waste area, the proposed venthole areas, and the access roads. Listed below are the significant parts of the reclamation efforts required at each parcel, followed by the calculations for reclamation.

Mine Waste and Portal Area	Cost
Remove compressor shed	$400
Plug portal	$5,120
Re-contouring the mine waste dump	$4,205
Spreading soil material	$3,625
Pocking waste dump	$5,000
Seeding	$3,042
Plug venthole (1)	$3,580
Total	$24,972

The cost to remove the compressor building is based on two men taking apart the compressor building in 4 hours and hauling it offsite. The estimated cost is $400.

The cost to remove the concrete for the compressor building pad and put it inside the portal is included in the cost to plug the portal.

The portal will be closed by using a 930 loader to load two 10-ton trucks and haul mine waste material inside the portal approximately 100 feet, then place the backfill using a 912 LHD, or equivalent.

Cost = 2 days x 8 hr./day x $320/hr. to backfill = $5,120

The cost to re-contour the mine waste dump is based on using a D-7 dozer, or equivalent, to push the mine waste material to a 3H:1V final slope. The total mine waste material that will need to be moved for this portion of the re-contouring effort is 15,000 lcy at a 3H:1V slope. This is projected to be done at a rate of 519 lcy/hr. The time required for the dozer is 15,000 lcy/298 lcy/hr. = 29 hr.

Cost = 1 dozer x $ 145/hr. x 29 hr. = $4,205

The cost to spread the soil cover material is based on loading the approximately 5,000 lcy of previously stockpiled soil into two 10 ton articulated mine trucks with a 930 Cat loader, or equivalent, and hauling the material from the soil stockpile area up to the top of the re-contoured mine waste dump. A D-7 dozer, or equivalent, will be used to spread the soil over the mine waste area (an area of approximately 5+ acres) after it is dumped by the mine trucks. The time

required for the trucks to haul this material to the mine waste pile is approximately 60 hours. The cost to spread the topsoil is based on using a 621 Cat scraper to pick up, haul and spread the topsoil over the surface of the re-contoured waste area.

Cost = Based on a round trip time of 5 minutes per trip it would take (5,000 lcy/ 20 lcy/trip) x 6 minutes/trip x $145/hr. = $3,625.

The cost to pock the south facing portion of the re-contoured mine waste area is based on using a Cat 315 excavator, or equivalent, to pock approximately 5 acres of the mine waste area. This would take four days to complete.

Cost = 1 excavator x $125/hr. x 40 hrs = $5,000

The cost to re-seed the mine waste storage area is based on broadcast seeding approximately 10 acres of re-contoured mine waste area and the mine yard. Two people would be able to do this work in 3 days.

Cost = (2 people x 8 hr./day x 3 days x $25/hr.) + (10 ac x 22.8 lbs seed/ac x $8.08/lb seed) = $3,042.24

The cost to plug the ventholes is based on pouring a concrete plug three feet thick into the top portion of the venthole. This plug will then be covered with approximately three feet of mine waste material using a Cat 950 loader, or equivalent. One foot of soil will then be spread over the mine waste fill using the loader. Prior experience plugging ventholes in this area indicate that a crew of four men can remove the collar material, set the base for the concrete plug, and pour the concrete in two days. The backfill material can be placed in a half day after the concrete has dried.

Cost/venthole = (6 yds. concrete x $150/yd) + (4 men x $30/hr. x 2 day/man x 8 hr./day) + ($95/hr. x 4 hr. x 1 loader) + (4 hr. x $ 95/hr. x 1 excavator/no operator) = $3580/venthole x 1 venthole
= $3,580

Equipment Cost Basis:

D-7 dozer w/operator	$145/hr.
315 excavator w/operator	$125/hr.
950 loader w/operator	$95/hr.
10 ton mine truck w/operator	$75/hr.
912 LHD w/operator	$75/hr.
Seed	$184/acre
621 Scraper	$145/hr.

Exhibit M
Other Permits & Licenses
SR-11 Mine Permit Amendment
M-1977-451

The following additional permits and environmental plans are required for SR-11:

1) The mining area is zoned "agriculture" by San Miguel County. Cotter has a conditional use permit issued by the San Miguel County Commissioner's office.

2) The San Miguel County Engineer has been informed of Cotter's intention to cross country road 4Q with mining equipment. A site specific access permit concerning traffic control signs, etc. has been issued by that office.

3) The mineral lease between U.S. Department of Energy (DOE) and Cotter Corporation requires Cotter to notify and receive approval from DOE of any modifications to Cotter's mining plan. This will include obtaining DOE approval for the proposed ventilation hole site.

4) Cotter will modify its Stormwater Discharge Permit as needed.

5) Cotter will apply for an air emissions permit from CDPHE if it is determined that the permit is required.

6) An explosives permit will be requested from the Department of Treasury, Bureau of ATF, prior to the resumption of mining operations.

7) Septic system permit.

Exhibit N
Source of Legal Right to Enter
SR-11 Mine Permit Amendment
M-1977-451

The SR-11 Mine is located on public lands managed by the U. S. Bureau of Land Management. The mineral rights are controlled by the U.S. Department of Energy (DOE). Cotter is the lessee of DOE Mining Lease Block No. AT(05-1)-ML-60.8-C-SR-11. Cotter has a legal right to enter through the provisions of the 2008 updated long-term lease agreement with the DOE. A copy of the lease can be found in Appendix IV - Confidential Documents.

Exhibit O
Owner(s) of Record of Affected Land (Surface Area) and
Owners of Substance to be Mined
SR-11 Mine Permit Amendment
M-1977-451

Owners of Land Surface

1) Montrose Bureau of Land Management, 2505 South Townsend Ave., Montrose, CO 81401 (adjacent land owner).

Owners of Substance to be Mined

1) U. S. Department of Energy, 2597 Legacy Way, Grand Junction, CO 81503

Exhibit P
Municipalities within Two Miles
SR-11 Mine Permit Amendment
M-1977-451

There are no municipalities located within 2 miles of the permitted affected area.

Exhibit Q
Proof of Mailing Notices to County
Commissioners and Soil Conservation District
SR-11 Mine Permit Amendment
M-1977-451

Notifications and accompanying amendment explanations have been sent to the San Miguel Conservation District and the San Miguel County Commissioners.

Please see attached documents.

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City, State, ZIP PO Box 29
Norwood, Colorado 81424

PS Form

Exhibit R
Proof of Filing with County Clerk
SR-11 Mine Permit Amendment
M-1977-451

Please see attached return receipt.

cotter

September 24, 2012

San Miguel County Clerk and Recorder
305 West Colorado Avenue
Telluride, Colorado 81435

RE: Notice of Permit Amendment for the SR-11 Mine, Permit No. M-1977-451

To Whom It May Concern:

This letter serves as notice that Cotter Corporation has submitted an amendment for the SR-11 Mine, existing permit #M-1977-451. The SR-11 Mine is located at or near, Sections 17 and 18 Township 43 North, Range 19 West, New Mexico Principal Meridian, in San Miguel County, Colorado.

The SR-11 Mine is currently permitted as a 112d operation. The purpose of the amendment is to incorporate an Environmental Protection Plan (EPP) into the existing mining permit.

Cotter Corporation is providing a copy of the EPP for the SR-11 Mine to the San Miguel County Clerk and Recorder's office in Telluride for review. Enclosed is a formal notice of the amendment application.

If you have questions or comments regarding this Amendment Application please call me at Cotter's Nucla office, 970-864-7347.

Respectfully,

Glen Williams
Vice President of Mining
Cotter Corporation

RECEIVED
9-27-2012
B Gld

SR-11 EPP County Clerk -Recorder ltr

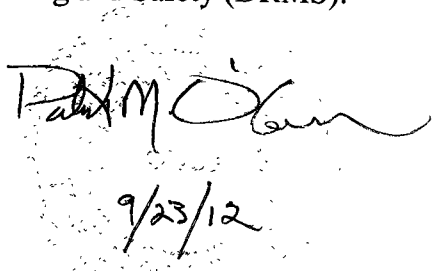
Cotter Corporation - West Slope Operations
P.O. Box 700, 28151 DD Road, Nucla, CO 81424 USA
Telephone (970) 864-7347
Fax (970) 864-7287

Exhibit T
Permanent Man-Made Structures
SR-11 Mine Permit Amendment
M-1977-451

There are no man-made structures that will be affected by the permitted mining operation.

CERTIFICATION

I hereby certify that this Environmental Protection Plan (EPP) for the design of the Cotter SR-11 Mine, was prepared by me (or under my direct supervision) in accordance with criteria required by the Colorado Division of Reclamation, Mining and Safety (DRMS).



9/23/12

Patrick M. O'Connor, P.E.
Registered Professional Engineer
State of Colorado, #20759

Exhibit U
Environmental Protection Plan
SR-11 Mine Permit Amendment
M-1977-451

Table of Contents

TABLES

FIGURES

Exhibit U
Environmental Protection Plan
SR-11 Mine Permit Amendment
M-1977-451

Cotter Corporation (N.S.L.) (Cotter) is submitting an Environmental Protection Plan for the SR-11 mine permit to comply with the Division of Reclamation, Mining and Safety (DRMS) Rules and Regulations.

(1) Introduction

The two surface areas determined to have the possibility to impact the surrounding environment by exposing toxic or acid-forming materials are:

A. Waste rock pile: Stormwater runoff from the waste pile could potentially liberate radium, uranium and other metals resulting in impacts to groundwater and/or surface water. A Synthetic Precipitation Leaching Procedure (SPLP) test was conducted on representative waste rock samples to determine the waste rock's potential for leaching metals and radionuclides.

B. Ore stockpile: To ensure that temporary stockpiles of ore will not adversely impact surface water or soil quality, the ore pad will be constructed using low-permeable compacted clay from a nearby source, and be limited to a 0.25 acre area with a well maintained berm around the pad diverting stormwater around the pile. Ore is not expected to have any adverse effect on groundwater due to:
    a. Limited exposure time the ore is left on the pad,
    b. Limited precipitation in the area combined with a clay liner underlying the pad
    c. Low permeability and limited downward mobility through the underlying strata.

(2) Maps

Maps showing locations of ore and waste rock stockpiles as well as other affected lands can be found in Exhibit C - Maps. Maps showing stormwater diversion structures can be found in Appendix III - Drainage Design Plan. Maps showing drill hole data, geology of the SR-11 area and soil maps are found in this exhibit.

(3) Identification of Other Agencies' Environmental Protection Measures and Monitoring Requirements

Cotter has taken into consideration the following environmental protection measures:

- The Colorado Historical Society was contacted during the application amendment process and a file search was completed. Adequate surveying of the area was conducted in July of 1996 (Cotter has this report on file and can provide it to DRMS upon request).

- There are minimal water issues at the SR-11 Mine. Effects on surface and ground- water are anticipated to be minimal at or near the mining area. No water is anticipated to be discharged from the mine. Consequently, no discharge permit with the Colorado Division of Water Resources or the Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division, will be necessary.

- Cotter will apply for an air emissions permit from CDPHE if it is determined that this is required for fugitive dust during ore transport and blasting.

- The mine is located on Department of Energy (DOE) leased lands. Cotter will inform the DOE of changes to the mining plan. This will include obtaining DOE approval for the proposed ventilation hole sites. Adjacent land owners within 200 feet of the proposed affected areas will also be notified of Cotter's intent.

- The area of the SR-11 Mine is zoned "agriculture" by San Miguel County. Cotter has a conditional use permit issued by the San Miguel County Commissioner's office.

- Socioeconomic impacts to the local communities will be positive but limited due to the small number of employees required at the mine.

- Cotter will strictly adhere to MSHA applicable regulations.

(4) Other Permits and Licenses

For a full list of Cotter's Permits and Licenses see Exhibit M - Other Permits and Licenses.

(5) Designated Chemical(s) Evaluation

No designated chemicals will be used in extractive metallurgical processes onsite. All ore will be transported offsite for processing.

Uranium ore and waste rock are not designated chemicals nor do they generate designated chemicals. They are regarded under Hard Rock Rule 1.1 (1) as potentially *Acid and Toxic Producing Materials*, and are addressed below in section (6) Designated Chemical(s) and Material(s) Handling.

(6) Designated Chemical(s) and Material(s) Handling

6.1 Types of Acid and Toxic Producing Materials Originating Onsite

6.1.1 Source

The Environmental Protection Agency (EPA) has a technical report on acid mine drainage prediction (EPA 530-R-94-036) that presents a fundamental analysis for the potential of acid mine drainage. Basically, acidic waters are formed by sulfide oxidation. Acid is generated at mine sites when metal sulfides are oxidized. For example, pyrite (FeS_2), when oxidized in the presence of water, creates acids by the following reaction:

$$2\ FeS_2 + 2\ H_2O + 7\ O_2 \rightarrow 4\ H^- + 4\ SO_4^{2-} + Fe^{2+}$$

The hydrogen ions (H^-) reduce the pH resulting in acidic conditions. The EPA report notes that acid mine drainage is common in metal and coal mines. Commonly, sulfide (S) minerals such as chalcopyrite, galena, and arsenopyrite, when oxidized in the presence of water as shown in the above formula, produce an acidic solution.

Conversely, common minerals for uranium ores in the Uravan Mineral Belt and their chemical formulas are listed below:

Carnotite: $K_2(UO_2)_2(VO_4)_2 \cdot 3H_2O$
Tyuyamunite: $Ca(UO_2)_2(VO_4)_2 \cdot 5\text{-}8H_2O$
Uraninite (Pitchblende): UO_2

Evident from the chemical formulas of these uranium compounds is the lack of sulfides. Consequently, there are no acid forming properties evident in the commonly seen uranium minerals compared with other sulfide based metal minerals.

Since there are reducing conditions in uranium deposits, there is some potential for pyrite deposition, but it is not a major component like metal and coal deposits. Another important issue presented by the EPA report is the evaluation of the neutralization of acid by the alkalinity released when the acid reacts with carbonate minerals. According to the EPA, this reaction can be an "important" means of moderating acid production. Salt Wash sandstones are commonly calcareous meaning that calcium carbonate cements the sand grains together forming sandstones. Any acid produced by pyrite would quickly be neutralized by the waste rock.

6.1.2 Quantity

Currently the mine is not producing ore and there is no ore stored on the surface. Once the ore body is reached, ore will be temporarily stored on the surface or transported to an

offsite processing facility. The ore storage pad will be located on top of the waste rock pile (see Exhibit C, Figure C4 - Maps) and will occupy less than 0.25 acres. Ore will be mined at an approximate rate of 25,000 tons per year. Ore from the stockpile will be hauled to the mill using a first in, first out system. Once mining is finished, ore will be removed from the site within 30 days.

Waste rock is placed on the waste rock piles as described in the mining plan. Waste rock is also gobbed underground to reduce the volume of the external waste rock pile. The waste rock proposed for gobbing underground will not be differentiated from waste rock disposed on the surface facilities. Therefore, the geochemical characterization of waste rock provided above and in section (14) Geochemical Data and Analysis is applicable to waste rock that may be placed underground. In addition, groundwater occurs below the contact of the ore zone and although drilling has identified a limited amount of groundwater in the area, none reach the underground workings (see below under section (8) Groundwater Information). After mining is finished, the waste rock pile will be reclaimed as described in Exhibit E - Reclamation Plan.

6.1.3 Prevention of Adverse Offsite Impacts

6.1.3.1 Stormwater

Stormwater will be diverted away from the waste rock pile and ore pad via berms and ditches. Diversion structures have been constructed and maintained, and will be left in place after reclamation in order to discourage stormwater runoff from coming in contact with either the waste rock pile or the ore pad area. Cotter understands the importance of constructing and maintaining stormwater control structures regardless of any other activities onsite.

6.1.3.2 Cross Contamination

Cross contamination of the waste rock and ore underground is minimal due to the nature of the "split shooting" method used in mining. During the "split shooting" effort, the drill round is completely drilled, the drill holes are probed to determine where the break between ore and waste material is, and then the waste material is blasted and removed. Once the waste material is removed, the ore material is blasted and removed to the ore stockpile area.

Cross contamination between the waste rock pile and ore stockpile on the surface will be limited due to the compacted clay liner beneath the ore pad. This clay liner will be a minimum of 12-inches thick. The material for the liner is available from a nearby property, and will be transported, applied in lifts, and compacted to minimize the permeability.

Prior to the selection of the clay source, samples will be collected and analyzed in the laboratory for cation exchange capacity (CEC). Modified Standard Proctor Tests will also be performed, and a plot of moisture content vs. dry unit weight will be prepared to determine the Line of Optimums. The optimum placed moisture content for the clay will be determined, and used to guide the construction with a goal of achieving an in place

hydraulic conductivity of less than 5 x 10^{-6} cm/sec. (Typically the lowest values of hydraulic conductivity occur when the dry unit weight is high and the moisture content is on the wet side of the optimum.)

Low hydraulic conductivity is expected to be just one factor in reducing the potential for transport of radioactive material from the ore pad. The underground ore typically occurs above the water table, and the ore will therefore be dry when placed on the pad. Atmospheric conditions at the site will further limit infiltration because evaporation exceeds precipitation. Further, the cation exchange capacity of the clays will contribute to sorption of uranium or other metals should seepage from the ore pad occur.

Ore will be rotated so that no fraction of the ore remains on the ore pad for longer than 180 days. Although the overall ore pad may contain ore continually, older ore will be transported from the pad to make way for freshly mined ore, so that no fraction of the ore remains on the ore pad for longer than 180 days. The limited duration of exposure to atmospheric conditions will limit the potential for weathering, release, and transport of constituents from the ore.

Surface water contact with the ore pad will be reduced or eliminated by ditches and berms constructed around the perimeter of the ore pad, as appropriate. These ditches and/or berms will prevent upslope water run-on from contacting the ore. The ditches and berms will be constructed to allow access by haul trucks and will be inspected and maintained regularly.

6.1.3.3 Groundwater

There is no significant groundwater at the SR-11 mine area due to insufficient precipitation and high evapotranspiration rates that limit recharge to the piles. The limited recharge prevents any significant quantities of water from migrating into the piles and therefore limits transport of uranium related constituents. For a full discussion of the potential effect to the groundwater see below in Section 8.

6.1.3.4 Re-vegetation

The waste rock pile and ore pad will be capped with previously stockpiled soil and seeded after mining is complete. Evaporation from the surface and the shallow subsurface limits infiltration through the waste rock pile. After re-vegetation is complete, evaporation, coupled with plant growth, will limit infiltration and fugitive dust.

(7) Facilities Evaluation

7.1 Containment Measures

Berms and stormwater runoff basins were constructed in 2005 and have proven efficient in diverting stormwater. A Drainage Design Plan has been developed for this site. The goal of this Drainage Design Plan is to prohibit runoff from entering the site and for precipitation falling on the site leaving the area during storm events. To this end, a few

improvements have been recommended and Cotter will be implementing them. See Appendix III - Drainage Design Plan for a full discussion of containment and diversion measures including maps.

7.2 Environmental Protection Evaluation

7.2.1 Radiometric Survey

Cotter will conduct a site radiation survey prior to mining in order to establish a baseline of current conditions. The survey will be conducted on a maximum 50 foot by 50 foot grid.

(8) Groundwater Information.

This section of the permit discusses the potential for environmental exposure from constituents of concern by the transport of groundwater. To evaluate this potential, the site geology, hydrology, geochemistry of the deposits, and possible groundwater migration pathways are discussed.

8.1 Area Geology

The large part of the Mesozoic section for the Colorado Plateau is displayed on the Quad sheet for the SR-11 mine site (see Figure U1). The Dakota Formation is the uppermost bedrock unit in the area and the siliceous sandstones that comprise this unit are resistant to erosion and commonly form benches and mesas in the area. The Dakota is responsible for the gently sloping topography from the Abajo Mountains in eastern Utah to just west of the SR-11 area. The Burro Canyon Formation directly underlies the Dakota and is often distinguished from the Dakota by the lack of coal or organic rich deposits. The importance of the Burro Canyon as a regional aquifer is discussed in Section 8.3.1.

Directly underlying the Burro Canyon Formation is the Brushy Basin Member of the Morrison. This geologic unit is comprised of mostly bentonitic shale but contains some sandstone and conglomeritic lenses (Cater, 1955). This unit's stratigraphy plays an important role in understanding groundwater transport in this region. Bentonite is classified as a montmorillonite clay mineral formed by the weathering of volcanic ash deposited during the Jurassic Period and characterized by a three layer crystal lattice that exhibits significant swelling on wetting. These types of shales are not only extremely impermeable to water movement but also exhibit high cation exchange capacities that adsorb and prevent the migration of dissolved constituents related to uranium deposits. These same bentonitic shales are found in the Salt Wash Member and restrict the downward movement of dissolved minerals.

Table U1: Summary of Selected Properties of Solid Phase Layered Silicates (After Bohn et al., 1979)

Component	Mineral Type (Layered Silicates)	Cation Exchange Capacity
Kaolinite	1:1	1-10 me/100g
Montmorillonite	2:1	80-120 me/100g

The Salt Wash Member of the Morrison Formation is the mineralized zone for the extraction of uranium and vanadium. The unit is comprised of interbedded sandstones and shales and mudstones. The sandstone units, particularly the upper sandstone, are mineralized. The sandstones tend to be fine grain and well cemented.

Underlying the Morrison Formation is the Summerville Formation that consists of shales and mudstones and is usually considered an aquitard in the area. The Entrada/Carmel Formations undivided, and the Navajo Sandstones underlie the Summerville aquitard and provide the first possible aquifers in the area. While the Carmel contains mudstone layers, both the Entrada and Navajo Formations consist dominantly of fine-grain eolian sandstones. The siliceous cemented Kayenta Formation, commonly a resistant bench-forming unit, consists of sandstones, mudstones and conglomerates that overlie the massive Wingate Sandstone. The cliff forming Wingate consists of fine grain, well sorted sand and is an important source of low to moderate quantities of groundwater. Red shales and mudstones of the Chinle Formation complete the geologic section for the area.

8.2 Mineralization

The name "Uravan Mineral Belt" is applied to a narrow, elongated area in southwestern Colorado in which carnotite deposits in the Morrison formation have a closer spacing, larger size, and higher grade than those in adjoining areas. The belt extends from Gateway through Uravan to Slick Rock. The deposits within the belt tend to be clustered in patches (Fischer and Hilpert, 1952).

Cater (1955) discusses the ore deposits at the Ike group of mines which are located on the SR-11 lease tract. The ore deposits occur in conspicuous northwest trending channel-fill sandstone lenses at the base of the uppermost sandstone layer of the Salt Wash Member. The ore minerals are carnotite and the micaceous vanadium mineral. Rolls are absent, but fossil logs are common and richly mineralized. The deposits are thought to have formed from groundwater solutions migrating through ore-bearing beds, probably soon after the accumulation of the sands. Precipitation likely resulted from slight changes in the chemical composition of the solutions, generally considered to happen when the groundwater encounters the reducing environment associated with decaying organic material. (Fischer and Hilpert, 1952).

Factors of geology, geochemistry and arid climatic conditions have combined to form the Uravan Mineral Belt - dominantly sandstone deposits of uranium, vanadium and associated metals. These same conditions restrict the movement of these minerals into the environment. The only viable transport mechanism for the migration of these

minerals from ore deposits located deep in geologic formation to possible exposure in the environment is via a groundwater pathway.

8.3 Regional Groundwater

To understand possible exposure routes resulting from mining, the geology that forms the framework for the movement of groundwater needs to be understood.

8.3.1 Area Aquifers

SR-11 is located at the eastern edge of an important regional aquifer for southwestern Colorado and southeastern Utah - the Dakota/Burro Canyon aquifer. In this arid region, protection of this valuable water resource is paramount. The Dakota/Burro Canyon Aquifer recharges along the flanks of the Abajo Mountains in southeastern Utah and extends southward toward Blanding, Utah and eastward toward Colorado. Hydraulic tests conducted on the Burro Canyon aquifer at the UMTRAP site near Monticello, Utah showed that substantial quantities of water are available from the aquifer and could augment regional dry land farming during drought conditions (Kautskey, Kearl et. al., 1986). The town of Monticello has several municipal wells for use during periods of drought. Other researchers indicate wells in the Dakota and Burro Canyon formations at Monticello and Blanding yield small to moderate amounts of fresh water, but commonly they do not have much storage and individual well yields are small (Kirby, 2008).

Due to the remoteness of the site, there are no water wells located within two miles of the mine site. A review of well records from the Colorado State Engineer's Office indicates that there are several domestic wells in the area of Egnar, Colorado. These wells range in depth from 100 to 160 feet and generally yield small quantities of water - less than 5 gallons per minute. The depth and location of these wells indicate that they are completed in the Dakota/Burro Canyon aquifer and the limited quantities of available water suggest either lower permeability or limited recharge. No wells were found to penetrate the deeper aquifers such as the Entrada or Navajo Formations in the area.

The SR-11 Mine is located near the contact of the Brushy Basin and Salt Wash Members of the Morrison Formation - well below the base of the Dakota/Burro Canyon regional aquifer. Mining will have no impact to the overlying regional aquifer. The Entrada Formation is assumed to be the upper-most aquifer possibly affected by the SR-11 mine in the area - although the formation is not saturated with water at numerous locations on the Colorado Plateau. Where groundwater does occur, the Entrada produces small to moderate quantities of water.

In Grand County, Utah, northwest of the study site, the Entrada Formation generally yields good quality water to seeps and springs at less than 5 gallons per minute when saturated (Eisinger and Lowe, 1999). According to the Colorado State Engineers office there are no groundwater wells in the Entrada Formation located within two miles of the SR-11 site. This is not surprising considering the remoteness of the SR-11 site.

8.3.2 Geologic Structure

The geologic structure of the area is also important in predicting the direction of groundwater flow. The SR-11 Mine is located to the southwest of the Lisbon Valley/Dolores anticline. The net result is that potential groundwater underlying the site would flow in a westerly direction. While there is no indication that the Entrada Formation is saturated in the area, if water was encountered in the mine, actions to evaluate the extent of potential contamination would focus on locating a groundwater well to the west of mining operations to ensure that proper monitoring activities could be initiated.

There are no mapped faults within the vicinity of SR-11. There is no indication of any extensive regional fault or fracture systems that could significantly affect the area hydrology. There are no mapped faults or evidence of faulting under planned stockpiles, storage areas, or waste piles at the mine.

8.3.3 Hydraulic Parameters

There is only a limited amount of hydraulic data available for the geologic formations capable of transmitting water at the SR-11 mine area. Consequently, estimates of hydraulic conductivity (permeability) are based on limited regional data and reported values for the type of rocks underlying the mine. Reference values for the Entrada Sandstone are from Lohman (1965) while sandstone and shale unit values are from Freeze and Cherry (1979). Kirby (2008) summarized permeability values based on several tests from wells located in the Burro Canyon Formation in eastern Utah.

Due to the remoteness of the region, the nearest available hydraulic information for the Navajo Sandstone comes from northwest of the area in Grand and San Juan counties, Utah where Lowe et al. (2007) reports moderate permeability values and wells that yield as little as 5 gallons per minute to wells located in fractured portions of the aquifer that yield as much as 300 gallons per minute. Lowe et al. (2007) also reports springs discharging from the Wingate Sandstone range from 10 to 240 gallons per minute.

Table U2: Hydraulic conductivity values for selected rock units at the site.

Rock Type	Hydraulic Conductivity (cm/s)
Dakota/Burro Canyon (Kdbc)	1.0E-04
Entrada Sandstone (Je)	5.0E-05
Navajo Sandstone (Jn)	1.0E-06 to 3.0E-03
Wingate Sandstone (Jw)	3.0E-05 to 5.0E-04
Mudstone/Shales (Jms,Js)	1.6E-07
Jms Sandstones	1.0E-06

Assuming that saturated conditions exist in the Salt Wash Sandstone, a porosity value of 0.2, and a hydraulic gradient of 0.025, equal to the regional dip of the strata, then calculated groundwater transport rates for uranium and related constituents from ore

bodies would be less than a foot a year in a west-southwest direction. Transport rates in the underlying Entrada Sandstone, if saturated, would be 6 feet per year in the same westerly direction.

UMETCO (1997) conducted a series of packer tests in the Summerville Formation to measure the hydraulic conductivity near the former Uravan Mill site. These tests, conducted at 167 to 270 psi, did not introduce any water into the formation, indicating that the hydraulic conductivity of the Summerville Formation is no greater than 1.0 E-08 cm/s. This conclusion is supported by laboratory testing that measured horizontal and vertical permeabilities of less than 9.7 E-10 cm/s. For all practical purposes, this low permeability value indicates that the Summerville Formation is an aquiclude - rock incapable of transmitting groundwater.

8.3.4 Recharge

Although groundwater flow in the region of SR-11 is west-southwest, regional aquifers from the Dakota/Burro Canyon through the Entrada, Navajo, and Wingate Formations receive significant recharge along the flanks of the Abajo Mountains in southeastern Utah. These laccolithic mountains forced up and exposed the surrounding bedrock formations along the flanks of the intrusive igneous rocks at elevations where significant precipitation occurs. Recharge from the Abajo Mountains eventually discharges on the hillside above the mineralized Salt Wash sandstone along the flank of Summit Canyon to the Dakota/Burro Canyon Formation. Similar discharges for the aquifers of the regions below the zone of interest would be expected to occur along the flanks of Summit Canyon. The geologic map for the area indicated no springs or major discharge points for aquifers that could be potentially impacted from mining activities. The lack of springs indicates there are limited quantities of groundwater in these aquifers.

The hydraulic characteristic of the upper Salt Wash sandstone suggests that recharge along the flanks of the Abajo Mountains is unlikely and local sources of recharge are nonexistent. There is no evidence in the literature that this geologic unit contains any significant quantities of groundwater capable of transporting uranium related constituents exposed during the mining process.

8.4 Groundwater Monitoring

Monitoring groundwater quality to specifications of the Resource Conservation and Recovery Act (RCRA) or requirements of the DRMS is difficult. Simple concepts of up- and down-gradient monitoring wells at locations that could provide an early warning system were problematic at best and not representative of subsurface conditions at worst. Cotter instructed crews drilling exploration holes to delineate ore deposits, and to note zones of "moisture." Figure U2 shows a 3-D diagram of the site topography and geology including the location of exploration borings that targeted the ore producing zone in the Salt Wash Sandstone. The view for the 3D diagram is from the northwest toward the southeast. The upper surface of Figure U2 shows the topography of the site truncated at the edge of the Summit Canyon so as not to block the lower layers in the figure. The middle layer is the ore zones within the upper sandstone unit of the Salt Wash Member of

the Morrison Formation as defined by drill holes. There is gap in the ore zone due the lack of sufficient concentrations of uranium/vanadium. The lower layer in Figure U2 is the Entrada Sandstone based on structural contours shown on the Geologic Map (Figure U1) for the Egnar Quadrangle (Cater, 1955). The proposed mine decline from the surface to the ore bearing zone is shown in blue and branches into two proposed drifts within the ore zone.

These test borings were drilled with air rotary drilling rigs and the geologists were instructed to note wet or moist zones based on observations of the drill cuttings. While this is a subjective observation and the results are not indicative of saturated conditions, it does indicate where water, under either saturated or unsaturated conditions, is located in the subsurface, but provides no indication of the mobility of the groundwater. Only about 20 percent of the test borings were drilled by Cotter with instructions to note water content. These "moist" zones, based on the driller logs, are shown as blue ovals.

There is only one test hole that showed moisture for the exploration borings. This moisture zone is found near one of the branches of the proposed access mine drift and located below the ore zone. With the lack of moisture observed in the remaining test borings, groundwater monitoring results indicate that the SR-11 will be a dry mine.

8.5 Geochemistry of Uranium Deposits

The next factor to consider for the potential mobilization of constituents associated with uranium deposits is the geochemistry of the uranium deposits. For Colorado Plateau deposits, the chief ore mineral is carnotite. It was initially believed by many to be a primary sedimentary mineral, precipitated during or shortly after the deposition of the enclosing sediments (Fischer, 1942). Carnotite is fully oxidized. The discovery of increasing amounts of uraninite in deeper deposits began to raise a valence problem. The possibility began to develop that uraninite is an early uranium mineral and that carnotite is an oxidation product - the result of weathering (Garrels and Christ (1965)).

Hostetler and Garrels (1962) used Eh-pH diagrams to illustrate the conditions under which uranium might be transported in groundwater in the presence of vanadium. The diagrams show that, when groundwater has a pH greater than 2 and oxidizing conditions, carnotite is stable and the dominant mineral. Several other studies suggest that uranium minerals, especially minerals that contain vanadium, are relatively insoluble including carnotite.

8.6 Mobilization of Uranium Related Constituents

With an understanding of the site geology, hydrology, and geochemistry, a scenario of possible mobilization and transport of uranium and related constituents needs to be developed to design an effective monitoring strategy. Mining would disturb the uranium deposits by introducing oxygen into reduced mineralized zones. It is possible that changes in redox conditions could mobilize uranium related constituents, but the geochemistry indicates that only limited amounts could be mobilized due to the low solubility of these uranium minerals. The lack of groundwater in the area further

prevents a viable pathway for the transport of these constituents. If groundwater was encountered and was of sufficient extent to transport the uranium and related constituents (all hydrologic data suggests this is not the case), then groundwater in the upper Salt Wash sandstone would migrate down dip or westward. Permeability values for the sandstone suggest low transport rates, on the order of a foot per year.

For these constituents to reach the Entrada, vertical transport through even lower permeable units would be necessary. Kearl (2005) conducted transport modeling studies to estimate the transport of mineral constituents associated with uranium ore deposits. A conservative approach consistent with the Nuclear Regulatory Commission requirements for high-level nuclear waste sites was used to develop a worst-case scenario - not necessarily the most likely scenario. Even under the worst case conditions, the modeling predicted that after 1000 years, uranium related constituents migrated approximately 200 feet vertically at a concentration of 10^{-6} (1/1,000,000 of the source concentration) of the initial concentration in the pore water of the waste rock. The uranium plume is contained in the Salt Wash Member of the Morrison Formation. The plume does not enter the Entrada Sandstone, the regional aquifer for the area. The Summerville Formation provides an additional buffer zone, restricting potential contamination from entering the groundwater. The modeling analysis did not consider the lower portion of the Brushy Basin formation that underlies the waste-rock pile. As discussed in Section 8.1, the Brushy Basin Formation bentonitic clay exhibits high sorption rates - further restricting the migration of uranium related constituents.

The results of this analysis indicate that conditions are not conducive to the transport of uranium related constituents to the environment. Geochemistry suggests that mobilization of these constituents is unlikely. There is no indication of a continuous groundwater system that could provide a pathway for these constituents to migrate from the mine to the environment. Any potential groundwater system in the ore producing sandstones would flow away from the canyon wall and deep into the syncline west of the site. Transport modeling has shown that vertical migration from the upper Salt Wash sandstone to the Entrada Formation is highly unlikely due to the lack of water, low permeability of the strata and the sorption of uranium related constituents.

8.7 Proposed Groundwater Monitoring Plan

Water encountered during mining will be sampled and sent for chemical analysis. If levels of uranium-related constituents are above established regulatory guidelines, Cotter will initiate monitoring according to DRMS regulation. A well will be placed down gradient of the mining area. Based upon the data gathered by Cotter, this approach has the best probability of encountering and effectively monitoring groundwater.

(9) Groundwater Quality Data

The results of this analysis indicate that conditions are not conducive to the transport of uranium related constituents to the environment. Geochemistry suggests that mobilization of these constituents is unlikely. There is no indication of a continuous

groundwater system that could provide a pathway for these constituents to migrate from the mine to the environment. Transport modeling has shown that vertical migration from the upper Salt Wash sandstone to the Entrada Formation is highly unlikely due to the lack of water, low permeability of the strata and the sorption of uranium related constituents.

A review of well records at the Colorado State Engineer's Office indicates there are no wells within two miles of the SR-11 site. There are several wells near Egnar, Colorado, approximately 6 miles southeast of the mine, but these wells range in depth from 100 to 160 feet and consequently are completed in the Dakota/Burro Canyon Formations. There are no records for deeper wells penetrating a potential aquifer below the SR-11 mine such as the Entrada or Navajo Sandstones.

(10) Surface Water Control and Containment Facilities Information

There is no evidence of water discharge or affected surface water at the SR-11 Mine. For a full discussion of the surface water at SR-11 see Exhibit G - Water Information.

Stormwater is diverted away from the ore and waste rock stockpiles through berms, ditches and catchment basins, see above (7) Facility Evaluation for discussion and design of these structures

The Drainage Design Plan, developed for this site, can be found in Appendix III.

(11) Surface Water Quality Data

There are no surface waters within 2 miles of the SR-11 mine. There are no perennial streams or rivers in the area surrounding the SR-11 mine. The nearest continuously flowing surface water system is the Dolores River that is located approximately 6 miles from the mine. The mine portal sits on the flanks of Summit Canyon that drains to the Dolores River near Slick Rock. No water was observed in the canyon and the drainage is considered ephemeral - flowing only during periods of snowmelt or for brief periods following summer thunderstorms. A USGS gaging station on the Dolores River at Bedrock, Colorado monitors total dissolved solids that during baseflow conditions average approximately 350 mg/l.

(12) Water Quality Monitoring Plan

As discussed above in sections (7) and (8), it is not anticipated that the SR-11 Mine will have any adverse effect on any surface waters, thus it is not necessary at this time to implement a monitoring plan.

(13) Climate

The closest weather station to the SR-11 Mine is located in Northdale, Colorado, approximately 12 miles from the portal. Available precipitation and pan evaporation data for this site is presented in Exhibit K - Climate.

13.1 Temperature

Temperatures at the Northdale NWS meteorological station generally range from 42° to 83° F in the summer and from 9° to 38° F in the winter. The overall average maximum annual temperature at Northdale is 61.1° (See Exhibit K - Table 1)

13.2 Wind Speed

Wind speed data was not available at the Northdale meteorological station. Longer term wind speed records are available from the BLM and the Boise Interagency Fire Center Remote Automatic Weather Station (RAWS) in Nucla, Colorado (NUCC2), elevation 5860 ft. Based on the available data from the Nucla station from 2002 through 2012, the average annual wind speed is 5.0 mph. Winds are primarily westerly winds.

As indicated in the climate data, precipitation for the Northdale site is 12.49 inches per year, whereas the pan evaporation rate is approximately 53 inches per year. The evapotranspiration rates (evaporation plus transpiration rates from area vegetation) in this semi-arid location would be higher than simple pan evaporation rates. Therefore, all rain and snow melt will infiltrate the porous dump material with very little percolating completely through the pile, the rest being returned to the atmosphere via evaporation, transpiration, or being absorbed by the dry but porous rock, leaving very little water for recharge.

(14) Geochemical Data and Analysis

This section discusses the results of the SPLP tests to measure the concentration of uranium related constituents leaching from waste rock stockpiles. During mining of ore at SR-11, representative ore samples will be submitted for SPLP testing and the results reported to the DRMS. Besides uranium and vanadium, several constituents are commonly associated with these types of mineral deposits. These constituents include arsenic, molybdenum, selenium, and at some sites radium. While all of these constituents occur naturally in the environment, their association with mining operations and potential for migration in the environment is examined.

Analytical results from the SPLP tests are compared with the appropriate federal and state water quality regulations and guidelines. These regulations include the Safe Drinking Water Act, National Secondary Drinking Water Standards (not federally enforceable), State of Colorado Basic Standards for Groundwater (5 CCR 1002-41), and Colorado Agricultural Standards.

14.1 Results of SPLP Tests

Laboratory SPLP results for chemical constituents of interests from waste rock samples are presented in Table U3 along with applicable water quality standards and guidelines.

Table U3: Constituents of Concern from the SR-11 Waste Rock Stockpile

Constituent	SPLP Laboratory results	Federal MCL	Federal Secondary Standards	Colorado Ground-water Standards	Colorado Agriculture Guidelines
Fluoride	0.6 mg/l		2.0 mg/l	4.0 mg/l	2 mg/l
Sulfate	15 mg/l		250 mg/l	250 mg/l	
TDS	164 mg/l		500 mg/l		
pH	10.2				
Aluminum	0.95 mg/l		0.05-0.2 mg/l		5 mg/l
Arsenic	0.003 mg/l	0.010 mg/l		0.01 mg/l	0.1 mg/l
Molybdenum	ND			0.035 mg/l	
Selenium	0.002 mg/l	0.050 mg/l		0.05 mg/l	
Uranium	0.0008 mg/l	0.030 mg/l		0.03 mg/l	
Vanadium	0.01 mg/l				0.1 mg/l
Zinc	0.02 mg/l				2 mg/l
Gross Alpha	ND			15 pCi/l	
Radium 226	ND	5 pCi/l			

No constituents exceed federal drinking water standards, Colorado State Groundwater standards, or agricultural guidelines. Only aluminum is within the range of Secondary Water Quality Standards - probably due to the high clay of the soils.

14.2 Mobility of Detected Uranium Ore Related Constituents

Two factors control the mobility of constituents identified in the SPLP analysis - precipitation and sorption. Limited precipitation in the area combined with high evapotranspiration rates make it unlikely that sufficient precipitation is available to mobilize ore related constituents any significant distances. The most likely scenario is that the majority of precipitation that falls in the area would be contained in the top layer of soil and waste material and used by plants covering the waste rock stockpiles once remediation is completed.

The simplest and most common method of estimating contaminant retardation is based on the partition (or distribution) coefficient, K_d. The K_d parameter is a factor related to the partitioning of a contaminant between the solid and aqueous phases. It is an empirical unit of measurement that attempts to account for various chemical and physical retardation mechanisms that are influenced by a myriad of variables. The K_d metric is the most common measure used in transport codes to describe the extent to which contaminants are sorbed to soils. A primary advantage of the K_d model is that it is easily inserted into hydrologic transport codes to quantify reduction in the rate of transport of the contaminant relative to groundwater, either by advection or diffusion.

The partition coefficient, K_d, is defined as the ratio of the quantity of the adsorbate adsorbed per mass of solid to the amount of the adsorbate remaining in solution at equilibrium. For the reaction

$$A + C_i = A_i$$

the mass action expression for K_d is

$$K_d = \frac{\text{Mass of Adsorbate Sorbed } (A_i)}{\text{Mass of Adsorbate in Solution } (C_i)}$$

Where A = free or unoccupied surface adsorption sites, C_i = total dissolved adsorbate remaining in solution at equilibrium, and A_i = amount of adsorbate on the solid at equilibrium.

Transport modeling simulations conducted at similar sites to SR-11 were conducted by Kearl (2005). The modeling was very conservative and followed NRC guidelines for high-level waste repositories. Using published Kd values for ore related constituents for transport calculation in sand and clay materials, it was determined that after 1000 years, the relative concentration of these at depths of less than 100 to 200 feet below the base of the waste rock pile would be 1/1,000,000 of the initial concentration. Since none of the constituents measured in the SPLP test showed any concentrations that exceeded drinking water standards or Colorado State guidelines, concentrations at any depth below the waste rock pile would not be of any environmental concern.

As previously discussed, once mining resumes at SR-11 and mining reaches the ore zone, representative ore samples will be submitted for SPLP testing and the results evaluated and reported to the DRMS.

14.3 Acid Mine Drainage Potential

As discussed in Section 6.1.1, there is a low potential for the development of acid mine drainage from the waste rock or ore stockpiles due to the chemical nature of the rock forming minerals. Salt Wash sandstones are commonly calcareous meaning that calcium carbonate cements the sand grains together forming sandstones. Water percolating through the waste rock or ore stockpiles would be expected to become alkaline due to the rocks chemistry. EPA Method 1312, Synthetic Precipitation Leaching Procedure (SPLP), requires an acidic solution with a pH of 5.0 be used for the tests.

As shown by the SPLP test results, pH of the water solution passed through the rock samples is 10.2 or alkaline. The waste rock acts as a buffer to acidic solutions. This result is consistent with the rock chemistry and shows that there is no potential for waste rock piles to form acid mine drainage.

(15) Construction Schedule Information

Ore and waste rock pile sites have already been chosen and will expand as mining continues (See Exhibit C - Maps, Figure C4). Berms and catchment basins will be improved and added as necessary presented in Appendix III - Drainage Design Plan. These structures will be regularly monitored and maintained.

Table 4: Construction Schedule

DATES	ACTIVITY	STATUS
2005-Present	Maintenance of existing stormwater BMPs	Ongoing
TBD	Implementation of new stormwater BMP's	Pending (application approval)
TBD	Sealing of mine portal	Pending (post mining)
TBD	Removal of mining facilities	Pending (post mining)
TBD	Site final reclamation (grading, pocking, seeding)	Pending (post mining)

TBD = dates to be determined

(16) Quality Assurance and Quality Control Program

The design and implementation of the Drainage Design Plan will be overseen by a registered professional engineer. Cotter will conduct regular inspections of all structures, repairing damage and making improvements as needed.

(17) Plant Growth Medium (Soils)

The surface disturbance at SR-11 occurs primarily in soil type 75, as marked on the soil map included in this exhibit. A soil analysis was done on these soil types and the results can be found on pages U-22 and U-23. Cotter will comply with Colorado State University's recommendations as closely as possible.

For a full description of soil types as well as a complete report from the Department of Agriculture, Natural Resources Conservation Service, outlining the soils relationship to the local vegetation in the SR-11 area see Exhibit I - Soil Information, and Exhibit J - Vegetation Information.

(18) Wildlife Protection

In order to minimize or prevent harm or damage to wildlife, Cotter will follow recommendations given by the Colorado Parks and Wildlife (CPW) as closely as possible. For a full copy of CPW's report, see Exhibit H - Wildlife Information.

Connor Design Group
Attn: Karen Fischer
2350 G Rd,
Grand Junction, CO 81505

Karen,
Number 440 and 441 are the samples you submitted marked SR11 and SR13A#57 respectively.
The pH levels are normal for this area and soluble salt levels are appropriately low for native grasses.
Native grasses typically like low Nitrogen levels while applying nitrogen will increase weed competition and reduce grass establishment. You might consider adding fresh wood chips to #440 to help reduce the nitrogen level.
The phosphorus level is low in both samples. Ward Lab has used the Olsen method. To correlate this with AB-DPTA method you need to multiply by 0.17. Thus the phosphate level for 440 is 1.24 ppm and for 441 is 1.9 ppm. Working eighty-eight (88) pounds of P2O5 per acre into these soils would increase root growth and plant survival.
There are two publications on my web site you might consider looking at.
http://www.coopext.colostate.edu/TRA/PLANTS/drylandgrasssand.shtml
http://www.coopext.colostate.edu/TRA/PLANTS/drylandgrassclaysoil.shtml

Sincerely,

Curtis E. Swift

Curtis E. Swift, PhD
Area Extension Agent Horticulture
Voice: 970 244-1840; Cell Phone: 970 250-5586; Fax: 970 244-1700
Email address: Curtis.Swift@colostate.edu
Web Site: http://WesternSlopeGardening.org

WARD Laboratories, Inc.

Ag Testing - Consulting

Account No. : 20217

SWIFT, CURTIS
FRIENDS & FLOWERS
CSU TRI RIVER EXTENSION
2775 HWY 50
GRAND JUNCTION CO 81503

Soil Analysis Report

Invoice No. : 1106848
Date Received : 05/04/2012
Date Reported : 05/08/2012

Results For : CURTIS SWIFT
Location :

Sample ID / Lab No.	Soil pH 1:1	Modified WDRF BpH	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI-%	FIA Nitrate ppm N	Depth Nitrate Lbs N/A	Method Phosphorus ppm P	-Ammonium Acetate- K ppm	Ca ppm	Mg ppm	Na ppm	Ca-P Sulfate ppm S	----------DTPA---------- Zn ppm	Fe ppm	Mn ppm	Cu ppm	Hot Water Boron ppm B	$CaNO_3$ Chloride ppm Cl	Sum of Cations me/100g	% Base -----Saturation----- H	K	Ca	Mg	Na
438							0 - 8 in	O-P																	
69505	7.8		1.09	HIGH	2.8	59.7	143	28.1	509	4896	322	663	116	2.09	13.3	4.8	0.67			31.4	0	4	78	9	9
439							0 - 8 in	O-P																	
69506	7.9		0.60	HIGH	2.3	40.1	96	36.0	383	5226	476	109	22	3.31	10.6	5.2	1.19			31.6	0	3	83	13	1
440							0 - 8 in	O-P																	
69507	8.0		0.59	HIGH	2.2	35.4	85	7.3	242	5843	305	14	19	0.20	10.9	12.2	0.53			32.4	0	2	90	8	0
441							0 - 8 in	O-P																	
69508	8.0		0.19	HIGH	0.8	1.2	3	11.3	273	3025	175	9	4	0.47	4.4	5.6	0.62			17.3	0	4	87	8	0

Reviewed By: Joshua Skrdla

Copy : 1

5/8/2012

Page 1 of 1

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Exhibit 6.5
Geotechnical Stability
SR-11 Mine Permit Amendment
M-1977-451

The primary geotechnical parameters for predicting slope stability include shear strength, angle of repose, weathering of rock, moisture content and stability of the underlying foundation.

Shear Strength

Shear strength is calculated using the Mohr-Coulomb failure criterion (Fredlund et al., 1996). The shear strength of granular soil is frequently characterized by the angle of internal friction (φ) and cohesion (C), as follows:

$\tau = c' + (\sigma n - uw) \tan \varphi'$ [1] where:
τ = shear strength
c' = cohesion intercept (due to adhesion, cementation, stress history, interlocking of particles, etc.)
φ' = effective angle of internal friction
σn = total normal stress on the plane of failure
$(\sigma n - uw)$ = effective normal stress on the plane of failure
uw = pore-water pressure.

While shear strength (τ) was not calculated specifically for the waste rock pile at SR-11, there is sufficient data from similar waste rock piles to infer that the shear strength of the pile at SR-11 will yield values sufficient for a stable slope.

The angle of internal friction angle is a function of the following parameters (Hawley, 2001; Holtz and Kovacs, 2003):

1. Particle shape and roughness of grain surface (friction angle typically increases with increasing angularity and surface roughness):

   SR-11: The waste rock is blasted and thus consists primarily of rough edged materials.

2. Grain quality (weak rock materials such as shale have lower friction angles compared to strong rock materials such as granite)

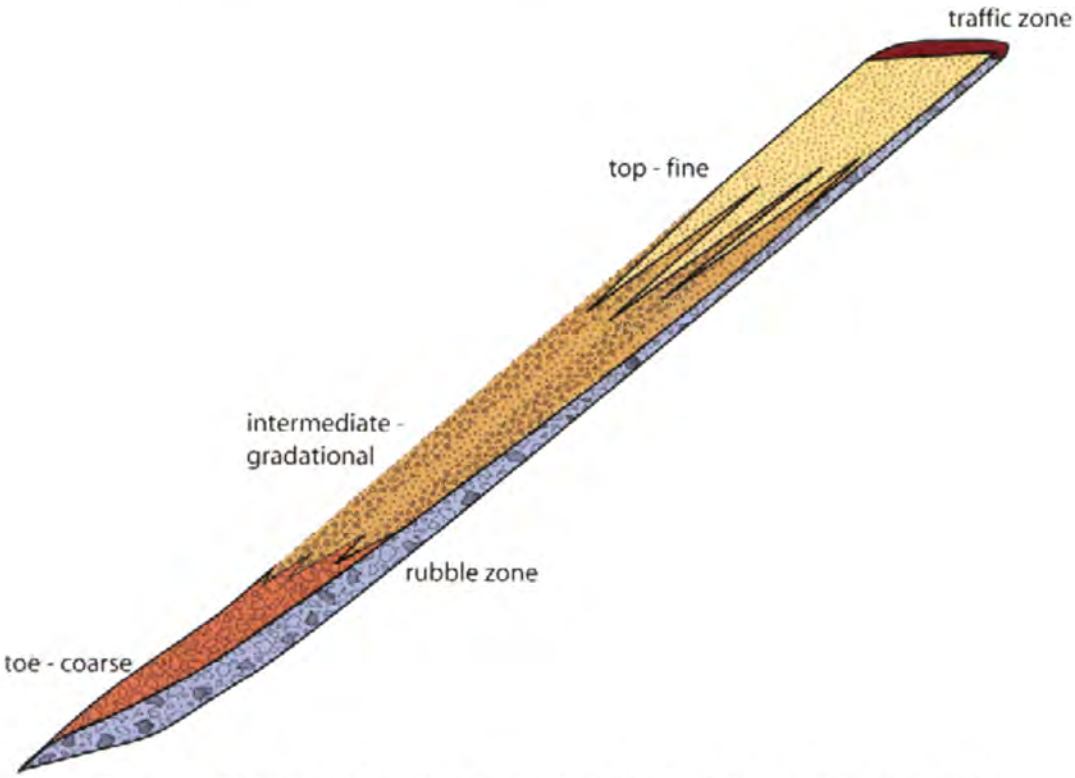
   SR-11: Waste rock is primarily sandstone, a semi weak rock.

3. Grain size (friction angle increases or decreases with increase in grain size)

   SR-11: Waste rock has been blasted so it ranges in size from small boulders to medium pebbles.

4. Grain size distribution (friction angle typically decreases with decreasing coefficient of uniformity, Cu)

   SR-11: End dumping (dumping rock over dump face resulting in some particle size segregation down slope towards the toe of the rock pile, with particle size generally increasing. See diagram below.) This could potentially lower the value of the friction angle. However, the slope is not excessively high and in final reclamation this slope will be re-contoured and spread out to obtain a more gradual slope. The end result will be a slope where the rock sizes are mixed.



5. State of compaction or packing (friction angle typically increases with increasing density or decreasing void ratio)

   SR-11: It can be assumed due to the type of rock and redistribution of waste rock and grading that will take place during reclamation (see # 4 above) that the rock pile is fairly compacted.

6. Specific gravity (related to mineralogy)

   SR-11: 2.20-2.80 gm/cc is the specific gravity of sandstone based on tabular data from EduMine - Professional Development and Training for Mining and the Geosciences. (http://www.edumine.com/xtoolkit/tables/sgtables.htm)

7. Applied stress level (friction angle decreases with increasing confining stress, resulting in a curved strength envelope passing through the origin instead of the classical straight line)

   SR-11: This is calculated based on ton/ft^2. Compared with other uranium mines, SR-11 produces a normal amount of waste rock (50-300 tons per day), thus it can be assumed that applied stress level will be normal to low.

8. Definition of failure conditions (drained or undrained) and degree of saturation.

   SR-11 is a dry mine thus the waste rock typically has little to no moisture and precipitation in the area is low.

Based on the known characteristics of the waste rock pile, most of these parameters indicate that the internal angle of friction will be normal to high.

Triaxial strength testing of large size (up to 200 mm) of rock fill particles, similar to those found in mine rock piles, have internal friction angles in the range of 40° to 50°, the lower end of the range corresponding to fine-grained material, and the upper end of the range corresponding to coarse-grained material (Leps, 1970).

Angle of Repose

Recommended angle of repose for waste dumps are:

(i) unweathered rock ~ 1(V):1.75(H)
(ii) weathered rock, overburden, up to 15 m high ~ 1(V):2.5(H)
(iii) weathered rock, overburden, greater than 15 m high ~ 1(V):3(H)
(*Geotechnical Slope Stability,* January, 1995.)

The waste rock pile will be graded at 3(H):1(V), or 18.43° putting the waste pile well within the recommended range.

Foundation Stability

The foundation of the waste rock pile is a gradually sloping area. The underlying soils have heavy clay content and there are no known aquifers under the pile. Therefore, there is no water that could enter the pile from below and compromise the stability of the underlying soils or the waste rock pile itself.

Factor of Safety (FS)

For infinite slopes consisting of cohesionless soils that are either above the water table or that are fully submerged, the factor of safety for slope stability is determined as follows:

FS = Tan• /Tan•

where,

- = the angle of internal friction for the soil
- = the slope angle relative to the horizontal (*WSDOT Geotechnical Design Manual M)*

There could be a small amount of cohesion which would add to the strength but this will be ignored in order to calculate the worst case scenario.

FS = tan (40°)/tan (18.43°) = 2.518

>1.4 is the recommended parameter for safety factor of permanent slopes.

Thus the 3:1 slope satisfies the Factor of Safety for this material.

References:

WSDOT Geotechnical Design Manual M 46-03.01 Page 7-i
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Leps, T.M., 1970, Review of Shearing Strength of rockfill: Journal of Soil Mechanics and Foundation Engineering Division, v. 96(SM4), p. 1159-1170.

Emergency Response Plan

Currently the SR-11 mine is not producing. As soon as mining operations commence again, the Emergency Response and Control Plan will be updated to include all relevant contact numbers in the case of a spill. The current plan outlining response procedures are included below.

Emergency Response and Control Plan
SR-11 Mine

Section 1: History of Spills

There have been no spills at this facility

Section 2: Emergency Response Procedures

A. Spill Definition: For the purpose of this procedure a spill is defined as the unintentional release of a material in use, process, or storage at the SR-11 Mine that may result in a significant adverse impact on the environment.

   The materials used, processed or stored at the mine site that may have an adverse impact to the environment have been identified and listed in Section 5 - List of Materials Representing a Spill Threat to the Environment.

B. Internal Notification: If it is believed by an employee that a spill has occurred, or is about to occur, the mine foreman should be notified. The mine foreman should be provided with the following information:

   a. The location and nature of the incident
   b. The type of material
   c. The quantity of material released

   The mine foreman will be responsible for notifying the Safety Director and the Environmental Coordinator of the situation. The Environmental Coordinator will determine whether any spill includes hazardous material in reportable quantities. Any spill over 25 gallons or an amount that reaches waters of the United States will be reported to the Colorado Department of Public Health and Environment.

   If it is determined that the incident is a spill, the mine foreman will gather assistance, as necessary, to help with the containment phase.

C. Containment: Efforts will be taken to terminate any ongoing release of material, and contain the spilled material through berming and/or absorption.

D. Sampling: Liquid and/or solid samples will be collected in the area affected by the spill to determine the extent of the spill, and the clean-up required.

E. Clean-up: Clean-up will consist of containment and removal of the spilled material, material containment by the spill, and any other debris resulting from the spill. Following the clean-up, the area affected by the spill will be restored to pre-spill conditions.

The materials contaminated by the spill that are cleaned-up will be disposed of in an appropriate manner depending on the type of contamination.

F. Report Preparation: The Environmental Coordinator will be responsible for preparing a report that addresses the cause of the spill, the spill containment procedures used, the results of the sampling that was performed to determine the extent of the spill, the results of the clean-up effort, and recommendations for measures to prevent future occurrences of similar incidences.

Section 3: Government Agency Notification

Fuel and oil spills will be evaluated to determine the reporting requirements. Spills greater than 25 gallons that are contained and will not reach a water body will be reported by telephone to the CDPHE, and then a written report will be submitted to the appropriate agency or official within five working days after the spill. (Any quantity of a petroleum based substance that reaches the waters of the United States will be immediately reported to the CDPHE Hotline). The spill hotline number at the CDPHE office in Denver, Colorado is 1-877-518-5608.

Section 4: Preventative Facilities

The item listed below has been identified as materials that have spill potential. The preventative features of the storage locations are described along with the materials.

Materials and Location	Spill Containment Features
Diesel Fuel Tank	Hypalon lined earthen bermed containment

Section 5: List of Materials Representing a Spill Threat to the Environment

Material	Location	Quantity
Diesel Fuel	Diesel fuel tank	500 gallon max
Lubricants, oil and antifreeze	Compressor shed	5 gallon buckets

Section 6: Implementation

Currently both preventative facilities are in place and functioning. They will continue to be maintained during times of active mining as well as times of temporary cessation.

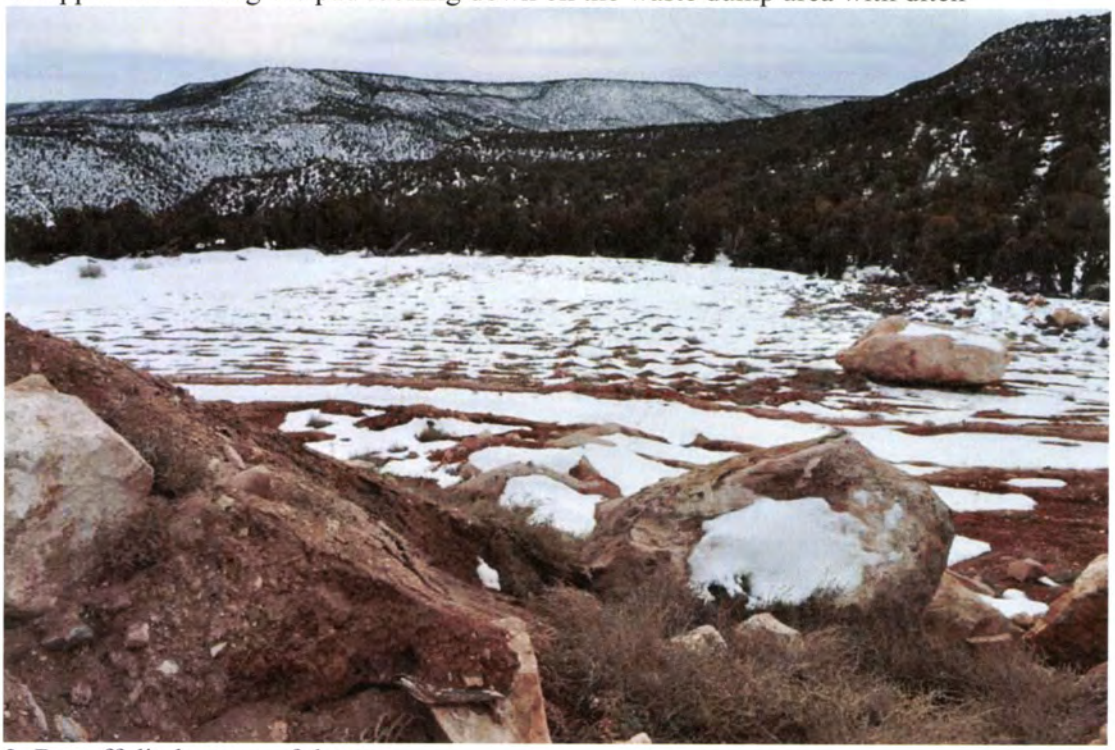
Section 7: Periodic Review

The plan will be reviewed and updated as necessary when changes to the mine facility layout and materials in use there occur. There is no diesel fuel or lubricants at the site now.

SR-11
Appendix I – Photos

1. Portal looking west

2. Upper berm along ore pad looking down on the waste dump area with ditch



3. Runoff ditch at toe of dump

4. Runoff basin.

5. Soil stockpile.

6. Water tank.

7. Work trailer.

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ANALYTICAL SUMMARY REPORT

June 13, 2012

O'Connor Design Inc
2350 G Rd
Grand Junction, CO 81505-9679

Workorder No.: C12050180

Project Name: SR-11

Energy Laboratories, Inc. Casper WY received the following 1 sample for O'Connor Design Inc on 5/3/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C12050180-001	SR-11	04/25/12 14:30	05/03/12	Waste Rock	Metals, SPLP Extractable Conductivity Mercury, SPLP Mercury Analysis Prep Filterability Fluoride E300.0 Anions Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite pH Digestion, Total Metals Gross Alpha, Gross Beta Radium 226, Total SPLP Extraction, Regular

The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing. Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. Data corrected for moisture content are typically noted as - dry on the report. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11
Lab ID: C12050180-001
Client Sample ID: SR-11

Report Date: 06/13/12
Collection Date: 04/25/12 14:30
DateReceived: 05/03/12
Matrix: Waste Rock

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Filterable	No					SW1311	05/10/12 08:48 / dcj
MAJOR IONS - SPLP EXTRACTABLE							
Chloride	ND	mg/L		1		E300.0	05/12/12 03:52 / wc
Fluoride	0.6	mg/L		0.1		A4500-F C	05/11/12 09:57 / jba
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	05/11/12 12:48 / dc
Nitrogen, Nitrate+Nitrite as N	2.6	mg/L	B	0.1		E353.2	05/10/12 14:54 / dc
Sulfate	15	mg/L		1		E300.0	05/12/12 03:52 / wc
PHYSICAL PROPERTIES - SPLP EXTRACTABLE							
Conductivity @ 25 C	252	umhos/cm		1		A2510 B	05/10/12 10:48 / ab
pH	10.2	s.u.	H	0.01		A4500-H B	05/10/12 10:48 / ab
METALS - SPLP EXTRACTABLE							
Aluminum	0.95	mg/L		0.03		SW6020	05/12/12 00:34 / smm
Antimony	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Arsenic	0.003	mg/L	B	0.001		SW6020	05/12/12 00:34 / smm
Barium	ND	mg/L		0.05		SW6020	05/12/12 00:34 / smm
Beryllium	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Cadmium	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Chromium	ND	mg/L		0.005		SW6020	05/12/12 00:34 / smm
Copper	ND	mg/L		0.005		SW6020	05/12/12 00:34 / smm
Iron	0.45	mg/L	B	0.03		SW6020	05/12/12 00:34 / smm
Lead	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Manganese	0.005	mg/L		0.001		SW6010B	05/14/12 20:31 / sf
Mercury	ND	mg/L		0.0020		SW7470A	05/17/12 14:04 / jrm
Molybdenum	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Nickel	ND	mg/L		0.005		SW6020	05/12/12 00:34 / smm
Selenium	0.002	mg/L	B	0.001		SW6020	05/12/12 00:34 / smm
Silver	ND	mg/L		0.001		SW6020	05/12/12 00:34 / smm
Thallium	ND	mg/L		0.0005		SW6020	05/12/12 00:34 / smm
Uranium	0.0008	mg/L	B	0.0003		SW6020	05/12/12 00:34 / smm
Vanadium	0.01	mg/L		0.01		SW6020	05/12/12 00:34 / smm
Zinc	0.02	mg/L		0.01		SW6020	05/12/12 00:34 / smm
RADIONUCLIDES - SPLP EXTRACTABLE							
Gross Alpha	-0.7	pCi/L	U			E900.0	06/02/12 06:29 / lbb
Gross Alpha precision (±)	1.0	pCi/L				E900.0	06/02/12 06:29 / lbb
Gross Alpha MDC	1.8	pCi/L				E900.0	06/02/12 06:29 / lbb
Radium 226	-0.6	pCi/L	U			E903.0	05/25/12 14:44 / trs
Radium 226 precision (±)	0.71	pCi/L				E903.0	05/25/12 14:44 / trs
Radium 226 MDC	1.5	pCi/L				E903.0	05/25/12 14:44 / trs

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
B - The analyte was detected in the method blank.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B										Batch: R159476
Sample ID: SC 2ND 1413		Laboratory Control Sample				Run: PHSC_101-C_120510A				05/10/12 10:23
Conductivity @ 25 C		1440	umhos/cm	1.0	102	90	110			
Sample ID: MBLK		Method Blank				Run: PHSC_101-C_120510A				05/10/12 10:28
Conductivity @ 25 C		2	umhos/cm	0.2						
Sample ID: C12050349-001ADUP		Sample Duplicate				Run: PHSC_101-C_120510A				05/10/12 10:59
Conductivity @ 25 C		474	umhos/cm	1.0				1.4	10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Batch: 33575
Sample ID: MB-33575		Method Blank				Run: MANTECH_120511A				05/11/12 09:26
Fluoride		0.05	mg/L	0.01						
Sample ID: LCS-33575		Laboratory Control Sample				Run: MANTECH_120511A				05/11/12 09:33
Fluoride		1.96	mg/L	0.10	96	90	110			
Sample ID: C12050163-001AMS		Sample Matrix Spike				Run: MANTECH_120511A				05/11/12 09:43
Fluoride		2.25	mg/L	0.10	98	80	120			
Sample ID: C12050163-001AMSD		Sample Matrix Spike Duplicate				Run: MANTECH_120511A				05/11/12 09:50
Fluoride		2.25	mg/L	0.10	98	80	120	0.0	10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC_101-C_120510A	
Sample ID: pH 6.86		Initial Calibration Verification Standard							05/10/12 10:09	
pH		6.84	s.u.	0.010	100	98	102			
Method: A4500-H B									Batch: R159476	
Sample ID: C12050349-001ADUP		Sample Duplicate				Run: PHSC_101-C_120510A			05/10/12 10:59	
pH		8.51	s.u.	0.010				0.0	3	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-NH3 G										Batch: 33575
Sample ID: MB-33575		Method Blank				Run: TECHNICON_120511A				05/11/12 12:36
Nitrogen, Ammonia as N		ND	mg/L	0.02						
Sample ID: LCS-33575		Laboratory Control Sample				Run: TECHNICON_120511A				05/11/12 12:38
Nitrogen, Ammonia as N		2.06	mg/L	0.050	105	90	110			
Sample ID: C12050180-001AMS		Sample Matrix Spike				Run: TECHNICON_120511A				05/11/12 12:50
Nitrogen, Ammonia as N		2.07	mg/L	0.050	106	90	110			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC2-C_120511A	
Sample ID: ICV-051112-10	2	Initial Calibration Verification Standard							05/11/12 18:52	
Chloride		9.94	mg/L	1.0	99	90	110			
Sulfate		39.9	mg/L	1.0	100	90	110			
Method: E300.0									Batch: R159553	
Sample ID: ICB-051112-11	2	Method Blank				Run: IC2-C_120511A			05/11/12 19:07	
Chloride		ND	mg/L	0.03						
Sulfate		0.1	mg/L	0.10						
Sample ID: LFB-051112-12	2	Laboratory Fortified Blank				Run: IC2-C_120511A			05/11/12 19:23	
Chloride		10.2	mg/L	1.0	102	90	110			
Sulfate		39.6	mg/L	1.0	99	90	110			
Sample ID: C12050180-001AMS	2	Sample Matrix Spike				Run: IC2-C_120511A			05/12/12 04:07	
Chloride		11.0	mg/L	1.0	106	90	110			
Sulfate		53.3	mg/L	1.0	100	90	110			
Sample ID: C12050180-001AMSD	2	Sample Matrix Spike Duplicate				Run: IC2-C_120511A			05/12/12 04:22	
Chloride		11.4	mg/L	1.0	111	90	110	4.1	10	S
Sulfate		55.0	mg/L	1.0	104	90	110	3.2	10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Batch: 33575
Sample ID: MB-33575		Method Blank				Run: TECHNICON_120510A				05/10/12 14:39
Nitrogen, Nitrate+Nitrite as N		1	mg/L	0.06						
Sample ID: LCS-33575		Laboratory Control Sample				Run: TECHNICON_120510A				05/10/12 14:41
Nitrogen, Nitrate+Nitrite as N		2.83	mg/L	0.10	93	90	110			
Sample ID: C12050180-001AMS		Sample Matrix Spike				Run: TECHNICON_120510A				05/10/12 14:56
Nitrogen, Nitrate+Nitrite as N		4.16	mg/L	0.10	82	90	110			S

- Matrix spike recoveries outside the acceptance range are considered matrix-related.

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E900.0										Batch: GrAB-1280
Sample ID: Th230-GrAB-1280		Laboratory Control Sample				Run: G542M_120531A				06/02/12 06:29
Gross Alpha		199	pCi/L		98	80	120			
Sample ID: MB-GrAB-1280	3	Method Blank				Run: G542M_120531A				06/02/12 06:29
Gross Alpha		-1	pCi/L							U
Gross Alpha precision (±)		0.9	pCi/L							
Gross Alpha MDC		2	pCi/L							
Sample ID: C12050179-001ADUP	3	Sample Duplicate				Run: G542M_120531A				06/02/12 06:29
Gross Alpha		73.3	pCi/L					22	21	R
Gross Alpha precision (±)		3.83	pCi/L							
Gross Alpha MDC		2.17	pCi/L							
Duplicate RPD is outside of the acceptance range for this analysis indicating a possible low precision for the batch. The sample associated with this Duplicate has been reanalyzed and the results for the reanalysis are shown on the Analytical Report for that sample.										
Sample ID: C12050180-001AMS		Sample Matrix Spike				Run: G542M_120531A				06/02/12 06:29
Gross Alpha		212	pCi/L		104	70	130			
Sample ID: C12050180-001AMSD		Sample Matrix Spike Duplicate				Run: G542M_120531A				06/02/12 06:29
Gross Alpha		199	pCi/L		98	70	130	6.4	15.7	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration

ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: 33575
Sample ID: C12050163-001AMS		Sample Matrix Spike				Run: BERTHOLD 770-2_120511A				05/25/12 14:44
Radium 226		67	pCi/L		104	70	130			
Sample ID: C12050163-001AMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-2_120511A				05/25/12 14:44
Radium 226		69	pCi/L		107	70	130	2.7	24.8	
Sample ID: LCS-33575		Laboratory Control Sample				Run: BERTHOLD 770-2_120511A				05/25/12 14:44
Radium 226		13	pCi/L		103	80	120			
Sample ID: MB-33575	3	Method Blank				Run: BERTHOLD 770-2_120511A				05/25/12 14:44
Radium 226		-0.08	pCi/L							U
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.3	pCi/L							

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Analytical Run: ICP2-C_120514A	
Sample ID: ICV		Initial Calibration Verification Standard							05/14/12 15:44	
Manganese		5.12	mg/L	0.010	102	95	105			
Sample ID: ICSA		Interference Check Sample A							05/14/12 16:04	
Manganese		-0.00480	mg/L	0.010						
Sample ID: ICSAB		Interference Check Sample AB							05/14/12 16:08	
Manganese		0.548	mg/L	0.010	110	80	120			
Method: SW6010B									Batch: 33605	
Sample ID: MB-33605		Method Blank				Run: ICP2-C_120514A			05/14/12 19:22	
Manganese		ND	mg/L	0.0002						
Sample ID: LCS3-33605		Laboratory Control Sample				Run: ICP2-C_120514A			05/14/12 19:26	
Manganese		2.6	mg/L	0.0010	103	80	120			
Sample ID: LCSD3-33605		Laboratory Control Sample Duplicate				Run: ICP2-C_120514A			05/14/12 19:30	
Manganese		2.5	mg/L	0.0010	101	80	120			
Sample ID: C12050163-001ADIL		Serial Dilution				Run: ICP2-C_120514A			05/14/12 19:38	
Manganese		ND	mg/L	0.0010		0	0		20	
Sample ID: C12050180-001AMS3		Sample Matrix Spike				Run: ICP2-C_120514A			05/14/12 20:35	
Manganese		2.5	mg/L	0.0010	101	75	125			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS4-C_120511A		
Sample ID: ICV	18	Initial Calibration Verification Standard							05/12/12 03:15	
Aluminum		0.0485	mg/L	0.0010	97	90	110			
Antimony		0.0503	mg/L	0.0010	101	90	110			
Arsenic		0.0488	mg/L	0.0010	98	90	110			
Barium		0.0492	mg/L	0.0010	98	90	110			
Beryllium		0.0498	mg/L	0.010	100	90	110			
Cadmium		0.0500	mg/L	0.0010	100	90	110			
Chromium		0.0494	mg/L	0.0010	99	90	110			
Copper		0.0498	mg/L	0.0010	100	90	110			
Iron		1.00	mg/L	0.0010	100	90	110			
Lead		0.0495	mg/L	0.0010	99	90	110			
Molybdenum		0.0511	mg/L	0.0010	102	90	110			
Nickel		0.0495	mg/L	0.0010	99	90	110			
Selenium		0.0500	mg/L	0.0010	100	90	110			
Silver		0.0203	mg/L	0.0010	101	90	110			
Thallium		0.0492	mg/L	0.0010	99	90	110			
Uranium		0.0486	mg/L	0.00030	97	90	110			
Vanadium		0.0489	mg/L	0.0010	98	90	110			
Zinc		0.0488	mg/L	0.0010	98	90	110			
Sample ID: ICSA	18	Interference Check Sample A							05/12/12 03:19	
Aluminum		1.12	mg/L	0.0010	112	70	130			
Antimony		0.000214	mg/L	0.0010						
Arsenic		2.81E-05	mg/L	0.0010						
Barium		0.000150	mg/L	0.0010						
Beryllium		5.46E-05	mg/L	0.010						
Cadmium		7.86E-05	mg/L	0.0010						
Chromium		5.49E-05	mg/L	0.0010						
Copper		7.73E-05	mg/L	0.0010						
Iron		1.04	mg/L	0.0010	104	70	130			
Lead		6.05E-05	mg/L	0.0010						
Molybdenum		0.0216	mg/L	0.0010	108	70	130			
Nickel		7.92E-05	mg/L	0.0010						
Selenium		7.44E-05	mg/L	0.0010						
Silver		0.000316	mg/L	0.0010						
Thallium		3.60E-05	mg/L	0.0010						
Uranium		4.42E-05	mg/L	0.00030						
Vanadium		4.83E-05	mg/L	0.0010						
Zinc		0.000988	mg/L	0.0010						
Sample ID: ICSAB	18	Interference Check Sample AB							05/12/12 03:24	
Aluminum		1.09	mg/L	0.0010	109	70	130			
Antimony		3.85E-05	mg/L	0.0010						
Arsenic		0.0103	mg/L	0.0010	103	70	130			
Barium		0.000132	mg/L	0.0010						
Beryllium		8.20E-06	mg/L	0.010						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS4-C_120511A	
Sample ID: ICSAB	18	Interference Check Sample AB							05/12/12 03:24	
Cadmium		0.0103	mg/L	0.0010	103	70	130			
Chromium		0.0106	mg/L	0.0010	106	70	130			
Copper		0.0107	mg/L	0.0010	107	70	130			
Iron		1.01	mg/L	0.0010	101	70	130			
Lead		3.70E-05	mg/L	0.0010						
Molybdenum		0.0212	mg/L	0.0010	106	70	130			
Nickel		0.0107	mg/L	0.0010	107	70	130			
Selenium		7.80E-06	mg/L	0.0010						
Silver		0.0102	mg/L	0.0010	102	70	130			
Thallium		8.00E-07	mg/L	0.0010						
Uranium		6.10E-06	mg/L	0.00030						
Vanadium		7.00E-06	mg/L	0.0010						
Zinc		0.0117	mg/L	0.0010	117	70	130			
Method: SW6020									Batch: 33605	
Sample ID: MB-33605	18	Method Blank				Run: ICPMS4-C_120511A			05/11/12 23:26	
Aluminum		0.03	mg/L	0.001						
Antimony		0.0002	mg/L	5E-05						
Arsenic		0.001	mg/L	7E-05						
Barium		0.004	mg/L	0.0001						
Beryllium		ND	mg/L	6E-05						
Cadmium		0.0001	mg/L	4E-05						
Chromium		0.004	mg/L	0.001						
Copper		0.004	mg/L	6E-05						
Iron		0.05	mg/L	0.0009						
Lead		0.0002	mg/L	3E-05						
Molybdenum		0.0008	mg/L	4E-05						
Nickel		0.0004	mg/L	6E-05						
Selenium		0.001	mg/L	6E-05						
Silver		0.0003	mg/L	2E-05						
Thallium		0.0005	mg/L	5E-05						
Uranium		0.0006	mg/L	5E-05						
Vanadium		0.007	mg/L	7E-05						
Zinc		0.002	mg/L	0.0005						
Sample ID: LCS3-33605	18	Laboratory Control Sample				Run: ICPMS4-C_120511A			05/11/12 23:30	
Aluminum		2.3	mg/L	0.030	92	80	120			
Antimony		0.47	mg/L	0.0010	93	80	120			
Arsenic		0.46	mg/L	0.0010	92	80	120			
Barium		0.48	mg/L	0.050	95	80	120			
Beryllium		0.23	mg/L	0.0010	91	80	120			
Cadmium		0.23	mg/L	0.0010	94	80	120			
Chromium		0.50	mg/L	0.0050	99	80	120			
Copper		0.50	mg/L	0.0050	100	80	120			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 33605
Sample ID: LCS3-33605	18	Laboratory Control Sample				Run: ICPMS4-C_120511A				05/11/12 23:30
Iron		2.4	mg/L	0.030	93	80	120			
Lead		0.50	mg/L	0.0010	100	80	120			
Molybdenum		0.48	mg/L	0.0010	95	80	120			
Nickel		0.50	mg/L	0.0050	101	80	120			
Selenium		0.44	mg/L	0.0010	87	80	120			
Silver		0.049	mg/L	0.0010	97	80	120			
Thallium		0.49	mg/L	0.00050	98	80	120			
Uranium		0.48	mg/L	0.00030	97	80	120			
Vanadium		0.50	mg/L	0.010	98	80	120			
Zinc		0.47	mg/L	0.010	93	80	120			
Sample ID: LCSD3-33605	18	Laboratory Control Sample Duplicate				Run: ICPMS4-C_120511A				05/11/12 23:35
Aluminum		2.4	mg/L	0.030	93	80	120			
Antimony		0.48	mg/L	0.0010	95	80	120			
Arsenic		0.46	mg/L	0.0010	92	80	120			
Barium		0.49	mg/L	0.050	97	80	120			
Beryllium		0.23	mg/L	0.0010	92	80	120			
Cadmium		0.24	mg/L	0.0010	95	80	120			
Chromium		0.49	mg/L	0.0050	98	80	120			
Copper		0.50	mg/L	0.0050	100	80	120			
Iron		2.4	mg/L	0.030	94	80	120			
Lead		0.51	mg/L	0.0010	102	80	120			
Molybdenum		0.49	mg/L	0.0010	97	80	120			
Nickel		0.50	mg/L	0.0050	100	80	120			
Selenium		0.44	mg/L	0.0010	88	80	120			
Silver		0.051	mg/L	0.0010	101	80	120			
Thallium		0.49	mg/L	0.00050	99	80	120			
Uranium		0.50	mg/L	0.00030	100	80	120			
Vanadium		0.49	mg/L	0.010	97	80	120			
Zinc		0.47	mg/L	0.010	93	80	120			
Sample ID: C12050163-001ADIL	18	Serial Dilution				Run: ICPMS4-C_120511A				05/12/12 00:07
Aluminum		0.027	mg/L	0.030		0	0		20	N
Antimony		ND	mg/L	0.0010		0	0		20	
Arsenic		0.087	mg/L	0.0010		0	0	5.0	20	
Barium		0.016	mg/L	0.050		0	0		20	
Beryllium		ND	mg/L	0.0010		0	0		20	
Cadmium		ND	mg/L	0.0010		0	0		20	
Chromium		ND	mg/L	0.011		0	0		20	
Copper		0.0061	mg/L	0.0050		0	0		20	N
Iron		0.019	mg/L	0.030		0	0		20	N
Lead		ND	mg/L	0.0010		0	0		20	
Molybdenum		0.023	mg/L	0.0010		0	0	29	20	R
Nickel		ND	mg/L	0.0050		0	0		20	
Selenium		0.12	mg/L	0.0010		0	0	17	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

R - RPD exceeds advisory limit.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 33605
Sample ID: C12050163-001ADIL	18	Serial Dilution				Run: ICPMS4-C_120511A				05/12/12 00:07
Silver		ND	mg/L	0.0010		0	0		20	
Thallium		ND	mg/L	0.00050		0	0		20	
Uranium		0.016	mg/L	0.00052		0	0	8.0	20	
Vanadium		6.4	mg/L	0.010		0	0	1.5	20	
Zinc		0.098	mg/L	0.010		0	0		20	N
Sample ID: C12050180-001AMS3	18	Sample Matrix Spike				Run: ICPMS4-C_120511A				05/12/12 00:57
Aluminum		3.6	mg/L	0.030	104	75	125			
Antimony		0.48	mg/L	0.0010	95	75	125			
Arsenic		0.46	mg/L	0.0010	91	75	125			
Barium		0.49	mg/L	0.050	97	75	125			
Beryllium		0.22	mg/L	0.0010	87	75	125			
Cadmium		0.23	mg/L	0.0010	94	75	125			
Chromium		0.49	mg/L	0.0050	97	75	125			
Copper		0.49	mg/L	0.0050	97	75	125			
Iron		2.9	mg/L	0.030	96	75	125			
Lead		0.51	mg/L	0.0010	101	75	125			
Molybdenum		0.48	mg/L	0.0010	96	75	125			
Nickel		0.49	mg/L	0.0050	98	75	125			
Selenium		0.43	mg/L	0.0010	86	75	125			
Silver		0.049	mg/L	0.0010	19	75	125			S
Thallium		0.49	mg/L	0.00050	98	75	125			
Uranium		0.50	mg/L	0.00030	100	75	125			
Vanadium		0.49	mg/L	0.010	96	75	125			
Zinc		0.47	mg/L	0.010	89	75	125			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: O'Connor Design Inc
Project: SR-11

Report Date: 06/13/12
Work Order: C12050180

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7470A									Analytical Run: CVAA_C203_120518A	
Sample ID: ICV		Initial Calibration Verification Standard							05/17/12 12:32	
Mercury		0.00487	mg/L	0.00010	97	90	110			
Method: SW7470A									Batch: 33652	
Sample ID: MB-33652		Method Blank				Run: CVAA_C203_120518A			05/17/12 13:42	
Mercury		ND	mg/L	3E-05						
Sample ID: LCS-33652		Laboratory Control Sample				Run: CVAA_C203_120518A			05/17/12 13:51	
Mercury		0.0049	mg/L	0.0020	98	85	115			
Sample ID: LCSD-33652		Laboratory Control Sample Duplicate				Run: CVAA_C203_120518A			05/17/12 13:56	
Mercury		0.0048	mg/L	0.0020	96	85	115	2.2	10	
Sample ID: C12050163-001ADUP		Serial Dilution				Run: CVAA_C203_120518A			05/17/12 13:59	
Mercury		ND	mg/L	0.0020					10	
Sample ID: C12050180-001AMS		Sample Matrix Spike				Run: CVAA_C203_120518A			05/17/12 14:08	
Mercury		0.0045	mg/L	0.0020	90	85	115			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

C12050180

O'Connor Design Inc

Login completed by: Corinne Wagner
Date Received: 5/3/2012

Reviewed by: BL2000\kschroeder
Received by: th

Reviewed Date: 5/7/2012
Carrier name: Ground

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	13.2°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name: Cotter Corporation	Project Name, PWS, Permit, Etc.: SM-18, SR-11 and SR-13A	Sample Origin State: CO	EPA/State Compliance: Yes ☑ No ☐
Report Mail Address: O'Connor Design Inc. 2350 G Rd Grand Jct, CO 81505	Contact Name: Karen Fischer / Phone/Fax: 970 361 6963 / Email: karenlfischer@yahoo.com		Sampler: (Please Print) Karen Fischer
Invoice Address: O'Connor Design Inc. 2350 G Rd. Grand Jct., CO 81505	Invoice Contact & Phone: Sydney Paris 970 241 7125	Purchase Order:	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT (Electronic Data) Format:_____
☐ POTW/WWTP ☐ LEVEL IV
☐ State: _____ ☐ NELAC
☐ Other: _____

Number of Containers
Sample Type: A W S V B O
Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED

SEE ATTACHED | Normal Turnaround (TAT) | RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments:

Shipped by: UPS - Grnd
Cooler ID(s): Box
Receipt Temp: 13.2 °C
On Ice: Yes (No)
Custody Seal Intact: Y (N)
Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	SEE ATTACHED	Normal TAT	RUSH	Comments
1	SM-18	04/25/12	16:00	waste rock	X	X		*Separate Workorder
2	SR-13A	04/25/12	13:45	waste rock	X	X		
3	SR-11	04/25/12	14:30	waste rock	X	X		
4								
5								
6								
7								
8								
9								
10								

LABORATORY USE ONLY: CL2050150

Custody Record MUST be Signed

	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Karen Fischer	05/01/12 11:40	Karen Fischer			
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
				Received by Laboratory:	Date/Time: 5-3-12/930	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: X

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Recommended Water Quality and Geochemical Analytes For Uranium Mine DMO Review.
Field pH
Electrical Conductivity
Aluminum
Arsenic
Barium
Cadmium
Copper
Iron
Lead
Molybdenum
Nickel
Nitrate + Nitrite
Selenium
Sulfate
Uranium
Vanadium
Zinc Ammonia Antimony Beryllium Chromium Chloride Fluoride Manganese Mercury Radium Silver Thallium Gross alpha

+ Radium 226 and 228 (if there is a hit for 226)

NOTE: It is the responsibility of the applicant or permit holder to obtain permit approvals prior to implementation of any monitoring/sampling activities. Please consult with the Division prior to initiating any such activities.

Karen Fischer 5/1/2012

12/17/08

2

May 1, 2012

Karen Fischer
O'Connor Design Group
2350 G Road
Grand Junction, CO 81505
970-361-6963

Subject: Request for Synthetic Precipitation Leaching Procedure (SPLP) on samples SM-18, SR-11 and SR-13A

I have attached the Division of Reclamation and Mining Safety's (DRMS) list of recommended geochemical analytes for the three samples. In addition to this list I also need all three samples tested for Radium 226, if there is a hit on 226 then I will need them tested for Radium 228 as well. I need a separate report for each sample. Please contact me with any questions. Thank you.

Sincerely,

Karen Fischer 5/1/2012

Karen Fischer

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
1 A	503,878	995,639	7113			132	6981		
2 A	503,790	995,667	7109			132	6977		
3 A	503,755	995,658	7108			132	6976	101	7008
4 A	503,817	995,633	7110			114	6996		
5 A	503,837	995,606	7111			132	6979		
6 A	503,843	995,580	7112			132	6980		
7 A	503,849	995,532	7113			132	6981		
8 A	504,218	995,473	7084			168	6916		
9 A	504,285	995,381	7098			168	6930		
10 A	504,372	995,259	7092			168	6924	138	6954
11 A	504,407	995,219	7137			168	6969		
12 A	504,712	995,475	7145			185	6960		
13 A	504,954	995,362	7166			220	6946		
14 A	504,860	995,310	7159			220	6939	153	7006
15 A	540,736	995,342	7144			220	6924		
16 A	504,970	995,480	7154			220	6934	168	6987
17 A	504,724	995,120	7148			200	6948		
18 A	503,798	995,595	7110			132	6978		
19 A	505,316	993,492	7542			725	6817		
20 E C	504,786	993,314	7542			760	6782		
22 A	502,703	991,659	7482			760	6722		
23 E C	503,396	993,891	7204			340	6864		
4 A	501,629	988,844	7456			725	6731		
5 A	503,561	994,273	7150			200	6950		
26 A	500,764	988,503	7446			725	6721		
27 A	500,229	988,241	7432			750	6682		
28 A	499,569	988,142	7423			735	6688	595	6828
29 A	503,688	995,742	7110			132	6978	84	7027
30 A	503,633	995,736	7109			132	6977		
31 A	503,683	995,776	7112			132	6980	84	7029
35	1	1	1			55	-54		
38 A	503,779	995,624	7109						
39 C	502,885	993,486	7136			295	6841		
40 C	502,932	993,425	7156			405	6751		
41 C	502,983	992,909	7243			400	6843		
42 C	503,091	993,090	7235			400	6835		
43 C	502,984	993,443	7157			285	6872		
44 C	502,819	992,818	7230			400	6830	340	6890
45 C	502,663	992,625	7215			380	6835		
46 C	503,018	993,456	7158			405	6753	208	6951
47 C	503,281	993,467	7218			305	6913		
48 A	503,059	993,535	7179			290	6889		
49 A	498,814	988,095	7417			740	6677		
50 A	501,518	992,272	7093			325	6768		
51 A	502,913	993,900	7114			250	6864		
52 A	505,185	995,465	7136			355	6781		
53 A	505,120	995,390	7145			200	6945		
4 A	503,728	995,392	7107			132	6975		
5 A	503,731	995,287	7112			132	6980		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
56 A	503,820	995,260	7115			144	6971	103	7012
57 A	503,933	995,220	7122			150	6972		
58 A	505,255	995,378	7145			185	6960		
59 A	505,126	995,207	7169			220	6949		
60 A	503,792	993,918	7260			525	6735		
61 A	504,982	995,294	7163			215	6948		
62 A	504,118	994,058	7247			325	6922		
63 A	505,012	995,015	7162			365	6797		
64 C	502,256	992,427	7167			340	6827	271	6897
65 A	503,805	995,017	7124			155	6969		
66 C	502,387	992,595	7182			320	6862		
67 A	504,635	995,233	7143			185	6958	177	6966
68 C	504,195	944,979	7144			185	6959		
69 A	504,437	944,829	7158			200	6958		
70 A	504,417	944,177	7257			325	6932		
71 A	504,786	994,332	7264			325	6939		
72 A	505,434	994,506	7273			325	6948		
73	1	1	1			215	-214	196	-195
75 A	505,004	994,916	7167			230	6937		
76 A	503,268	995,358	7089			125	6964		
77 A	504,016	995,175	7127			155	6972		
78 A	504,548	995,535	7136			185	6951		
79 A	504,268	995,645	7124			186	6938	128	6996
80 A	503,354	995,641	7097			144	6953		
81 A	503,606	995,608	7102			136	6966		
82 A	501,742	992,757	7060			325	6735		
83 A	503,920	994,637	7175			245	6930		
84 A	504,059	994,437	7193			245	6948		
85 A	503,823	994,746	7133			220	6913		
86 A	500,887	991,654	7065			285	6780		
87 A	501,319	991,162	7078			320	6758		
88 A	501,713	990,767	7116			500	6616		
89 A	501,482	990,196	7129			325	6804		
90 A	500,633	989,825	7098			450	6648		
91	1	1	1						
92 A	500,944	990,585	6979			200	6779		
93 A	503,876	994,409	7188			250	6938		
94 C	503,537	994,618	7120			155	6965		
95 A	500,478	990,617	6983			200	6783	132	6852
96 A	500,136	990,005	7036			250	6786		
97 A	500,145	989,850	7008			440	6568		
98 A	499,980	990,183	7005			200	6805		
99 A	500,089	990,335	7022			240	6782		
100 A	499,928	990,053	6990			200	6790		
101 A	499,825	990,395	6963			180	6783		
102 A	499,943	990,565	6942			140	6802		
103 A	500,134	990,580	6943			120	6823		
104 A	499,654	990,055	6972			200	6772		
105 A	500,480	990,961	6890			84	6806		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
106 A	499,819	990,639	6902			96	6806		
107 A	499,689	990,703	6896			80	6816		
108 A	499,668	990,665	6900			96	6804		
109 A	499,636	990,639	6903			96	6807		
110 A	499,602	990,603	6904			100	6804		
111 A	499,697	990,484	6931			150	6781		
112 A	500,620	990,709	6969			200	6769		
113 A	499,599	991,400	6928			126	6802		
114 A	499,815	991,279	6921			96	6825		
115 A	500,003	991,034	6915			72	6843		
116 A	499,756	990,573	6906			103	6803		
117 A	499,751	990,448	6944			150	6794		
118 A	499,861	990,493	6941			140	6801		
119 A	500,146	991,179	6971			200	6771		
120 A	500,252	990,608	6961			200	6761		
121 A	500,167	990,497	6990			200	6790		
122 A	501,281	990,643	7039			220	6819		
123 A	500,861	991,033	6997			200	6797		
124 C	502,539	992,539	7219			360	6859		
125 A	503,482	993,417	7255			340	6915		
126 A	501,342	991,030	7044			290	6754		
127 A	501,241	991,055	7039			280	6759		
28 C	501,973	991,793	7268			440	6828	393	6876
29 C	502,152	991,781	7299			480	6819		
130 A	504,868	994,842	7169			240	6929		
131 A	504,549	995,402	7142			180	6962		
132 A	502,786	993,218	7143			280	6863		
133 C	502,910	992,956	7237			380	6857	343	6894
134 C	501,897	991,727	7268			460	6808	392	6876
135 C	501,766	991,958	7188			420	6768		
136 C	500,846	990,449	7000			200	6800		
137 A	505,208	995,018	7187			259	6928		
138 A	505,385	994,970	7196			260	6936		
139 A	501,611	991,103	7095			360	6735		
140 A	501,164	989,899	7129			330	6799		
141 A	500,381	990,162	7050			280	6770		
142 A	500,336	990,372	7012			200	6812		
143 A	500,781	990,601	6992			200	6792		
144 C	500,974	990,747	6987			160	6827	130	6857
145 C	502,415	992,439	7227			380	6847		
146 A	503,237	993,568	7216			340	6876		
147 A	501,883	991,626	7265			440	6825		
148 A	503,393	993,788	7211			300	6911		
149 C	503,299	993,965	7180			280	6900	219	6961
150 A	501,797	991,407	7235			440	6795		
151 A	504,125	994,359	7200			280	6920		
152 A	504,295	994,370	7204			280	6924		
53 A	503,868	994,149	7231			320	6911		
54 A	504,269	994,636	7149			154	6995		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
155 A	504,247	995,272	7129			180	6949		
156 A	504,437	994,829	7173			260	6913		
157 A	504,416	994,645	7187			250	6937		
159 A	504,137	995,397	7082			160	6922		
160 A	504,590	995,125	7146			220	6926		
161 A	501,912	991,319	7227			450	6777		
162 C	501,587	991,584	7205			430	6775		
163 A	501,855	992,082	7205			420	6785		
164 A	505,284	994,894	7203			280	6923		
165 C	503,396	994,312	7134			220	6914		
166 C	502,428	992,698	7162			360	6802	270	6893
167 A	501,974	992,390	7156			370	6786		
168 C	502,205	992,613	7149			360	6789		
169 A	504,838	995,033	7153			220	6933		
170 A	504,988	994,967	7166			230	6936		
171 C	502,093	992,084	7261			440	6821	389	6872
172 AA	502,397	992,257	7236			390	6846		
172 BA	505,096	994,943	7236			240	6996		
173 A	504,787	994,943	7164			260	6904		
174 A	504,931	994,697	7186			280	6906		
175 A	504,684	995,028	7197			260	6937		
176 A	503,158	994,123	7135			260	6875		
177 C	503,004	993,127	7225			410	6815	329	6897
178 A	502,649	992,940	7152			300	6852	252	6901
179 C	502,240	992,218	7246			420	6826	369	6878
180 A	500,766	990,774	6921			110	6811		
181 C	500,666	990,520	7002			240	6762		
182 A	503,180	993,469	7199			310	6889		
183 A	503,427	994,246	7142			230	6912	158	6985
184 A	505,024	995,665	7142			200	6942		
185 A	504,984	995,530	7148			200	6948	140	7008
186 A	504,987	995,562	7148			260	6888	137	7011
187 A	504,911	995,638	7142			200	6942	164	6978
188	1	1	1			200	-199		
189 A	504,923	995,595	7145			200	6945		
190 A	504,944	995,523	7150			220	6930	144	7006
191 A	504,962	995,544	7149			220	6929	174	6975
192 A	504,963	995,508	7150			220	6930	171	6979
193 A	504,940	995,498	7151			220	6931	144	7007
194 A	504,909	995,389	7156			200	6956		
195 A	504,896	995,487	7150			200	6950		
196 A	504,924	995,437	7155			220	6935	151	7004
197 A	504,951	995,435	7156			220	6936	151	7005
198 A	504,891	995,417	7153			220	6933		
199 A	505,034	995,620	7139			180	6959		
200 A	505,067	995,667	7135			180	6955		
201 A	504,925	995,318	7160			200	6960	158	7002
202 A	504,910	995,229	7165			220	6945		
203 A	504,993	995,608	7145			210	6935		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
204 A	1	1	7137			180	6957		
205 A	1	1	7146			190	6956		
206 A	1	1	7146			180	6966		
207 A	505,026	995,780	7136			180	6956		
208 A	505,070	995,727	7137			180	6957		
209 A	505,050	995,735	7138			180	6958	151	6987
210	1	1	1			180	-179		
211 A	504,983	995,663	7142			190	6952		
212 A	504,992	995,715	7139			180	6959		
213 A	504,945	995,602	7146			195	6951		
214 A	504,929	995,565	7148			200	6948		
215 A	499,713	988,300	7430			720	6710		
216 A	504,783	995,331	7153			200	6953		
217	1	1	1			200	-199		
218 A	504,617	995,275	7145			180	6965		
219 A	604,665	995,028	7159			200	6959	13	7147
220 E C	504,505	995,291	7139			190	6949	166	6973
221 C	504,528	995,260	7139			190	6949		
222 A	504,473	995,182	7139			190	6949		
223 C	504,424	995,294	7134			180	6954		
224 A	504,300	995,168	7137			200	6937		
225 A	504,318	995,027	7146			220	6926		
226 C	504,265	994,903	7150			200	6950	171	6980
227 A	504,201	995,197	7130			200	6930		
228 C	504,181	994,782	7143			220	6923		
229 A	503,984	994,573	7183			260	6923	177	7006
230 A	504,932	995,060	7158			200	6958		
231 A	505,025	995,024	7163			220	6943		
232 A	505,057	995,090	7177			240	6937		
233 A	503,612	994,755	7113			200	6913		
234 A	503,556	994,719	7113			200	6913		
235 E C	503,515	994,452	7141			220	6921	142	7000
236 A	505,151	994,999	7178			240	6938		
237 A	503,683	994,239	7168			220	6948		
238 A	505,215	994,986	7190			240	6950		
239 A	505,298	994,966	7196			250	6946		
240 A	505,334	994,903	7203			270	6933		
241 A	505,274	994,848	7206			270	6936		
242 C	503,434	994,107	7164			220	6944	184	6981
243 E C	503,245	993,897	7183			240	6943	216	6967
244 A	503,137	993,770	7185			220	6965		
245 A	503,082	993,666	7183			250	6933		
246 A	503,109	993,505	7186			240	6946		
247 C	503,036	993,422	7168			240	6928		
248 C	503,010	993,359	7189			250	6939		
249 E C	503,352	993,650	7222			310	6912		
250 A	503,177	993,649	7198			265	6933		
251 C	503,296	993,755	7205			270	6935		
252 E C	503,156	992,904	7278			400	6878		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
253 A	502,962	992,686	7275			400	6875		
254 A	503,592	993,486	7262			330	6932		
255 A	503,831	993,360	7300			370	6930	352	6948
256 C	503,313	993,313	7246			370	6876		
257 A	503,142	993,229	7239			360	6879	341	6899
258 A	503,054	993,256	7217			360	6857		
259 C	502,154	992,077	7276			445	6831	399	6877
260 C	501,962	991,658	7265			465	6800		
261 C	502,785	992,897	7213			360	6853		
262 A	501,433	991,454	7164			350	6814		
263 A	501,543	991,276	7168			350	6818		
264 A	501,920	991,080	7182			350	6832		
265 A	502,064	990,962	7180			350	6830		
266 A	502,105	991,494	7283			460	6823		
267 E C	502,071	991,627	7283			450	6833		
268 C	502,282	991,962	7328			480	6848	456	6873
269 A	501,955	991,232	7230			400	6830		
270 E C	501,655	991,385	7221			380	6841		
271 C	501,623	991,734	7199			355	6844	312	6887
272 A	502,006	992,273	7205			350	6855		
273 A	500,624	989,617	7134			400	6734		
274 A	500,126	989,630	7119			360	6759		
275 C	502,628	992,699	7183			335	6848	294	6889
276 A	500,653	990,204	7042			240	6802		
277 A	499,975	989,797	7026			285	6741		
278 A	500,644	990,299	7024			220	6804		
279 C	500,360	990,510	6995			200	6795		
281 C	501,124	990,474	6991			200	6791	100	6891
283 A	504,118	993,553	7314			390	6924		
284 A	505,110	993,997	7330			420	6910		
285 A	505,460	994,070	7348			420	6928		
286 A	501,354	990,621	7044			225	6819		
287 A	501,415	990,586	7047			225	6822		
288 A	501,196	991,306	7069			320	6749		
289 C	501,436	991,098	7086			320	6766		
290 A	501,606	990,973	7101			340	6761		
291 A	504,795	995,286	7155			200	6955		
292 A	504,734	995,293	7154			205	6949		
293 A	504,786	995,363	7152			205	6947		
294 A	504,739	995,363	7149			200	6949		
295 A	504,829	995,367	7154			205	6949		
296 A	504,863	995,391	7153			205	6948		
297 A	504,969	995,414	7158			205	6953	149	7009
298 A	504,926	995,373	7158			205	6953		
299 A	504,892	995,354	7155			205	6950		
300 A	504,652	995,290	7146			200	6946		
301 A	505,396	996,618	7056			84	6972		
302 A	505,378	996,614	7061			84	6977		
303 A	505,382	996,678	7056			84	6972	52	7004

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
304 A	505,339	996,688	7062			84	6978		
305 A	505,430	996,553	7057			85	6972	60	6997
306 A	505,400	996,550	7061			85	6976		
307 A	505,388	996,497	7064						
308 A	505,365	996,480	7073			95	6978		
309 A	505,271	996,615	7083			95	6988		
310 A	505,105	996,643	7091			105	6986		
311 A	505,114	996,618	7091			105	6986		
312 A	505,094	996,665	7092			105	6987		
313 A	504,980	996,765	7088			105	6983		
314 A	504,965	996,787	7087			105	6982		
315 A	504,941	996,816	7086			105	6981	68	7018
316 A	504,920	996,820	7085			105	6980		
317 A	504,899	996,810	7085			90	6995		
318 A	504,930	996,895	7084			81	7003		
319 A	504,911	996,889	7084			105	6979		
320	505,266	996,662	7075			110	6965		
321 A	504,565	995,315	7116			200	6916		
322 A	504,940	995,403	7157			220	6937		
323 A	504,865	995,362	7155			205	6950		
324 A	504,905	995,404	7156			200	6956		
325 A	504,830	995,316	7157			200	6957	154	7003
326 A	504,895	995,052	7158			210	6948	193	6965
27 A	504,781	995,193	7147			200	6947		
328 C	504,469	995,332	7136			190	6946		
329 C	504,477	995,290	7137			190	6947		
330 A	504,852	996,357	7106			118	6988		
331 A	504,890	996,353	7104			130	6974		
332 A	504,894	996,311	7108			140	6968	86	7022
333 A	504,917	996,409	7102			124	6978	79	7023
334 A	504,916	996,446	7099			118	6981		
335 A	504,893	996,444	7100			118	6982		
336 A	505,057	996,482	7096			116	6980		
337 A	505,119	995,517	7094			116	6978	80	7014
338 A	505,143	996,520	7095			116	6979		
339 A	505,193	996,521	7093			116	6977		
340 A	505,253	996,520	7089			116	6973		
341 A	505,243	996,470	7092			116	6976	91	7001
342 A	505,232	996,427	7095			116	6979		
343 A	505,181	996,440	7096			116	6980		
344 A	505,123	996,449	7097			116	6981		
345 A	505,078	996,447	7097			116	6981		
346 A	505,271	996,342	7016			100	6916		
347 A	505,192	996,309	7101			100	7001		
348 A	505,137	996,286	7103			110	6993		
349 A	505,037	996,620	7092			110	6982		
350 A	505,062	996,563	7062			106	6956	82	6980
51 A	505,086	996,567	7063			116	6947		
352 A	505,167	996,620	7092			110	6982		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
353 A	505,145	996,676	7092			210	6882		
354 A	504,880	996,867	7083			88	6995	63	7020
355 A	504,876	996,918	7082			88	6994		
356 A	504,854	996,889	7082			88	6994	63	7019
357 A	504,834	996,848	7083			116	6967		
358 A	504,792	996,846	7080			88	6992	79	7001
359 A	504,877	996,892	7083			88	6995	48	7035
360 A	504,838	996,796	7084			88	6996		
361 A	504,796	996,796	7082			88	6994		
362 A	504,836	996,742	7084			88	6996		
363 A	504,802	996,734	7083			88	6995		
364 A	504,942	996,843	7086			74	7012		
365 A	504,864	996,812	7084			94	6990		
366 A	504,790	996,881	7079			88	6991		
367 A	504,757	996,819	7078			82	6996		
368 A	504,837	996,700	7086			95	6991		
369 A	504,804	996,693	7086			88	6998		
370 A	505,104	996,075	7111			145	6966		
371 A	505,079	996,042	7118			145	6973		
372 A	505,211	996,048	7105			131	6974		
373 A	505,239	996,024	7100			131	6969	87	7013
374 A	505,278	996,021	7096			121	6975	101	6995
`75 A	505,253	996,044	7100			125	6975	111	6989
,76 A	505,303	996,051	7096			115	6981		
377 A	505,277	996,072	7099			121	6978		
378 A	505,394	996,091	7085			99	6986		
379 A	505,366	996,113	7087			110	6977		
380 A	505,308	996,018	7094			116	6978		
381 A	505,281	995,994	7095			115	6980	91	7004
382 A	505,312	996,366	7091			110	6981		
383 A	505,269	996,426	7092			110	6982		
384 A	505,475	996,508	7053			66	6987		
385 A	505,407	996,581	7062			77	6985		
386 A	505,409	996,650	7052			66	6986	53	6999
387 A	505,378	996,587	7061			88	6973		
388 A	505,334	996,613	7068			85	6983		
389 A	505,414	995,654	7054			75	6979		
390 A	505,351	996,649	7060			77	6983		
391 A	505,402	996,677	7054			72	6982		
392 A	505,376	996,702	7055			66	6989		
393 A	505,355	996,681	7058			66	6992		
394 A	505,340	996,736	7056			66	6990		
395 A	505,338	996,785	7056			66	6990		
396 A	505,290	996,743	7068			88	6980		
397 A	504,973	996,776	7065			77	6988		
398 A	505,002	996,716	7090			92	6998		
399 A	504,990	996,741	7088			92	6996		
00 A	505,022	996,790	7088			110	6978		
401 A	504,988	996,805	7088			99	6989		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
402 A	504,977	996,866	1086			92	994		
403 A	504,964	996,918	7084			87	6997		
404 A	504,983	996,959	7082			88	6994		
405 A	504,823	996,885	7081			88	6993		
406 A	505,015	996,650	7091			99	6992		
407 A	505,217	996,617	7090			95	6995		
408 A	504,840	997,184	7048			55	6993		
409 A	504,899	997,152	7055			54	7001		
410 A	1	1	1			64	-63		
411 A	503,840	995,476	7112			119	6993	91	7021
412 A	503,890	995,423	7114			111	7003		
413 A	503,896	995,389	7114			120	6994		
414 A	503,921	995,352	7116			119	6997		
415 A	503,909	995,308	7119			96	7023		
416 A	503,761	995,312	7115			120	6995		
417 A	503,884	995,511	7113			119	6994		
418 A	503,835	995,525	7113			119	6994	89	7024
419 A	503,817	995,552	7112			118	6994		
420 A	503,803	995,579	7111			120	6991		
421 A	803,803	995,650	7110			82	7028	80	7030
422 A	503,822	995,678	7111			108	7003		
423 A	503,712	995,631	7107			90	7017	80	7027
'24 A	503,614	995,632	7102			109	6993	76	7027
25 A	503,591	995,629	7103			108	6995		
426 A	503,710	995,730	7110			108	7002		
427 A	503,704	995,764	7112			108	7004		
428 A	503,695	995,808	7114			108	7006	93	7021
429 A	503,701	995,835	7115			109	7006		
430 A	503,668	995,738	7110			108	7002	80	7030
431 A	503,653	995,733	7110			108	7002	81	7029
432 A	503,583	995,788	7110			109	7001		
433 A	503,840	995,651	7111			108	7003		
434 A	503,623	995,893	7115			108	7007		
435 A	503,590	996,070	7116			116	7000		
436 A	503,656	995,897	7117			107	7010	92	7025
437 A	503,539	996,140	7111			101	7010		
438 A	503,519	996,154	7110			109	7001	85	7025
439 A	503,483	996,174	7108			113	6995	82	7026
440 A	503,563	996,206	7108			110	6998	82	7026
441 A	503,917	995,917	7122			127	6995		
442 A	503,723	996,000	7121			108	7013	97	7024
443 A	503,756	996,003	7121						
444 A	503,698	996,149	7115			97	7018		
445 A	503,725	996,161	7116			71	7045		
446 A	503,479	995,906	7113			117	6996		
447 A	503,496	995,963	7115			97	7018		
448 A	503,460	996,005	7112			116	6996		
49 A	503,414	996,052	7110			113	6997		
450 A	503,441	996,089	7108			105	7003		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
451 A	503,374	996,067	7107			119	6988	102	7005
452 A	503,368	996,131	7104			108	6996		
453 A	503,409	996,332	7102			84	7018		
454 A	503,449	996,345	7104			87	7017		
455 A	503,450	996,296	7103			99	7004		
456 A	503,498	996,286	7104			103	7001		
457 A	503,890	995,464	7114			116	6998		
458 A	503,449	996,125	7108			99	7009		
459 A	503,802	995,622	7110			107	7003		
460 A	503,776	995,637	7109			107	7002		
461 A	503,635	995,918	7116			107	7009		
86-1	503,026	993,018	7235			380	6855		
86-2	502,922	993,043	7226			380	6846		
86-3	502,721	992,691	7189			340	6849		
86-4	502,505	992,732	7170			330	6840		
86-5	502,328	992,717	7158			380	6778		
86-6	502,414	992,817	7131			340	6791		
86-7	502,195	991,712	7323			480	6843		
86-8	502,184	991,928	7315			480	6835		
86-9	502,260	992,030	7320			480	6840		
86-10	502,272	991,851	7327			480	6847		
86-11	502,146	991,694	7307			460	6847		
86-12	502,083	991,832	7275	440	6835	440	6835		
86-13	501,963	991,730	7271			440	6831		
86-14	502,050	991,937	7261			420	6841		
86-15	502,079	992,059	7261			420	6841		
86-16	502,268	992,171	7268			415	6853		
86-17	502,134	992,203	7247			405	6842	355	6893
86-18	501,913	991,836	7248			400	6848		
86-19	501,800	991,734	7252						
86-20	501,702	991,705	7233						
86-21	502,291	992,285	7217			360	6857		
86-22	502,262	992,116	7292			435	6857		
86-23	501,605	991,851	7173			335	6838		
86-24	501,550	991,767	7169			360	6809		
87-1	501,809	991,848	7224			405	6819		
87-2	502,389	991,915	7357			515	6842		
87-3	502,340	991,835	7355			515	6840		
87-4	502,283	991,748	7348			505	6843		
87-5	502,379	992,032	7322			485	6837		
87-6	502,383	992,118	7291			450	6841	414	6877
87-7	501,954	992,031	7232			385	6847	341	6892
87-8	501,913	991,946	7234			395	6839	321	6914
87-9	501,983	992,113	7230			385	6845		
87-10	502,203	992,347	7195			340	6855		
87-11	502,301	992,501	7172			320	6852		
87-12	502,176	992,410	7171			320	6851		
87-13	502,277	992,557	7179			320	6859		
87-14	502,795	992,594	7238			385	6853		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
87-15	501,741	991,562	7255			420	6835		
87-16	502,692	992,788	7188			340	6848		
87-17	501,535	991,860	7146			360	6786		
87-18	501,486	991,783	7149			360	6789		
87-19	501,478	991,694	7167			335	6832		
87-20	501,453	992,558	7087			161	6926		
87-21	501,655	992,565	7080			168	6912		
87-22	501,168	992,527	7068			94	6974		
87-23	502,056	992,546	7102			231	6871		
87-24	501,886	992,571	7092			203	6889		
88-1	502,268	991,843	7327			380	6947	342	6985
88-2	502,372	992,115	7292			380	6912		
88-3	502,077	992,052	7267			340	6927	301	6966
89-1	502,059	992,165	7244			395	6849		
89-2	502,445	992,155	7285			430	6855		
89-3	502,464	992,072	7322			475	6847		
89-4	502,336	992,343	7201			340	6861		
89-5	502,503	992,652	7195			330	6865		
89-6	502,921	992,868	7254			380	6874		
89-7	502,802	992,646	7222			360	6862		
89-8	502,857	992,995	7222			340	6882		
89-9	502,574	992,783	7157			285	6872		
89-10	502,234	992,498	7148			280	6868		
91-1	503,137	993,362	7188			316	6872		
91-2	502,791	993,009	7182			300	6882		
91-3	502,861	993,073	7195			310	6885		
91-4	502,923	993,150	7202			320	6882		
91-5	502,979	993,230	7199			320	6879		
91-6	503,115	992,996	7243			370	6873		
91-7	503,027	992,914	7251			380	6871		
92-1	501,287	991,613	7130			300	6830		
92-2	501,350	991,860	7116			280	6836		
92-3	501,302	991,665	7129			280	6849		
92-4	501,114	991,594	7090			250	6840		
92-5	503,022	993,359	7186			300	6886		
92-6	503,242	993,363	7215			340	6875		
92-7	503,174	993,309	7216			330	6886		
Portal -1	500,811	992,561	7030						
SU-5	504,043	995,100	7125			231	6895		
SU-6	503,553	994,588	7128			200	6928		
SU-7	503,979	944,561	7172			215	6957		
SU-8	503,145	994,157	7128			153	6976		
SU-9	504,049	994,187	7240			235	7005		
SU-10	503,405	994,324	7132			113	7020		
SU-11	504,793	996,924	7080			85	6995		
SU-12	503,654	994,371	7164			195	6969		
SU-13	504,838	994,955	7167			194	6973		
SU-14	504,970	996,854	7088			95	6993		
SU-15	505,061	996,812	7092			106	6986		

	SR-11 Drillholes								
HOLE #	Northing	EASTING	ELEV	Depth to Water	Elev of Water	Total Depth	Bottom of DH	Lowest Ore	Lowest Ore Elev
SU-16	504,956	995,018	7155			160	6995		
SU-17	505,359	996,895	7083			74	7009		
SU-18	505,014	995,300	7162			200	6962		
SU-19 A	505,247	995,536	7132			151	6982		
SU-20	505,080	996,502	7104			176	6928		
SU-21	504,925	996,683	7095			95	7000		
SU-22	504,647	995,349	7138			183	6955		
SU-23	504,385	995,232	7182			161	7021		
SU-24	504,721	996,807	7088			98	6990		
SU-25	505,104	996,198	7119			136	6983		
SU-26	502,927	993,906	7112			215	6897		
SU-27	502,991	993,479	7148			215	6933		
SU-28	505,160	996,492	7102			115	6987		
SU-29	505,412	995,972	7095			106	6989		
SU-30	502,600	993,268	7124			204	6920		
SU-31	502,392	993,073	7113			154	6960		
SU-32	502,171	992,904	7085			160	6925		
SU-33	505,013	996,505	7102			104	6998		
SU-34	505,117	996,145	7121			130	6991		
SU-35	505,063	996,582	7100			104	6996	84	7016
SU-36	505,158	996,204	7118			135	6983		
SU-37	503,031	993,460	7162			222	6940		
SU-38	505,078	996,412	7109			113	6996	63	7046
SU-39	505,107	996,247	7118			134	6984	99	7020
SU-40	503,005	993,521	7155			215	6940		
SU-41	505,197	996,068	7122			134	6988	111	7011
SU-43	502,923	993,497	7145			205	6940	172	6973
SU-44	505,092	996,325	7117			141	6977	86	7031
SU-45	505,114	996,045	7124			144	6980		
SU-46	501,831	992,935	7050			135	6915		
SU-47	505,056	996,192	7121			135	6986	91	7030
SU-48	505,288	996,038	7110			120	6990		
SU-49	502,857	993,517	7135			255	6880		
SU-50	505,044	996,329	7114			135	6979	70	7044
SU-51	505,140	996,330	7112			125	6988		
SU-52	505,117	995,988	7129			152	6977	125	7004
SU-53	504,973	996,031	7125			154	6971		
SU-54	502,952	993,556	7155			214	6941		
SU-55	502,874	993,455	7144			206	6938		
SU-56	504,862	995,518	7142			185	6957		
SU-57	505,056	995,793	7130			170	6960		
SU-58	505,102	995,892	7133			166	6967		

Drainage Design Plan

(Engineered Stormwater Management Plan)

For

SR-11 Mine

Near Egnar, Colorado

Operated by Cotter Corporation (N.S.L.)

Nucla, Colorado

August 7, 2012

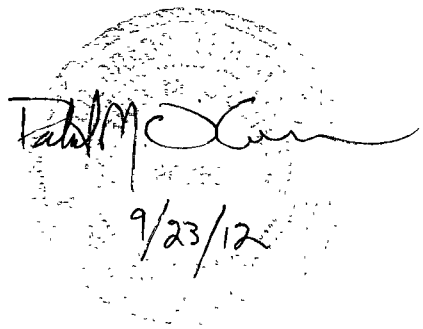
Prepared By

O'Connor Design Group, Inc.

2350 G Road, Suite 113
Grand Junction, CO 81505

CERTIFICATION

I hereby certify that this Drainage Design Plan for the design of the Cotter SR-11 Mine, was prepared by me (or under my direct supervision) in accordance with criteria required by the Colorado Division of Reclamation, Mining and Safety (DRMS).



Patrick M. O'Connor, P.E.
Registered Professional Engineer
State of Colorado, #20759

Table of Contents

ATTACHMENTS

-Haestad Reports-

Drawings

1.0 Introduction

The Colorado Division of Reclamation, Mining and Safety's (DRMS) revised regulations for a Designated Mining Operation (DMO) require an Engineered Stormwater Management Plan (ESWMP), commonly referred to as a Drainage Design Plan, to ensure that waste rock and ore stockpiles are protected from design storm events that could potentially erode and transport materials offsite from mining operations. In addition, this plan provides site information and plans to control stormwater runoff from the site, including best management practices to minimize soil disturbances, control erosion and sedimentation during operation and post-reclamation, prevent run-off from offsite areas from flowing across the site, and reduce the potential for pollutants leaking and being transported by stormwater runoff.

2.0 Approach

The goal of the ESWMP is to protect the waste rock stockpile and ore stockpile areas from 10- and 100-year storm events during mining operations and long-term protection of the waste rock area after remediation has been completed. The approach used in this plan is to prevent offsite run-on from entering the active surface mining area by diverting offsite surface flows above the stockpile areas via berms or diversion ditches, and preventing onsite runoff from leaving the site, or containing it long enough to allow sediment to settle in the retention pond. This plan defines the drainage areas above the mining sites, delineates the onsite drainage area, determines the amount of runoff from 10-year, 24-hour and 100-year, 24-hour precipitation events, routes offsite runoff around the site, and contains or controls onsite precipitation and subsequent runoff.

Similar to the SWMP regulated by the Colorado Department of Public Health and Environment (CDPHE), this plan also focuses on potential sources of pollution, particularly petroleum compounds and other potentially hazardous materials. Prevention of unintended discharge using secondary containment structures to minimize the potential for spills or leaks from containment structures, reporting requirements to the CDPHE, and best management practices related to storage and containment are important components of a conventional SWMP regulated by CDPHE and incorporated into this plan.

3.0 Location

The SR-11 mine is located in southwestern Colorado near the Utah border. The nearest town is Egnar, Colorado located approximately 6 miles SSW of the mine site (22 miles via roadway). The mine can either be accessed from Egnar or from Slick Rock, Colorado via county roads. All surface runoff from the area will eventually flow to the southeast into Summit Canyon, an ephemeral drainage that eventually discharges to the Dolores River near the town of Slick Rock, Colorado. A vicinity map is included in the attachments to this ESWMP.

4.0 Site Description

4.1 Operations Structures

SR-11 is a designated mining operation. Uranium and vanadium minerals will be mined underground producing ore and waste rock that is stored at the surface. The mine portal is located near the crest of a ridge that separates two natural drainages - designated as the western (Offsite Basin 10) and eastern (Offsite Basin 20) drainages for the purposes of this report. The waste rock stockpile is the major feature of the site, extending to the south from the portal area. This man-made feature provides a working area that contains the site office, water tanks, and a future ore stockpile area. When mining resumes, it is anticipated that additional storage facilities for compressors, generators, maintenance equipment, and supplies, plus a 500-gallon diesel fuel tank with secondary containment, will be installed at the site to support mining activities.

Clay soils from nearby will be placed on the waste rock pile, compacted, and used as a temporary storage area for ore mined at the site. As mining continues, the waste rock pile will expand in a southern direction. The area below the waste rock stockpile, designated as the lower area, contains the topsoil stockpile and the runoff retention pond for the site. The entire mining site, including the waste rock stockpile and the majority of the topsoil pile, are contained by berms that surround the lower area.

The existing entrance road that connects to the nearby county road will be used as a haul road to periodically transport ore from the mine.

4.2 Surrounding Area Characteristics

Most of the affected area at SR-11 is classified as a Pinion-Juniper woodland. Associated secondary species include:

Indian ricegrass	Gambel oak
Muttongrass	Prairie junegrass
Snakeweed	Western wheatgrass
Elk sedge	Douglas fir

None of these species are currently listed on the BLM Colorado Sensitive Species List found at www.blm.gov/co/st/en/BLM_Programs/botany/Sensitive_Species_List_.html.

The vegetative cover on SR-11 is relatively dense and well established. Most Pinion-Juniper stands do not reach over twenty feet in height. Shrubs, grasses and forbs remain closely cropped by grazing and wildlife use.

4.3 Existing Stormwater Structures

Stormwater control structures have been in place at the SR-11 mine area since initial construction in 2005. The mine is located on a ridgeline sandwiched between eastern and western drainages. These natural drainages route offsite runoff around the mining site.

Offsite runoff from the highlands above the mine site is diverted on the west side of the ridgeline by a berm that directs flow towards the upper magazine area. On the east side, some offsite surface flow is contained by a borrow ditch that runs from the upper road to the entrance road. It eventually discharges in the first of two culverts that route flow beneath the entrance road and discharge into the eastern drainage. All other offsite runoff is discharged to the eastern or western drainages and is routed around the mining operations.

Some onsite generated runoff is initially contained by a berm that defines the upper crest of the waste rock pile. Surface flow is directed to a low spot on the upper surface of the waste pile where it is directed into a rock-lined channel along the flank of the waste rock pile. A small drainage swale is located below the toe of the waste rock and directs runoff into the main retention pond for the site. This retention pond is located at the lowest topographic area contained within the site berm. The lower area, designated as the region between the toe of the waste rock pile and the property boundary, is surrounded by the site berm that runs from the lower magazine area around the base of the site near the county road and eventually terminates at the top soil stockpile. All runoff from the lower area is contained by the berm and directed to the retention pond.

Field observations of the existing stormwater structures indicate they are behaving as designed. There is no evidence of uncontained offsite discharges or excessive erosion, and the retention basin contains excess vegetation thriving on past contained precipitation events.

5.0 Site Manager

The site manager for the SR-11 will be responsible for implementing best management practices at the site during the operation of the mine, bi-annual stormwater inspections, maintenance of stormwater inspection records, and oversight of reclamation efforts once mining activities are completed.

The Vice President of Mining for Cotter Corporation, Glen Williams, is responsible for implementing and maintaining the SWMP for the SR-11 site. Below is Mr. Williams contact information:

Mr. Glen Williams
Vice President of Mining, Western Slope Operation
Cotter Corporation (N.S.L.)
P.O. Box 700
Nucla, Colorado 81424
Phone: (97) 864-7347
Email glen.williams@cotterusa.com

After mining has ceased, the land will be reclaimed for range and wildlife habitat. Cotter Corporation will restore the affected areas in accordance with the reclamation permit and D.O.E. lease requirements on the SR-11 lease.

6.0 Potential Pollution Sources

Mining operations result in ore and waste rock stockpiles that are stored on the land surface adjacent to the mine entrance. The ore stockpile remains onsite only for short durations as the ore is hauled to the process mill shortly after removal from the mine. The waste rock will remain onsite permanently and be stabilized in-place.

There will be a 500-gallon diesel fuel tank with secondary containment located near the mine portal. The tank is used to refuel equipment during mining operations but remains empty during extended inactive mining periods.

Other petroleum products used at the site will include hydraulic and lubricating oils. These oils are generally in 5-gallon containers and stored in one of the onsite buildings.

7.0 Drainage Design

7.1 Engineering Approach

The drainage design is focused on preventing erosion and transport of the waste rock stockpile and ore storage areas during operation and long-term protection of the waste rock pile after reclamation. Currently, drainage at the site is controlled by berms that route offsite runoff around existing stockpile areas, and by swales, berms, and ponds that collect onsite runoff. The effectiveness of these existing features has been analyzed for selected design storms and subsequent runoff to ensure compliance with best management practices to prevent erosion and offsite transport of potential pollution sources.

The attached drawings illustrate: onsite basin topography, boundaries, and BMP components (Sheet 1 of 4); offsite basin topography and boundaries (Sheet 2 of 4); and diversion channel cross-sections (Sheets 3 and 4 of 4).

The National Resource Conservation Service (NRCS - formerly known as the Soil Conservation Service, or SCS) dimensionless unit hydrograph procedure is one of the most well-known methods for deriving synthetic unit hydrographs and determining runoff peaks and volumes. For drainage basins where no runoff has been measured, the Curve Number Method can be used to estimate the depth of direct runoff from the rainfall depth, given an index describing runoff response characteristics. This method was originally developed by the SCS for storm conditions prevalent in the United States and was the method used in this study.

7.2 Design Storms

DRMS requires analysis using 10-year and 100-year, 24-hour storms. The National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Volume III isopluvials were used in conjunction with site locations (latitude and longitude) to determine precipitation amounts for the given storms. Copies of these charts are included as attachments to this ESWMP.

7.3 Runoff/Discharge Calculations

Peak flows were determined for the 100-year storm in all basins to determine required capacities for the diversion channels. SCS Unit Hydrograph Methods were applied utilizing "Haestad Pond Pack" software. Worksheets and results produced by the software are included as an attachment to this ESWMP. Primary input requirements are: runoff curve number (CN), precipitation, and time of concentration. NOTE: The two offsite basins are labeled "OFF 10" and "OFF 20", and the one onsite basin is labeled "30", or "ONSITE 30".

Curve numbers were taken from tables available from many sources based on surface soil types and vegetation. Surface soils at the site are considered "Hydrologic Soils Group B" (soils having a moderate infiltration rate when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse texture) given the soils report provided by NRCS. Surface vegetation is considered "Pinion/Juniper" with either poor or fair stands or a weighted combination of both. The larger offsite basins have areas with varying concentrations of pinion/juniper stands and are undisturbed; therefore, they received weighted combinations of CN values (varying from 58 to 75). The onsite basins are mainly disturbed areas void of vegetation and were therefore assigned a CN of 75 for "poor" stands in Type "B" soils.

Times of concentration were computed for each basin utilizing widely accepted formulas for computation of sheet-flow, shallow concentrated flow, and channel-flow from the headwaters to the receiving storage area.

Results of the 100-year peak flows are summarized here for each basin:

BASIN	**RUNOFF**	**DESCRIPTION**
Offsite 10	Q_{100} = 11.4 cfs	Undisturbed pinion/juniper stands
Offsite 20	Q_{100} = 28.7 cfs	Undisturbed pinion/juniper stands
Onsite 30	Q_{100} = 5.5 cfs	Disturbed, mine yard, and stockpile areas

Capacities of the diversion channels were analyzed using Manning's Equation for the surveyed cross-sections at the locations shown on attached Sheets 3 and 4. Channel analysis shows that the existing diversion channels are currently capable of transporting the 100-year flows generated by their respective basins around the site generally within the bottom 10 to 15 feet of the offsite channel. This is a good distance (both horizontally

and vertically) away from the site boundary berms. Actual velocities and 100-year water-surface elevations are shown at each cross-section. Worksheets and results for the "Haestad FlowMaster" software analysis are included in the attachments.

7.4 Stormwater Routing and Retention

The retention pond volume was calculated using the Haestad Pond Pack software utilizing SCS methods. DRMS requires complete retention of the 10-year runoff, with the ability to properly pass the 100-year flows downstream. Analysis of the existing retention basin (retention pond) indicates it is currently large enough and capable of collecting and storing the 100-year event with no discharge downstream. Worksheets and results of the stormwater routing and retention calculations are included in the attachments, but a summary follows:

ONSITE BASIN	TOP OF POND ELEV	100-YR WATER-SURFACE
Basin 30 (operation area)	Top of pond: 6971.0	6970.89

7.5 Recommended Modifications to Existing BMP Structures

Given the information provided in this report, analysis has shown that the current site BMP's (diversion channels and retention pond) are properly sized and capable of managing stormwater for the site in compliance with DRMS criteria.

8.0 Stormwater Management Plans (SWMP)

8.1 Best Management Practices

Best Management Practices (BMPs) for the site include the following:

- Divert offsite runoff around stockpile areas
- Retention of onsite surface runoff
- Secondary containment of above ground fuel tank
- Proper storage of petroleum products
- Good site housekeeping

The above ground diesel fuel tank should be locked when personnel are not present at the site. Secondary containment at the site includes a lined retention basin capable of containing at least 110 percent of the volume of the tank. Periodic inspections of the containment area are to ensure that precipitation is pumped from the containment area as needed.

All small quantities of petroleum products should be stored indoors out of the weather in the maintenance shed. Any spills in the shed should be cleaned immediately and the waste oils properly disposed.

Good housekeeping procedures should be implemented at the site at all times. Trash, especially used lubricating and hydraulic oil containers, should be picked up and periodically removed from the site. Oil spills should be cleaned up and the stained soils placed in containers or on plastic sheets and allowed to evaporate.

8.2 Inspection/Reporting Requirements

BMPs implemented based on the engineered drainage design should be inspected as part of the semi-annual inspections, once in the spring and once in the fall, and are to be conducted as required by the Colorado Department of Public Health and Environment regulations. BMPs should be reviewed and inspected to ensure they are performing as designed. Any damage to berms, retention basin, or other BMPs should be noted in the inspection report and repaired as soon as possible.

Secondary containment for the fuel tank should be inspected for leaks in the liner and water from precipitation should be inspected for oil sheens and pumped out on an as needed basis.

Any spill exceeding 25 gallons, or combined spills exceeding 40 gallons within a year, should be reported to the CDPHE. Spills of any quantity reaching the waters of the United States should be reported immediately to the CDPHE hotline.

8.3 Site Reclamation

DRMS requires that mining sites be reclaimed prior to release. Reclamation efforts are consistent with stormwater management practices including re-grading and vegetation of disturbed areas. For the SR-11 site, reclamation actions and methods are detailed in the Environmental Protection Plan provided for the mine.

ATTACHMENTS

MASTER DESIGN STORM SUMMARY

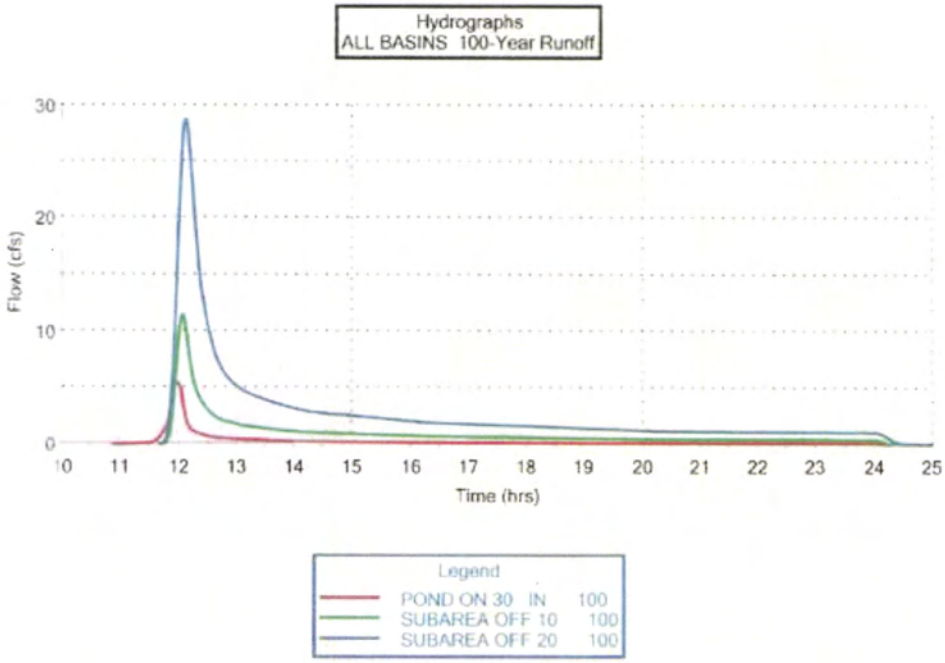
Network Storm Collection: Cotter [illegible]

Return Event	Total Depth in	Rainfall Type	RNF ID
100	3.0000	Synthetic Curve	TypeII 24hr
10	1.9000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=LeftRt)

Node ID		Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu ft
*OUT OFF 10		JCT	100	44573		12.[illegible]	[illegible]		
*OUT OFF 10		JCT	10	9926		12.2000	[illegible]		
*OUT OFF 20		JCT	100	[illegible]		12.[illegible]	[illegible]		
*OUT OFF 20		JCT	10	[illegible]		12.2000	[illegible]		
POND ON 30	IN	POND	100	14302		12.0000	5.47		
*POND ON 30	IN	POND	10	4558		12.0000	1.47		
*POND ON 30	OUT	POND	100	0		10.9000	.00	[illegible]	140[illegible]
*POND ON 30	OUT	POND	10	[illegible]		11.[illegible]	[illegible]	[illegible]	[illegible]
SUBAREA OFF 10		AREA	100	[illegible]		12.1000	[illegible]		
SUBAREA OFF 10		AREA	10	[illegible]		12.2000	[illegible]		
SUBAREA OFF 20		AREA	100	[illegible]		12.1500	[illegible]		
SUBAREA OFF 20		AREA	10	[illegible]		12.2000	[illegible]		
SUBAREA ON 30		AREA	100	[illegible]		12.0000	[illegible]		
SUBAREA ON 30		AREA	10	4558		12.0000	[illegible]		


Hydrographs
ALL BASINS 100-Year Runoff
Flow (cfs)
30
20
10
0
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
Time (hrs)
Legend
POND ON 30 IN 100
SUBAREA OFF 10 100
SUBAREA OFF 20 100

Type.... [illegible] Area [illegible]
Name.... [illegible]

File.... [illegible] Corp [illegible] SR-11 MINE.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Pinyon, juniper fair	5[illegible]	[illegible].900			58.0[illegible]
Pinyon, juniper fair	[illegible]	[illegible]			[illegible]
COMPOSITE AREA & WEIGHTED CN --->		63.600			65.5[illegible] (66)

Name.... SUBAREA CN [illegible]

File.... [illegible] MUSE File

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
[illegible]	[illegible]	[illegible]			[illegible]
COMPOSITE AREA & WEIGHTED CN --->		[illegible]			[illegible]

File [illegible] Documents\[illegible] C[illegible]\SP-1.[illegible] MINE.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TP-55 Sheet

Mannings n .0[illegible]
Hydraulic Length 300.00 ft
2yr, 24hr P 1.900[illegible]
Slope .067000 ft/ft

Avg.Velocity .85 ft/sec

Segment # Time .09[illegible] hrs

Segment #2: Tc: TP 55 Shallow

Hydraulic Length 1400.00 ft
Slope .300000 ft/ft
Unpaved

Avg.Velocity 8.84 ft/sec

Segment #2 Time: .0440 hr

Segment #3: Tc: TP 55 Channel

Flow Area 2.0000 sq.ft
Wetted Perimeter 12.00 ft
Hydraulic Radius [illegible] ft
Slope .090000 ft/ft
Mannings n .0[illegible]
Hydraulic Length 1000.00 ft

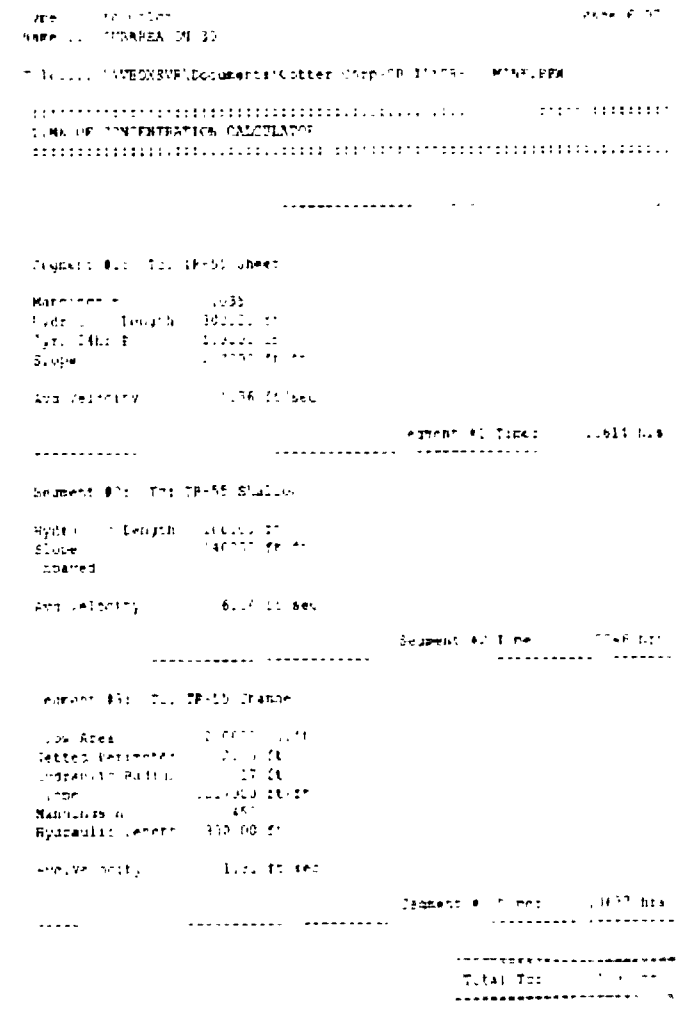
Avg.Velocity [illegible] ft/sec

Segment # Time .09[illegible] hrs

Total Tc: .[illegible] hrs

TIME OF CONCENTRATION CALCULATION

ESWMP-14



Type.... Vol. Elev-Area Page [illegible]
Name.... POND IN 30

File.... [illegible] MINE.PPW

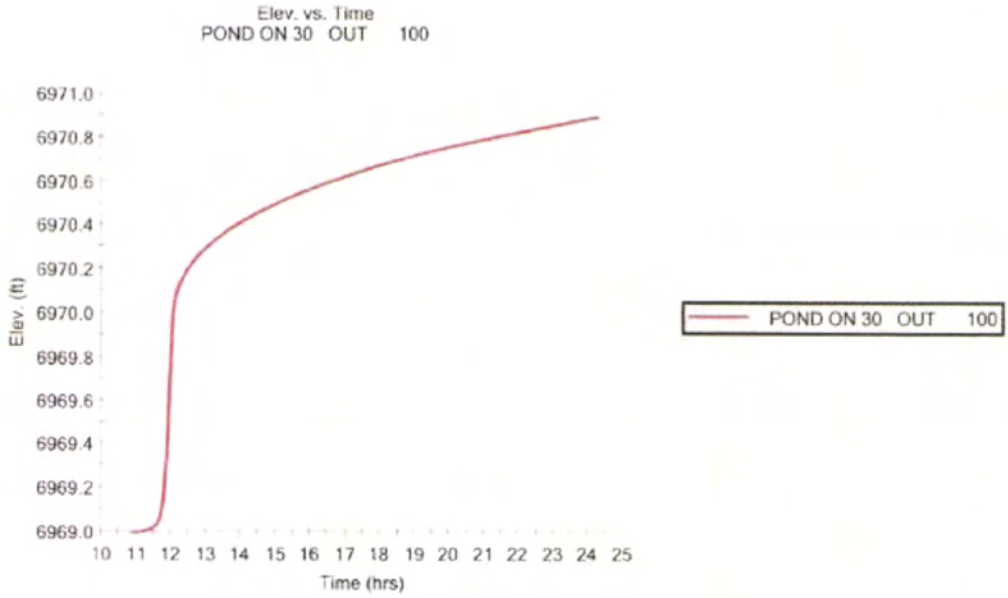
Elevation (ft)	Planimeter (sq.in)	Area (sq ft)	A1+A2+sqr (A1*A2) (sq ft)	Volume (cu ft)	Volume Sum (cu ft)
6969.00	-----	2334		0	
[illegible].00	-----	8214	14673	4891	4891
6971.00	-----	12499	31[illegible]	15637	[illegible]

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

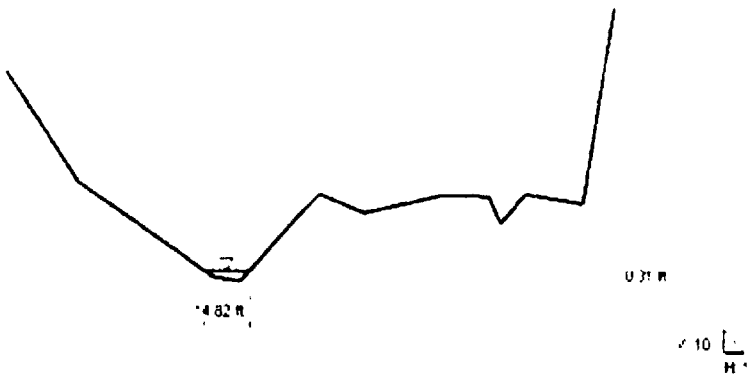
Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq. rt. (Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2


Elev. vs. Time
POND ON 30 OUT 100
6971.0
6970.8
6970.6
6970.4
6970.2
6970.0
6969.8
6969.6
6969.4
6969.2
6969.0
Elev. (ft)
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Time (hrs)
POND ON 30 OUT 100

Section Offsite 10 - 1
Cross Section for Irregular Section - 1

Project Description		
Flow Element	Irregular Section	
Friction Method	Manning Formula	
Solve For	Normal Depth	
Section Data		
Roughness Coefficient	0.045	
Channel Slope	0.13300	ft/ft
Normal Depth	0.31	ft
Elevation Range	6875.72 to 6883.75 ft	
Discharge	11.40	ft^3/s



Worksheet for Irregular Section - 1

Project Description		
Flow Element.	Irregular Section	
Friction Method	Manning Formula	
Solve For	Normal Depth	
Input Data		
Channel Slope.	0 13300	ft/ft
Discharge	11 40	ft³/s
Options		
Current Roughness Weighted Meth	ImprovedLotters	
Open Channel Weighted Roughnes	ImprovedLotters	
Closed Channel Weighted Roughne	Hortons	
Results		
Roughness Coefficient	0.035	
Water Surface Elevation	6876.00	ft
Elevation Range:	6875.72 to 6883.75 ft	
Flow Area	2 39	ft²
Wetted Perimeter	14 01	ft
Top Width	13 99	ft
Normal Depth	0 28	ft
Critical Depth:	0.39	ft
Critical Slope	0 02870	ft/ft
Velocity	4.77	ft/s
Velocity Head	0.35	ft
Specific Energy	0.63	ft
Froude Number	2 03	
Flow Type	Supercritical	

Segment Roughness

Start Station	End Station	Roughness Coefficient
(0+00, 6881 84)	(2+00, 6883 75)	0 035

Section Geometry

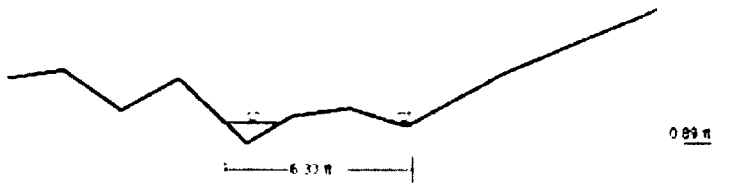
Station	Elevation
0+00	6881 84
0+24	6878 60

Worksheet for Irregular Section - 1

Station	Elevation
0+68	6875.83
0+77	6875.72
1+03	6878.28
1+18	6877.72
1+44	6876.20
1+58	6878.21
1+63	6877.41
1+71	6878.29
1+80	6878.01
2+00	6883.75

Section Offsite 10 - 2
Cross Section for Irregular Section - 2

Project Description		
Flow Element	Irregular Section	
Friction Method	Manning Formula	
Solve For	Normal Depth	
Section Data		
Roughness Coefficient	0.041	
Channel Slope	0.08000	ft/ft
Normal Depth	0.89	ft
Elevation Range	5899.50 to 5905.41 ft	
Discharge	11.40	cfs



Worksheet for Irregular Section - 2

Project Description		
Flow Element	Irregular Section	
Friction Method	Manning Formula	
Solve For:	Normal Depth	
Input Data		
Channel Slope	0.00030	ft/ft
Discharge.	11 40	ft^3/s
Options		
Current Roughness Weighted Meth	ImprovedLotters	
Open Channel Weighted Roughnes	ImprovedLotters	
Closed Channel Weighted Roughne	Hortons	
Results		
Roughness Coefficient:	0.041	
Water Surface Elevation:	6000 30	ft
Elevation Range.	6899.50 to 6905 41 ft	
Flow Area	2.27	ft²
Wetted Perimeter	6 69	ft
Top Width:	6 33	ft
Normal Depth	0 89	ft
Critical Depth:	1 02	ft
Critical Slope:	0 03523	ft/ft
Velocity	5.03	ft/s
Velocity Head:	0 39	ft
Specific Energy:	1 28	ft
Froude Number:	1.48	
Flow Type	Supercritical	

Segment Roughness

Start Station	End Station	Roughness Coefficient
(0+00, 6902 33)	(0+57, 6905 41)	0 045

Section Geometry

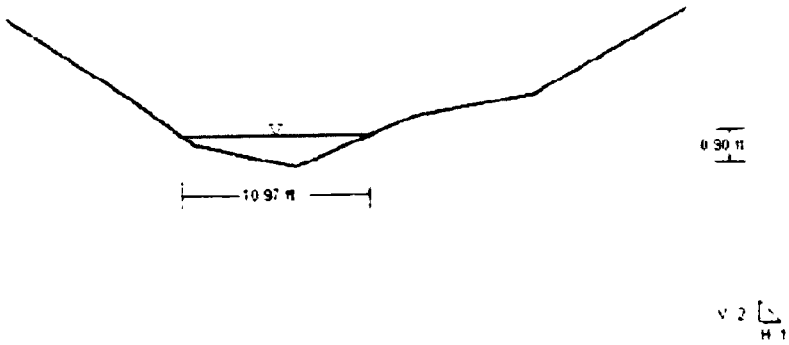
Station	Elevation
0+00	6902.33
0+05	6902.67

Worksheet for Irregular Section - 2

Station	Elevation
0+10	5900.92
0+15	5902.33
0+21	5899.53
0+25	5900.73
0+30	5901.03
0+35	5900.24
0+43	5902.44
0+57	5906.41

Section Offsite 20 - 2
Cross Section for Irregular Section - 2

Project Description		
Flow Element	Irregular Section	
Friction Method	Manning Formula	
Solve For	Normal Depth	
Section Data		
Roughness Coefficient	0.045	
Channel Slope	0.06700	ft/ft
Normal Depth	0.90	ft
Elevation Range	6904.22 to 6908.82 ft	
Discharge	28.70	ft³/s



Worksheet for Irregular Section - 2

Project Description		
Flow Element	Irregular Section	
Friction Method	Manning Formula	
Solve For	Normal Depth	
Input Data		
Channel Slope	0.06700	ft/ft
Discharge	28.70	ft³/s
Options		
Current Roughness Weighted Meth	ImprovedLotters	
Open Channel Weighted Roughnes	ImprovedLotters	
Closed Channel Weighted Roughne	Horton's	
Results		
Roughness Coefficient	0.045	
Water Surface Elevation	6906.12	ft
Elevation Range	6904.22 to 6908.82 ft	
Flow Area	5.42	ft²
Wetted Perimeter	11.14	ft
Top Width	10.97	ft
Normal Depth	0.90	ft
Critical Depth	1.01	ft
Critical Slope	0.038645	ft/ft
Velocity	5.29	ft/s
Velocity Head	0.44	ft
Specific Energy	1.33	ft
Froude Number	1.33	
Flow Type	Supercritical	

Segment Roughness

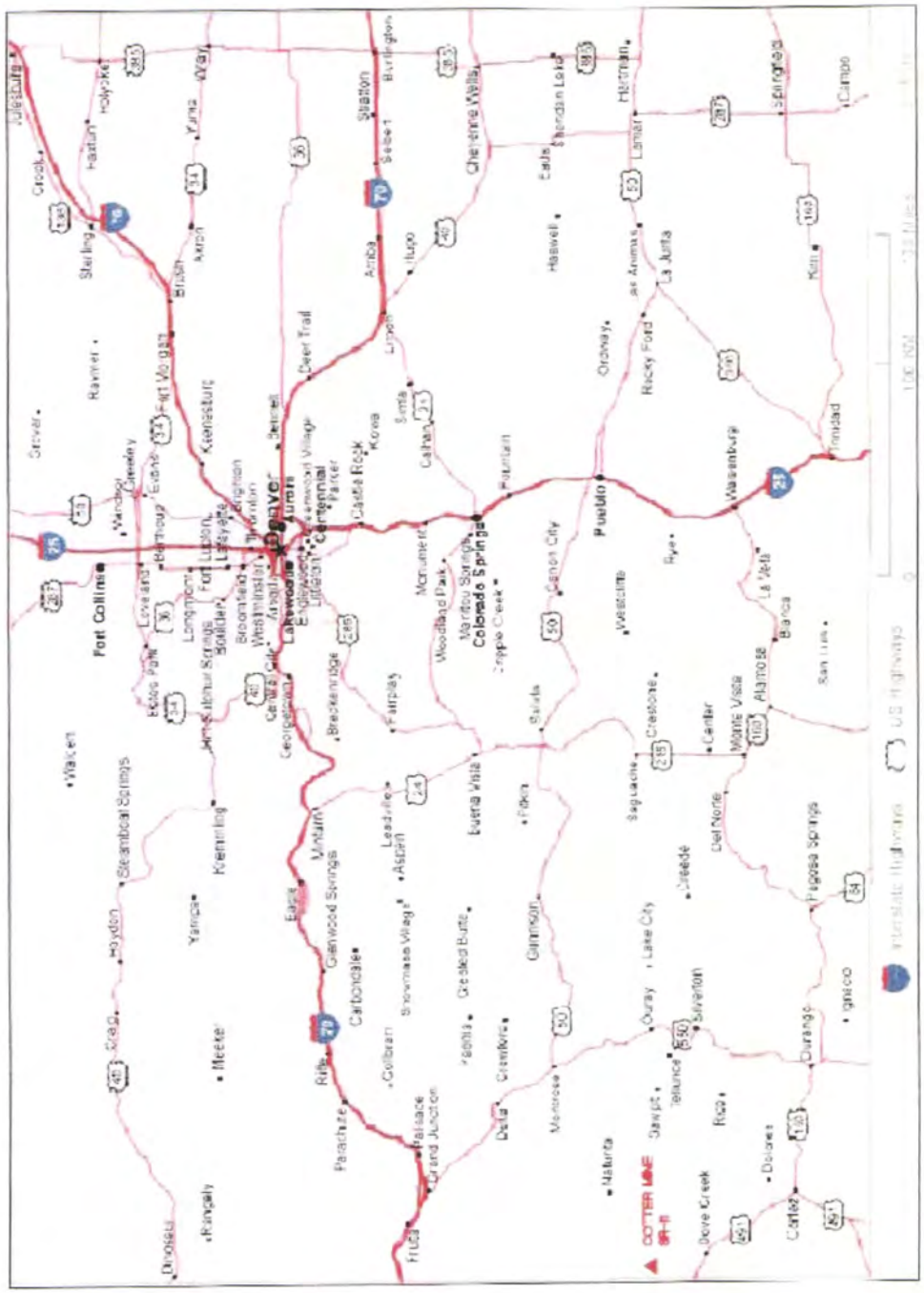
Start Station	End Station	Roughness Coefficient
(0+00, 6908.67)	(0+40, 6908.82)	0.045

Section Geometry

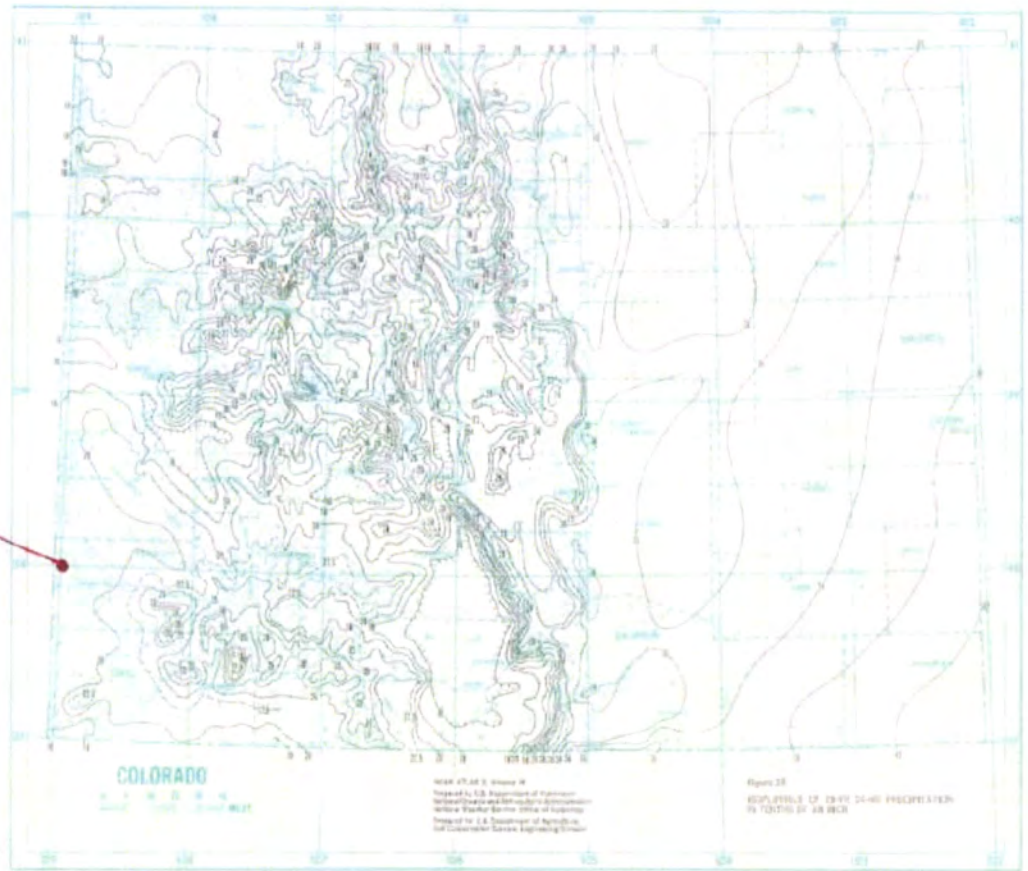
Station	Elevation
0+00	6908.67
0+07	6906.38

Worksheet for Irregular Section - 2

Station	Elevation
0+11	6904.88
0+17	6904.22
0+24	6905.67
0+31	6906.28
0+40	6908.82

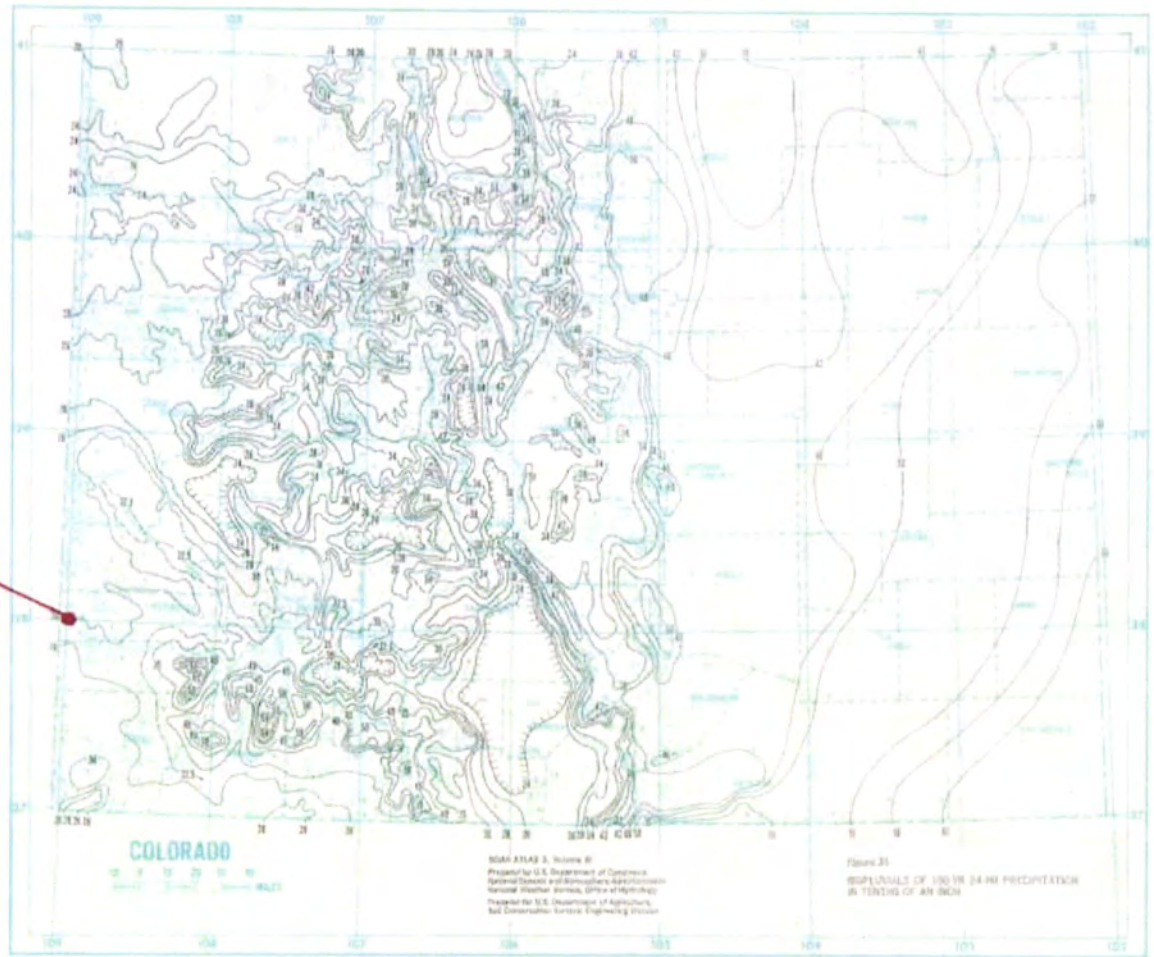

VICINITY MAP
Denver
Fort Collins
Colorado Springs
Pueblo
Grand Junction
Durango
Aspen
Glenwood Springs
Steamboat Springs
Vail
Breckenridge
Leadville
Salida
Gunnison
Montrose
Cortez
Telluride
Ouray
Silverton
Trinidad
La Junta
Lamar
Sterling
Limon
Burlington
Alamosa
Monte Vista
Del Norte
Pagosa Springs
Dove Creek
Dolores
Rangely
Meeker
Craig
Hayden
Yampa
Kremmling
Walden
Granby
Estes Park
Loveland
Longmont
Boulder
Broomfield
Westminster
Arvada
Golden
Lakewood
Littleton
Englewood
Aurora
Centennial
Parker
Castle Rock
Monument
Woodland Park
Fairplay
Buena Vista
Canon City
Florence
Cripple Creek
Penrose
Rye
Westcliffe
Walsenburg
La Veta
Gardner
Crestone
Saguache
Creede
Lake City
Gateway
Naturita
Nucla
Ridgway
Ouray
Telluride
Placerville
Delta
Olathe
Montrose
Paonia
Hotchkiss
Crawford
Somerset
Redstone
Carbondale
Snowmass Village
Aspen
Basalt
Eagle
Minturn
Leadville
Fairplay
Hartsel
Guffey
Lake George
Florissant
Divide
Woodland Park
Manitou Springs
Colorado Springs
Fountain
Security
Widefield
Pueblo West
Boone
Rocky Ford
Swink
Las Animas
Hasty
Granada
Lamar
Holly
Wiley
Eads
Kit Carson
Cheyenne Wells
Kanorado
Sharon Springs
Goodland
Burlington
Seibert
Stratton
Hugo
Limon
Genoa
Matheson
Simla
Calhan
Peyton
Falcon
Ellicott
Yoder
Rush
Colorado Springs
Fountain
Security
Widefield
Pueblo West
Boone
Rocky Ford
Swink
Las Animas
Hasty
Granada
Lamar
Holly
Wiley
Eads
Kit Carson
Cheyenne Wells
Kanorado
Sharon Springs
Goodland
Burlington
Seibert
Stratton
Hugo
Limon
Genoa
Matheson
Simla
Calhan
Peyton
Falcon
Ellicott
Yoder
Rush
Interstate Highway
US Highway

SR-11 Site



ESWMP-29

SR-11 Site



9.0 References

Ponce, V. M. and R. H. Hawkins. 1996. Runoff curve number: Has it reached maturity? Journal of Hydrologic Engineering 1(1):11-19.

USDA-SCS. 1985. National Engineering Handbook, Section 4 - Hydrology. Washington, D.C.: USDA-SCS.

USDA-SCS. 1993. National Engineering Handbook Series, Part 630, Chapter 4, Storm Rainfall Depth. Washington, D.C.: USDA-SCS.

Young, R. A., C. A. Onstad, D. D. Bosch, and W. P. Anderson. 1987. AGNPS, Agricultural

Haestad Software: "PondPack, Version 9", and "FlowMaster, 2005". Now owned and operated by Bentley Systems, Inc.

OFFSITE
BASIN 10

OFF
10

(26.0 AC.)

PERMIT
BOUNDARY
10.3 ACRES

SECTION 10–2

SECTION 20–2

OFFSITE
BASIN 20

OFF
20

(63.8 AC.)

Q_{100} = 28.7 CFS
Q_{10} = 2.7 CFS

WATER TANK

PROPANE
TANK

MAGAZINES

OFFICE/DRY

GENERATOR

DIESEL
TANK

STORAGE

COMPRESSOR

SEPTIC
TANK

PORTAL

WASTE ROCK
PILE

EXISTING DRIFT

EXISTING BERM

ONSITE
BASIN 30

30

(4.1 AC.)

EXISTING
RETENTION
POND 30

EXISTING BERM

EXISTING BERM

GATE

SECTION 10–1

Q_{100} = 11.4 CFS
Q_{10} = 0.6 CFS

San Miguel County Road 4Q

N

0 50 100 200

SCALE: 1" = 100'
CONTOUR INTERVAL = 1 FOOT

REVISION ⚠ ____ DATE ____	DRAWN BY RLC DATE 8/8/2012	O'Connor Design Group, Inc.	SITE DRAINAGE & BMP's DRAINAGE DESIGN PLAN COTTER CORPORATION MINE SR-11
REVISION ⚠ ____ DATE ____	DESIGNED BY PMO DATE 8/8/2012	2350 G Road Grand Junction, Co. 81505 Phone: (970) 241-7125 Fax: (970) 241-7852	
REVISION ⚠ ____ DATE ____	CHECKED BY PMO DATE 8/8/2012		SHEET 1 OF 4

C:\Land Projects 2009\COTTER CORPORATION - SR-11\dwg\SR-11DRAINAGE-PLAN.dwg, 9/22/2012 5:05:15 PM, Rick

N

0 200 400 800

SCALE: 1" = 400'
CONTOUR INTERVAL = 20 FEET

DOE

BLM

DOE

DOE

DOE

300 L.F. SHEET FLOW
S = 4.0%

300 L.F. SHEET FLOW
S = 4.0%

1000 L.F. SHALLOW CONCENTRATED
FLOW S = 38.0%

1400 L.F. SHALLOW CONCENTRATED
FLOW S = 30.0%

1800 L.F. CHANNEL FLOW
S = 7.2%

1000 L.F. CHANNEL FLOW
S = 9.0%

OFF 20

OFF 10

OFF 10

ONSITE 30

EXISTING DRILL ROAD

NEW ACCESS ROAD

20-2

10-2

10-1

RETAINING POND

San Miguel County Road 4Q

San Miguel County Road 4Q

LEGEND

CONTOUR LINE

BASIN BOUNDARY

TIME OF CONCENTRATION FLOW ROUTE

BASIN LABEL

PERMIT BOUNDARY

REVISION 1 ____ DATE ____	DRAWN BY RLC	DATE 8/8/2012	O'Connor Design Group, Inc.
REVISION 2 ____ DATE ____	DESIGNED BY PMO	DATE 8/8/2012	2350 G Road Grand Junction, Co. 81505 Phone: (970) 241-7125 Fax: (970) 241-7852
REVISION 3 ____ DATE ____	CHECKED BY PMO	DATE 8/8/2012	

EXISTING SITE & OFFSITE BASINS
DRAINAGE DESIGN PLAN
COTTER CORPORATION MINE SR-11

SHEET 2 OF 4

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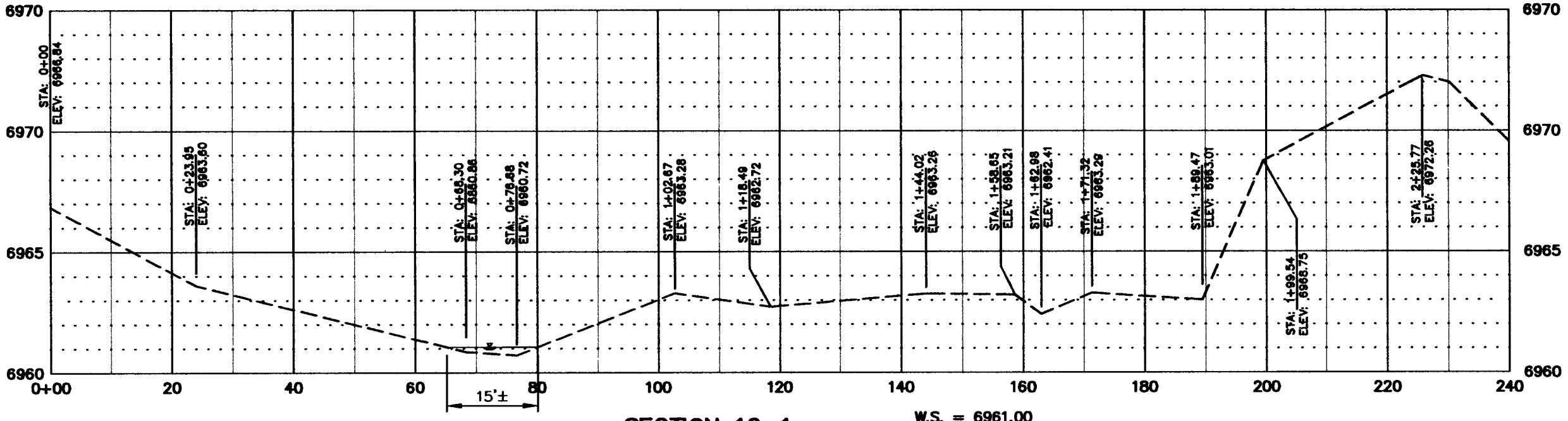
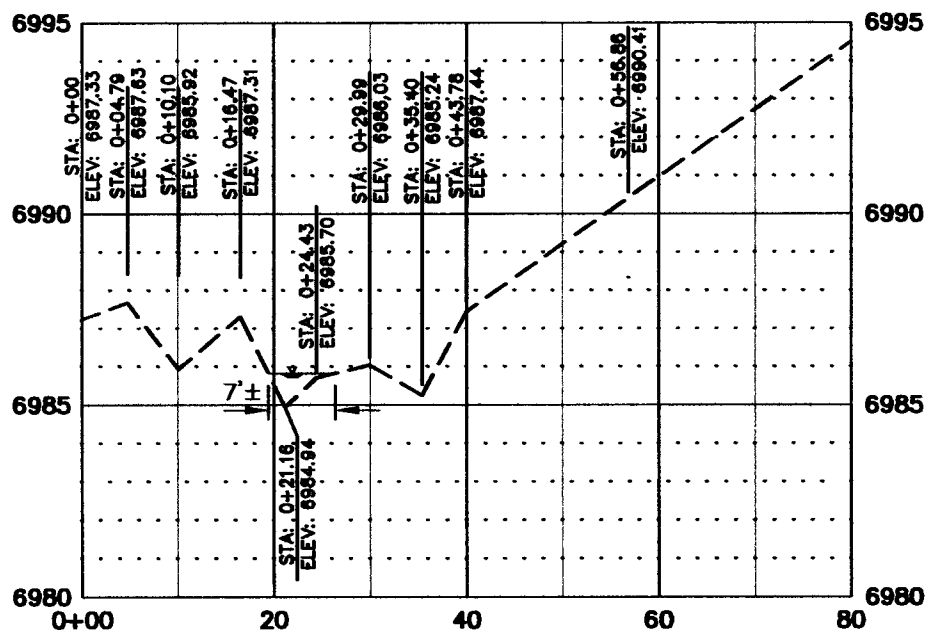


SECTION 10–1
OFFSITE BASIN 10

W.S. = 6961.00
V = 4.77 FPS

UPSTREAM SLOPE
S = 0.1330 (13.30%)



SECTION 10–2
OFFSITE BASIN 10

W.S. = 6985.39
V = 5.03 FPS

UPSTREAM SLOPE
S = 0.0800 (8.00%)

OFFSITE BASIN 10
Q_{100} = 11.4 CFS

SCALE: HORIZONTAL: 1"20'
VERTICAL: 1"=5'

REVISION ⚠ ____ DATE ____ REVISION ⚠ ____ DATE ____ REVISION ⚠ ____ DATE ____	DRAWN BY RLC DATE 8/8/2012 DESIGNED BY PMO DATE 8/8/2012 CHECKED BY PMO DATE 8/8/2012	O'Connor Design Group, Inc. 2350 G Road Grand Junction, Co. 81505 Phone: (970) 241-7125 Fax: (970) 241-7852	DRAINAGE CHANNEL CROSS-SECTIONS DRAINAGE DESIGN PLAN COTTER CORPORATION MINE SR-11	SHEET 3 OF 4

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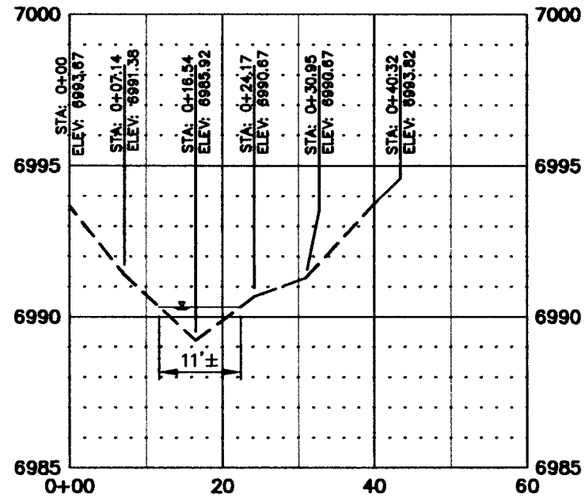


SECTION 20–2
OFFSITE BASIN 20

W.S. = 6990.12
V = 5.29 FPS

UPSTREAM SLOPE
S = 0.0670 (6.70%)

OFFSITE BASIN 20
Q_{100} = 28.7 CFS

SCALE: HORIZONTAL: 1"=20'
VERTICAL: 1"=5'

REVISION ⚠ ____ DATE ____
REVISION ⚠ ____ DATE ____
REVISION ⚠ ____ DATE ____

DRAWN BY RLC DATE 8/8/2012
DESIGNED BY PMO DATE 8/8/2012
CHECKED BY PMO DATE 8/8/2012

O'Connor Design Group, Inc.
2350 G Road
Grand Junction, Co. 81505
Phone: (970) 241-7125
Fax: (970) 241-7852

DRAINAGE CHANNEL CROSS-SECTIONS
DRAINAGE DESIGN PLAN
COTTER CORPORATION MINE SR-11

April 2008

DE-RO01-08LM70075

URANIUM MINING LEASE
UNITED STATES DEPARTMENT OF ENERGY

THIS LEASE AGREEMENT, effective as of this 30th day of April, 2008, by and between the UNITED STATES OF AMERICA (hereinafter "Government"), represented by the **UNITED STATES DEPARTMENT OF ENERGY** (hereinafter "DOE"), whose principal place of business for the purpose of this Lease is 2597 B ¾ Road, Grand Junction, Colorado 81503 and **Cotter Corporation** whose principal place of business for the purpose of this Lease is 7800 East Dorado Place, Suite 210, Englewood, Colorado 80111, (hereinafter "Lessee"):

WITNESSETH THAT:

DOE represents that it is in possession of certain Government owned uranium mining property in San Miguel County, Colorado, more particularly described as Lease Tract **C-SR-11** in Appendix "A" which is attached hereto and hereby made a part this Agreement (the "Property").

DOE desires that said Property be explored, developed, and operated for the production of uranium-bearing ores.

This Lease is authorized by Section 67 of the Atomic Energy Act of 1954, as amended, and is issued pursuant to the provisions of the DOE's regulations governing the issuance of leases for mining deposits of uranium in lands held by the DOE (10 CFR Part 760).

NOW, THEREFORE, the parties do hereby agree as follows:

I. GRANT OF LEASE.

For considerations hereinafter stated and performance by the Lessee of the terms and conditions hereinafter provided, the DOE does hereby lease to the Lessee, for the purposes of exploring for, developing, mining, and removing deposits of uranium, vanadium, and associated minerals, the Property described in Appendix "A", which is attached hereto and hereby made a part hereof, subject to the terms and conditions hereinafter set forth. The rights hereby granted are limited to exploration, development, mining, and removal of ore from within the vertical planes of the boundary lines of the Property, and the Lessee shall have no right hereunder to extend its workings beyond such vertical planes. Access to the Property is not guaranteed by the Government. The Lessee shall be responsible for securing such access.

II. TERM. This Lease shall remain in effect for a period of ten (10) years from the aforementioned effective date, except as it may be sooner relinquished or cancelled pursuant to other provisions of this Lease.

Near the end of that 10-year period, DOE will re-evaluate the leasing program to determine if the leases/leasing program should continue.

III. DEFINITIONS. As used herein:

(a) The term "Government" means the Government of the United States of America, including its authorized representatives associated with the Uranium Leasing Program.

(b) The term "DOE" means the United States Department of Energy, or duly authorized representatives thereof, including the Realty Officer except for the purpose of deciding an appeal under Article XXVII "DISPUTES".

(c) The term "Realty Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Realty Officer acting within the limits of their authority as delegated by the Realty Officer.

(d) The term "associated minerals" means any minerals, other than the minerals covered by this Lease, which are (i) so intermingled with the deposits of the mineral or minerals for which this Lease is issued that separate development is, in the opinion of the Realty Officer, not warranted for mining or for economic reasons, or (ii) of such poor quality and in such small quantity that separate development is, in the opinion of the Realty Officer, undesirable for mining or for economic reasons.

(e) The term "applicable statutes and regulations" means all applicable Federal, state, and local statutes, rules, regulations, and standards, as they may be amended or replaced from time to time. These statutes include but are not limited to, those relating to mine safety; radiation; air, water, and land pollution; disposal of liquid and solid waste; and workmen's and unemployment compensation.

(f) The term "Exploration Plan" as described in Article XII "EXPLORATION PLAN" and Appendix "C" means a plan of activity proposed by the Lessee for the purpose of conducting approved operations to explore, test, or prospect for minerals covered by this Lease.

(g) The term "Mining Plan" as referenced in Article XIII "MINING PLAN" and Appendix "C" means a plan of activity proposed by the Lessee for the purpose of conducting surface and underground operations to develop or extract the minerals covered by this Lease.

(h) Article "Titles and Headings" as used throughout this Lease are inserted for convenience only, and shall not be deemed to be a part of this Lease or considered in construing this Lease.

IV. GENERAL PERFORMANCE REQUIREMENT. The Lessee shall conduct all activities in accordance with the terms and conditions of this Lease and with those in 10 CFR Part 760. Furthermore, the Lessee shall conduct exploration, development, and mining activities on the Property with all reasonable diligence, skill, and care, as is required to systematically advance lease operations toward, and ultimately achieve and maintain, production of uranium ore consistent with good and safe mining practice, and in accordance with market conditions. Reasonable diligence shall be assessed by the Realty Officer at his sole discretion on the basis of the Lessee's ongoing lease activities or the lack thereof. Site permitting activities and the performance of cultural resource surveys and/or threatened and endangered species surveys shall be accepted by the Realty Officer as evidence supporting reasonable diligence.

V. ROYALTIES. The Lessee shall pay or cause to be paid, as directed by the DOE, the royalties specified in Appendix "B", which is attached hereto and hereby made a part hereof, at the rates and in the manner set forth therein.

VI. INTEREST ON OVERDUE PAYMENTS — FORFEITURE FOR NON-PAYMENT.

(a) All amounts that become payable by the Lessee to the Government under this Lease shall bear simple interest from the date due until paid unless paid within thirty (30) days of becoming due. The interest rate shall be established by DOE (on a quarterly basis as required) as the Federal Short-Term Rate (applied to and applicable to the calendar quarter in which the amount becomes due) plus three (3) percent. The Federal Short-Term Rate is the rate published monthly by the Internal Revenue Service pursuant to Section 1274(d) of the Internal Revenue Code. Additional interest shall be assessed for each subsequent calendar quarter until the amount is paid.

(b) Amounts shall be due at the earlier of the following dates:

(1) The date fixed under this Lease.

(2) The date of the first written demand for payment consistent with this Lease, including any demand resulting from a default cancellation.

(c) Notwithstanding the provisions of paragraphs (a) and (b) of this Article VI, and irrespective of interest payments made by the Lessee to DOE pursuant thereto, the Realty Officer, in his sole discretion, may cancel this Lease for failure by the Lessee to pay the entire principle amount of any annual royalty, base royalty, or bid royalty within sixty (60) calendar days after payment thereof is due from the Lessee to the DOE under the terms of

this Lease. Such cancellation shall be effective upon Lessee's receipt of a written notice thereof from the Realty Officer. Failure of DOE to exercise its right to cancel shall not be deemed to be a waiver thereof.

VII. USE OF SURFACE.

(a) Subject to the other provisions of this Lease, the rights granted to the Lessee herein include the right to use so much of the surface of the Property as is required for the exploration for, and development, mining, and removal of ore, including the right to erect such buildings and other structures and install such machinery and other facilities as may be required for such operations; provided, that the Lessee shall recognize existing uses and commitments in the form of grazing, timbering, Bureau of Land Management special use permits, and public recreation, and improvements such as water developments, ditches, roads, trails, pipelines, telephone, telegraph, and power lines, fences, and rights-of-way; and Lessee shall conduct its operations so as to interfere as little as possible with such existing uses and improvements.

(b) The Property shall at all times be subject to other lawful uses heretofore or hereafter granted by the Government, through any authorized agency; provided, that such uses shall not prevent, obstruct, or unduly interfere with any right granted under this Lease.

VIII. LEASES FOR OTHER MINERALS. The granting of this Lease shall not preclude the issuance by the Government of other leases of the Property for the purposes of mining and extracting oil, gas, oil shale, coal, phosphate, potassium, sodium, sulphur, or other minerals which are or may in the future be leasable pursuant to Federal mineral leasing laws; provided, that any such leases hereafter issued shall provide that operations under such leases shall not prevent, obstruct, or unduly interfere with any right granted under this Lease.

IX. USE OF SALABLE MINERALS. No salable minerals, such as sand, gravel, or stone, found on the Property shall be used by the Lessee in its operations unless such salable minerals have been purchased from the Government under the provisions of the Materials Act of July 31, 1947, 30 U.S.C. 601, as amended, or from the owner of such salable minerals if other than the Government.

X. SECURITY AND SAFETY. The Lessee shall secure and post all areas that might reasonably be considered hazardous to the general public, including, but not limited to ore stockpile areas, loading areas, mining openings, and mine-rock waste piles, in accordance with all applicable statutes and regulations and specific requirements and stipulations set forth in Appendix "C". If necessary, the Lessee agrees to construct fences or other barriers around the perimeter of safety-hazard areas to minimize the potential for intrusion by humans, livestock, and

wildlife. Radioactive materials exposed by the Lessee's operation shall be managed to ensure that the exposure of humans and ecosystems is as low as reasonably achievable.

XI. ENVIRONMENTAL REQUIREMENTS. The Lessee, at the Lessee's expense, shall comply with all applicable statutes and regulations and abide by the specific requirements and stipulations set forth in Appendix "C", which is attached hereto and hereby made a part hereof.

XII. EXPLORATION PLAN.

(a) Prior to commencing any surface-disturbing operations to explore, test, or prospect for minerals covered by this Lease, the Lessee shall file with the Realty Officer three (3) copies of a plan for the proposed exploration activities and shall obtain the Realty Officer's approval of such plan. The Exploration Plan shall be consistent with the "Notice of Intent to Conduct Prospecting Operations" (hereinafter "Notice") to be filed with the Colorado Mined Land Reclamation Board (hereinafter MLRB) in accordance with "Rule 5" of the "Mineral Rules and Regulations" of the Colorado MLRB, as these rules may be amended. The Exploration Plan shall include all information required by the "Notice", and in addition, must specifically include the following information:

(1) A site-specific environmental analysis;

(2) A description of specific measures to be taken to assure compliance with the requirements of Article XI "ENVIRONMENTAL REQUIREMENTS", including methods of reclamation contemplated by the Lessee; and

(3) The specific information outlined in Appendix "C" of this Lease.

(b) All Exploration Plans submitted to the Realty Officer pursuant to this Article XII and all proposed activities contained therein shall be reviewed by DOE in accordance with 10 CFR Part 1021 "National Environmental Policy Act Implementing Procedures".

(c) If preparation and filing of an Exploration Plan for the entire operation is dependent upon factors which cannot or will not be determined except during the progress of exploration activities, partial plans may be submitted and approved from time to time; provided however, that the Lessee shall not perform exploration activities not described in an approved plan.

(d) Changes may be made in the approved Exploration Plan by mutual written agreement of the Lessee and the Realty Officer. Approval is contingent upon the Lessee notifying all other appropriate agencies (as outlined in Appendix "C") of the proposed changes.

XIII. MINING PLAN.

(a) Prior to constructing any surface installation or commencing mine development on the Property, the Lessee shall file with the Realty Officer three (3) copies of a plan for the proposed mining operations and shall obtain the Realty Officer's approval of such plan. Such mining plan shall be consistent with the "Reclamation Permit Application" (hereinafter "Application") to be filed with the Colorado MLRB in accordance with "Rule 1.4" and "Rule 6" of the "Mineral Rules and Regulations" of the Colorado MLRB, as these rules may be amended. The Mining Plan shall include all information required by the "Application", and in addition, must specifically include the following information:

(1) A site-specific environmental analysis;

(2) A description of specific measures to be taken to assure compliance with the requirements of Article XI "ENVIRONMENTAL REQUIREMENTS", including methods of reclamation contemplated by the Lessee; and

(3) The specific information outlined in Appendix "C" of this Lease.

(b) All Mining Plans submitted to the Realty Officer pursuant to this Article XIII and all proposed activities contained therein shall be reviewed by DOE in accordance with 10 CFR Part 1021 "National Environmental Policy Act Implementing Procedures".

(c) If preparation and filing of a Mining Plan for the entire operation is dependent on factors which cannot or will not be determined except during the progress of mining activities, a partial plan may be submitted and approved from time to time; provided however, that the Lessee shall not perform mining activities not described in an approved plan.

(d) Changes may be made in the approved Mining Plan by mutual written agreement of the Lessee and the Realty Officer. Approval is contingent upon the Lessee notifying all other appropriate agencies (as outlined in Appendix "C") of the proposed changes.

XIV. PERFORMANCE BOND.

(a) Upon approval of an Exploration Plan or Mining Plan, and prior to commencing any surface-disturbing operations, the Lessee shall be required to file a suitable performance bond of not less than **$43,000** with satisfactory surety, payable to the United States Department of Energy. The bond shall be conditioned upon the faithful compliance with all applicable statutes and regulations, the terms and conditions of this Lease, and any

Exploration Plans and Mining Plans, including amendments and supplements thereto, which have been approved by the Realty Officer.

(b) The Realty Officer shall set the amount of the initial bond and may, from time to time, require an increase or allow a decrease in the amount of the bond, as in his judgment the circumstances may require. In determining the amount of the bond, the Realty Officer shall take into consideration all applicable statutes and regulations and the character and nature of the reclamation requirements of the Lease, including the requirements of any approved Exploration Plans and Mining Plans and partial or supplementary plans, and the estimated costs of such reclamation.

(c) The Lessee and his sureties shall be liable for any damage to the Government resulting from the Lessee's failure to complete any work required upon the expiration, relinquishment, or cancellation of this Lease.

XV. INSPECTION. The DOE reserves the right, through its officers, employees, agents, and contractors, to enter upon the leased property and into all parts of any of Lessee's mines therein at all reasonable times for inspection and other purposes subject to the Lessee's standard operating procedures.

XVI. GOOD FAITH NEGOTIATIONS. At the request of the Realty Officer, the Lessee will negotiate in good faith with the DOE to reach an agreement under which the Lessee, for appropriate compensation, would correct undesirable conditions existing on the Property as a result of pre–1974 mining activities and such other conditions that may be identified from time to time by the Realty Officer. If for any reason, the Lessee is unable to perform the work required to correct such conditions in a timely manner, DOE reserves the right to contract with another entity to enter upon the Property and perform said work.

XVII. INDEMNIFICATION OF GOVERNMENT.

(a) The Government, including its employees, all tiers of contractors, agents, and authorized representatives shall not be responsible for any mechanics' or miners' liens or other liens, encumbrances, or liabilities incurred by the Lessee in connection with the operation of the Property. The Lessee assumes all responsibility for and will hold the Government harmless from any and all claims and liability of any nature arising from the operation or occupancy of the Property.

(b) The Lessee agrees to protect and indemnify the Government against any payroll taxes or contributions imposed with respect to any employee of the Lessee by any applicable law dealing with old age pensions, unemployment compensation, accident compensation, health insurance and related subjects. The Lessee

also agrees, at its own cost and expense, to insure to each person employed in, about, or upon the Property, the compensation provided for by law with respect to workmen's compensation and employer's liability insurance, properly safeguarding the Government, including its employees, all tiers of contractors, agents, and authorized representatives, against liability for injuries to persons, including injuries resulting in death, and loss of and damage to property in policies and amounts acceptable to the DOE and to furnish to the DOE written evidence of such insurance.

XVIII. REPORTING REQUIREMENTS.

(a) The Lessee shall provide the Realty Officer with copies of all permits and correspondence from local, state, or other Federal agencies or entities which pertain to the Lessee's activities on the Property.

(b) The Lessee shall provide to the Realty Officer, within twenty calendar days after the end of each month, an accurate record of the tonnage and U_3O_8 and V_2O_5 grades of each lot of ore delivered from the Property to a mill, buying station, or other purchaser during the previous month, including copies of all settlement sheets furnished to the Lessee for ores so delivered.

(c) The Lessee shall provide to the Realty Officer as soon as practicable after the end of each calendar quarter, the following documents, records, and/or maps:

(1) A formal (written and signed) summary of all activities conducted on the Property during such calendar quarter that, among other things, documents the Lessee's reasonable diligence required by Article IV "GENERAL PERFORMANCE REQUIREMENT".

(2) A map or maps showing the location of all exploration holes drilled on the Property during such calendar quarter, together with copies of any logs and assay records applicable to such drill holes.

(3) A mine map or maps showing the progress of mining on the Property as of the end of such calendar quarter.

(4) Lessee's estimate of the tonnage and U_3O_8 and V_2O_5 grades of all ores stockpiled on the Property as of the end of such calendar quarter.

(5) If no activity occurs on the Property during a calendar quarter, a letter submitted to the Realty Officer stating that no activity has occurred shall satisfy this reporting requirement.

(d) The Lessee further agrees to provide to the Realty Officer the results of any inspections of Lessee's mines or other facilities located on the Property, conducted by personnel of local, state, or other Federal agencies under applicable statutes and regulations. Furthermore, the Lessee agrees to notify the Realty Officer of any planned or scheduled inspections to be performed by local, state, or other federal agencies as soon as such schedule is known so that the Realty Officer may participate in said inspection if so desired.

(c) The Lessee is hereby notified that information obtained by DOE from the Lessee under this section shall be subject to the provisions of the Freedom of Information Act (5 U.S.C. 552).

XIX. TAXES. The Lessee agrees to pay when due all taxes lawfully assessed and levied pursuant to state or Federal law upon improvements, output of mines, and other interests, property, and assets of the Lessee in or upon the Property.

XX. ASSIGNMENT. The Lessee agrees that no transfer of this Lease, or of any interest therein or claim thereunder, by assignment, sublease, operating agreement, or otherwise, shall occur unless and until approved in writing by the Realty Officer.

XXI. RELINQUISHMENT OF LEASE. This Lease may be surrendered by the Lessee upon the Lessee's filing with the DOE, and the Realty Officer's approval of, a written application for relinquishment. Approval of the application shall be contingent upon the delivery of the Property to the DOE in a condition satisfactory to the Realty Officer, in accordance with the terms of this Lease, and upon the continued liability of the Lessee to make payment of all royalty and other debts theretofore accrued and due the DOE.

XXII. CANCELLATION OF LEASE. DOE may cancel this Lease if the Realty Officer determines that the Lessee has failed to comply with any provision of this Lease including reasonable diligence. Failure of DOE to exercise its rights to cancel shall not be deemed to be a waiver thereof.

XXIII. DELIVERY OF PREMISES. At the expiration of this Lease, or upon its earlier relinquishment or cancellation as herein provided, the Lessee shall, within one hundred eighty (180) days or other period mutually agreed to by the Lessee and Realty Officer, surrender the Property in a condition satisfactory to the Realty Officer, and shall, unless otherwise directed by the Realty Officer in writing, remove from the Property at Lessee's expense all structures, machinery, equipment, tools, and improvements placed thereon by the Lessee; provided, that the Lessee shall not remove any timbers or improvements which are determined by the Realty Officer to be required to be left in the mine workings to protect such workings as a mining property. Furthermore, prior to the surrender of

the Property, the Lessee shall remove from the Property at Lessee's expense all stockpiles of ore and/or protore materials placed thereon by the Lessee and remit the required royalties to DOE in accordance with Article V "ROYALTIES" and Appendix "B". Otherwise, the Lessee shall at the Lessee's expense return all stockpiles of ore and/or protore materials to a suitable location within the underground mine workings on the Property or other location on the Property as designated by the Realty Officer.

XXIV. EXAMINATION OF RECORDS.

(a) The DOE and the Comptroller General of the United States or duly authorized representatives of either shall, until three (3) years after final payment under this Lease, have access to and the right to examine any of the Lessee's directly pertinent books, documents, papers, or other records involving transactions related to this Lease. The Lessee shall make these records and documents available to the Government, at the Lessee's offices, at all reasonable times, without any charge.

(b) The Lessee agrees to include in first-tier subcontracts under this Lease a clause to the effect that the DOE or the Comptroller General or duly authorized representatives of either shall, until three (3) years after final payment under the subcontract, have access to and the right to examine any of the subcontractor's directly pertinent books, documents, papers, or other records involving transactions related to the subcontract.

(c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under Article XXVII "DISPUTES", (2) litigation or settlement of claims arising from the performance of this Lease, or (3) costs and expenses of this Lease to which the DOE or the Comptroller General or duly authorized representatives of either has taken exception shall continue until such appeals, litigation, claims, or exceptions are disposed of.

XXV. OFFICIALS NOT TO BENEFIT. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Lease, or to any benefit arising from it. However, this clause does not apply to this Lease to the extent that this Lease is made with a corporation for the corporation's general benefit.

XXVI. COVENANT AGAINST CONTINGENT FEES. The Lessee warrants that no person or selling agency has been employed or retained to solicit or secure this Lease upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Lessee for the purpose of securing business. For breach or violation of this

warranty, the Government shall have the right to cancel this Lease without liability, or in its discretion to require the Lessee to pay to DOE the full amount of such commission, percentage, brokerage, or contingent fee.

XXVII. DISPUTES.

(a) Except as otherwise provided in this Lease, any dispute concerning a question of fact arising under this Lease which is not disposed of by agreement shall be decided by the Realty Officer, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to the Lessee. The decision of the Realty Officer shall be final and conclusive unless within 30 days from the date of receipt of such copy, the Lessee mails or otherwise furnishes to the Realty Officer a written appeal addressed to the DOE. The decision of the DOE for the determination of such appeals shall be final and conclusive unless determined by a court of competent jurisdiction to have been fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence. In connection with any appeal proceeding under this clause, the Lessee shall be afforded an opportunity to be heard, and to offer evidence in support of its appeal. Pending final decision of a dispute hereunder, the Lessee shall abide by the Realty Officer's decision.

(b) The provisions of paragraph (a) above does not preclude consideration of questions of law; provided, that nothing in this Lease shall be construed as making final the decision of any administrative official, representative, or board on a question of law.

XXVIII. HEIRS AND SUCCESSORS-IN-INTEREST. Each obligation hereunder shall extend to and be binding upon, and every benefit hereof shall inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

XXIX. MEMORANDUM FOR RECORDING. If the Lessee so requests, the parties agree to execute a mutually agreeable written memorandum of even date herewith sufficient to be entitled to be recorded under the laws of the State of Colorado, reciting that all of their right, title, and interest in and to the Property is held subject to this Lease, and that DOE has reserved the royalties described in this Lease, which memorandum Lessee may place of record in the appropriate County. Upon termination of this lease, lessee agrees to execute documentation, which will also be recorded appropriately, showing the lease has terminated.

XXX. NOTICE. Any notice, election, report, or other correspondence ("Documents") required or permitted hereunder shall be in writing and shall be addressed to the party to whom directed as follows:

(a) If to Lessee:

Cotter Corporation

7800 East Dorado Place, Suite 210

Englewood, CO 80111

Attention: Amory E. Quinn, President

Telephone: (720) 554–6200

Facsimile: (720) 554–6201

(b) If to DOE:

U.S. Department Of Energy

11025 Dover Street, Suite 1000

Westminster, CO 80021-5573

Attention: Steve Schiesswohl, Realty Officer

Telephone: (720) 377–9683

Facsimile: (720) 377–3829

Time-sensitive Documents shall be (i) sent by registered or certified United States mail, postage prepaid, return receipt requested; (ii) sent by a reputable overnight courier, or (iii) sent by facsimile transmission with confirmation of receipt. All other Documents can be delivered or sent as indicated above, or may be sent by regular United States mail.

Either party may, from time to time, change its address for the delivery of future documents hereunder by notice in accordance with this Section XXX. Except as provided for royalty payments in Appendix "B" paragraph (g), all documents generated in accordance with this Lease shall be deemed complete and effective on the date that the document was issued.

XXXI. SURVIVAL. The following shall survive termination of this Lease: Articles V, VII (a), X, XI, XIV, XV, XVII, XVIII, XIX, XXII, XXIII, XXIV, and XXX and the Appendices.

IN WITNESS WHEREOF, the parties hereto have executed this Lease, effective as of the date first above written, intending to be legally bound thereby.

UNITED STATES OF AMERICA UNITED STATES DEPARTMENT OF ENERGY	COTTER CORPORATION (LESSEE)
By	By
Title Realty Officer	Title V.P. Accounting & Finance
Date 4/30/2008	Date 4-29-08

APPENDIX A

DESCRIPTION OF LEASED PROPERTY

The leased Property described herein was referred to as "MINING LEASE NO. AT(05-1)-ML-60.8-C-SR-11" during the period from 1974 to the enactment of this lease. This mining Property, containing 1,303.22 acres, more or less, situated in San Miguel County, Colorado, includes those portions of Sections 8, 17, and 18, Township 43 North, Range 19 West, New Mexico Principal Meridian, bounded and described as follows:

Beginning at Southeast Corner Section 8,

thence S 02° 0'21" W 5,257.22 feet to Southeast Corner Section 17,

thence N 88°00'58" W 5,257.15 feet to Southeast Corner Section 18,

thence N 88°05'48" W 2,679.48 feet to South 1/4 Corner Section 18,

thence N 87°42'07" W 2,546.57 feet to Southwest Corner Section 18,

thence N 02°06'14" E 3,933.81 feet to West 1/16 Corner Northwest 1/4 Section 18,

thence S 88°04'19" E 2,593.59 feet to East 1/16 Corner Northwest 1/4 Section 18,

thence N 00°48'23" E 1,323.85 feet to North 1/4 Corner Section 18,

thence S 87°45'44" E 2,656.39 feet to Southeast Corner Section 7,

thence N 03°19'14" E 2,628.74 feet to West 1/4 Corner Section 8,

thence S 88°06'40" E 5,193.13 feet to East 1/4 Corner Section 8,

thence S 01°59'21" W 2,637.74 feet to Southeast Corner Section 8, the point of beginning.

And excluding the following area containing 200.25 acres, more or less, bounded and described as follows:

Beginning at the Southeast Corner Section 17,

thence N 88°00'58" W 3,975.07 feet to South 1/16 Corner Southwest 1/4 Section 17,

thence N 02°08'24" E 1,318.28 feet to Center Southwest 1/4 Section 17,

thence S 87°50'10" E 2,637.26 feet to Center Southeast 1/4 Section 17,

thence N 02°08'42" E 2,635.87 feet to Center Northeast 1/4 Section 17,

thence S 87°49'53" E 1,328.32 feet to East 1/16 Corner Northeast 1/4 Section 17,

thence S 02°00'21" W 3,941.57 feet to Southeast Corner Section 17, the point of beginning,

APPENDIX B

ROYALTIES

(a) At the beginning of each lease year during the term of this Lease, there shall become due and payable to the DOE an annual royalty of [redacted]. Annual royalties paid pursuant to this article shall be credited against base royalties and royalty bid payments which become payable during the term of this Lease. Annual royalties so paid shall not be refunded upon the expiration, relinquishment, or cancellation of this Lease. Additionally, annual royalty payments made during the lease term of MINING LEASE NO. AT(05-1)-ML-60.8-C-SR-11 that have not been applied against past production royalty payments, shall be brought forward and credited against base royalties and royalty bid payments which become payable during the term of this Lease.

(b) The Lessee agrees to pay to the DOE a base royalty, per dry ton of ore delivered from the Property to a mill or other receiving station, determined as provided in paragraph (h) of this Appendix "B", in the amount of (a) Two percent (2%) of the value per dry ton up to and including a value of Fifty Dollars ($50.00) per dry ton, plus (b) Ten percent (10%) of the value per dry ton in excess of Fifty Dollars ($50.00) per dry ton and up to and including One Hundred Twenty-Five Dollars ($125.00) per dry ton, plus (c) Fourteen percent (14%) of the value per dry ton in excess of a value of One Hundred Twenty-Five Dollars ($125.00) per dry ton.

(c) The Lessee agrees to pay to the DOE, in addition to the base royalty required to be paid pursuant to paragraph (b) of this Appendix "B", a royalty bid payment, per dry ton of ore delivered from the Property to a mill or other receiving station, in the amount of [redacted] percent ([redacted]) of the value per dry ton, determined as provided in paragraph (h) of this Appendix "B"; provided, that such royalty bid payments shall not be payable with respect to ores mined from the Property and delivered to a mill or other receiving station after royalty bid payments have been made for ores containing a total of [redacted] pounds of U_3O_8 so delivered by the Lessee from the Property.

(d) Unless otherwise authorized by DOE in writing, all ores mined from the Property shall be stockpiled on the Property until such time as they are delivered to a mill or other receiving station.

(e) With respect to ores which are mined from the Property and delivered to a mill or other receiving station which is owned or controlled by the Lessee, the Lessee agrees to make base royalty and royalty bid payments, for all lots of such ore assayed or fed to process during each calendar month, within twenty (20) calendar days after the end of such calendar month. Such base royalty and royalty bid payments shall be treated as provisional payments with

respect to any lot of ore for which the DOE requests an umpire assay, and an appropriate adjustment shall be made in the first base royalty and royalty bid payment following Lessee's receipt of the results of such umpire assay for such lot of ore.

(f) With respect to ores which are mined from the Property and delivered to a mill or other receiving station not owned or controlled by the Lessee, the Lessee agrees:

(1) That the DOE may receive base royalty and royalty bid payments directly from the owner or controller of the mill or other receiving station to which such ores are shipped by the Lessee if the DOE makes arrangements therefore satisfactory to the Lessee.

(2) That, in the absence of such arrangements, the Lessee shall make base royalty and royalty bid payments for all lots of such ore assayed or fed to process (includes delivery of such ore to an ore-buying station or sample plant) during each calendar month, within twenty (20) calendar days after payment for such lots is mailed to the Lessee; provided, that an appropriate extension of such twenty (20) day period shall be granted by the Realty Officer for any undue delay in the mails which causes a delay in delivery to the Lessee of payment for such lots of ore. Such base royalty and royalty bid payments shall be treated as provisional payments with respect to any lot of ore for which the DOE requests an umpire assay, and an appropriate adjustment shall be made in the first base royalty and royalty bid payment following finalization of payment to the Lessee for such ore.

(g) Payments of base royalty and royalty bid amounts due the DOE shall be deemed to have been made when received at the DOE Legacy Management Office in Grand Junction, Colorado.

(h) DOE shall establish the prices for uranium and vanadium that shall be used to calculate the fair-market value of lease tract ores. These prices shall be established on a quarterly basis, on or before the twentieth (20^{th}) day after the end of the previous calendar quarter (in January, April, July, and October), and shall remain in effect during the calendar quarter in which they are established. DOE shall establish these prices as follows:

(1) Using an electronic spreadsheet, DOE shall monitor, record, and track the spot-market and long-term-market prices for uranium (quoted as dollars per pound U_3O_8) as reported weekly in *U_x Weekly*. The spreadsheet will then (i) automatically calculate the monthly and quarterly arithmetic average prices for uranium (both spot-market and long-term-market), and (ii) automatically calculate a quarterly weighted-average price for uranium by applying the appropriate purchase contract percentages to the respective quarterly average prices. Using this spreadsheet, DOE shall also monitor, record, and track the Total Purchased (Weighted-Average Price) for

uranium as reported annually by the Energy Information Administration in Table S1b. *Weighted-Average Price of Uranium Purchased by Owners and Operators of U.S. Civilian Nuclear Power Reactors (quoted as Dollars per Pound U_3O_8 Equivalent)*. The spreadsheet will then automatically calculate the arithmetic average between the quarterly weighted-average price for uranium and the Total Purchased (Weighted-Average Price) for uranium. The resulting figure is reported as the annualized quarterly weighted-average price for uranium.

(2) Using the same electronic spreadsheet, DOE shall monitor, record, and track the market price of vanadium (quoted as dollars per pound V_2O_5) as reported twice weekly in *Metal Bulletin (Non-Ferrous Primary Metals, Noble Alloys and Ores, Vanadium pentoxide)*. The spreadsheet will then (i) automatically calculate the monthly and quarterly arithmetic average prices for vanadium, and (ii) automatically apply an adjustment factor of one-half (0.5) to each quarterly arithmetic average price for vanadium. The resulting figure is reported as the adjusted quarterly average price for vanadium.

(3) Paragraphs (h)(1) and (h)(2) can be summarized by the following three equations:

$$U = (Q_{WA} + TP_{WA}) / 2 \quad (1)$$

where:

U	=	Annualized Quarterly Weighted-Average Price for Uranium
Q_{WA}	=	Quarterly Weighted-Average Price for Uranium
TP_{WA}	=	Total Purchased (Weighted-Average Price) for Uranium

$$Q_{WA} = Q_{SM} * P_{SM} + Q_{LTM} * P_{LTM} \quad (2)$$

where:

Q_{SM}	=	Quarterly Arithmetic Average Price for the Uranium Spot Market
P_{SM}	=	Purchase Contract Percentage for the Uranium Spot Market
Q_{LTM}	=	Quarterly Arithmetic Average Price for the Uranium Long Term Market
P_{LTM}	=	Purchase Contract Percentage for the Uranium Long Term Market

$$V = Q_{WA} * 0.5 \quad (3)$$

where:

V	=	Annualized Quarterly Weighted-Average Price for Vanadium
Q_{WA}	=	Quarterly Weighted-Average Price for Vanadium

(i) The Lessee shall be notified of these prices (annualized quarterly weighted-average price for uranium and adjusted quarterly average price for vanadium) by formal written correspondence. The Lessee shall use these

prices to calculate the fair-market value of the ore in dollars per dry ton (calculated to the nearest cent [$0.01]), for all lots of such ore assayed during any calendar month. This fair-market value shall be determined by:

(1) Computing the number of recoverable pounds of contained U_3O_8 and V_2O_5 per dry ton of ore in the lots so assayed by (i) multiplying the total number of pounds of U_3O_8 and V_2O_5, respectively, contained in the lots of ore so assayed during such calendar month, by factors of 0.96 and 0.79, respectively (the average milling facility's recovery rates for U_3O_8 and V_2O_5, respectively, as acknowledged by DOE) and (ii) dividing each of the resulting numbers by the total number of dry tons of ore contained in the lots so assayed during such calendar month, and carrying the results to three decimal places for U_3O_8 and two decimal places for V_2O_5; and

(2) Adding together the dollar amounts obtained by (i) multiplying the number of recoverable pounds of U_3O_8 per dry ton of ore in the lots so assayed by the price per pound of U_3O_8 established by DOE and (ii) multiplying the number of recoverable pounds of V_2O_5 per dry ton of ore in the lots so assayed by the price per pound of V_2O_5 established by DOE.

(j) For ores that have been mined from the Property and delivered to a mill or other receiving station, but not assayed or fed to process, the Lessee shall estimate the value of said ores using standard industry practices, and shall make base royalty and royalty bid payments to DOE equal to or greater than 95 percent (95%) of the estimated value of the base royalty and royalty bid payments due to DOE. Such base royalty and royalty bid payments shall be treated as provisional payments with respect to said ores until such time that said ores are assayed or fed to process and the final base royalty and royalty bid payments due to DOE are calculated and final base royalty and royalty bid payments are made.

(k) If price quotations for vanadium pentoxide become unavailable, the DOE and the Lessee will negotiate to establish a method of determining an appropriate market price per pound of V_2O_5 to be used in determining that portion of the value per dry ton of ore attributable to vanadium. Pending agreement on such method, the last prices established by paragraph (h)(2) above shall be used in determining the portion of the value per dry ton of ore attributable to vanadium, for the purpose of computing royalties under this Lease. If the parties fail to reach agreement on an applicable method, the matter shall constitute a dispute to be decided in accordance with the Article XXVII "DISPUTES" of this Lease.

(l) The parties hereto agree that if the Lessee is paid for any constituent, other than uranium or vanadium, contained in ores mined from the Property, all amounts so paid shall be held in trust by the Lessee for the DOE until

the Lessee and the DOE agree upon a base royalty to be paid to the DOE with respect to Lessee's sale of such constituent.

(m) Consistent with Article XXIII "DELIVERY OF PREMISES", the Lessee agrees, that within one hundred eighty (180) days following the expiration, relinquishment, or termination of this Lease as herein provided, all royalties associated with this lease (annual royalty, base royalty, and bid royalty) shall become due and payable to the DOE. For ores that have been mined from the Property, but not assayed or fed to process, the Lessee shall estimate the value of said ores using standard industry practices, and shall make base royalty and royalty bid payments to DOE equal to or greater than 95 percent (95%) of the estimated value of the base royalty and royalty bid payments due to DOE. Such base royalty and royalty bid payments shall be treated as provisional payments with respect to said ores until such time that said ores are assayed or fed to process and the final base royalty and royalty bid payments due to DOE are calculated and final base royalty and royalty bid payments are made.

WEIGHING, SAMPLING, AND ASSAYING.

With respect to ores which are mined from the Property and delivered to a mill or other receiving station, the Lessee agrees to the following provisions:

(a) The Lessee shall weigh, or cause to be weighed, each lot of ore delivered from the Property to a mill or other receiving station and shall furnish the DOE a record of the weight of such lot. The scales used in weighing such ore shall be balanced daily and checked once each week or more often, as appears necessary, by either standard weights or by check-weighing against another scale. Scale platforms will be kept clean and free of the sides of the pit, and the scales shall be inspected and certified every six months by the appropriate entity of the state in which the mill or receiving station is located, if such inspection is available; otherwise, a biannual inspection shall be made by a competent organization which is acceptable to both the Lessee and the DOE.

(b) The Lessee shall sample, or cause to be sampled, each lot of ore according to standard and accepted practices in ore sampling, and such sampling shall be final and binding on both parties to this Lease. The DOE or its representative may be present at the sampling of such ore. The Lessee shall ensure that moisture determinations are made according to standard practices in ore sampling. The Lessee shall ensure that each final sample is divided into four (4) pulps, one of which shall be promptly furnished to the DOE, one of which shall be retained by the Lessee for assay purposes, and two of which shall be held in reserve by the Lessee for possible umpire analysis. The Lessee shall promptly assay, or cause to be assayed, its pulp for U_3O_8 and V_2O_5 content and shall transmit the assay results to the DOE, together with weight and moisture certificates for the lot sampled. For the purpose of such reporting, all assays for U_3O_8 shall be adjusted to the nearest 0.001% and all assays for V_2O_5 shall be adjusted to the nearest 0.01%.

(c) The DOE may assay its pulps at its own expense. In case of disagreement with the Lessee's assay with respect to either U_3O_8 or V_2O_5 content, the DOE may, within 30 calendar days after receiving its pulp, mail to the Lessee a written request for an umpire assay. Upon receipt of such written request, the Lessee shall promptly submit one of the pulps held in reserve to an assayer, whom the parties hereto shall agree upon, for umpire assay. With respect to both U_3O_8 and V_2O_5 content, if the assay of the umpire is within the assays of the two parties, it shall be final. If not, the assay which is nearer to that of the umpire shall

prevail. The party whose assay for U_3O_8 is further from that of the umpire shall pay the cost of the umpire's assay. In the event that the umpire's assay for U_3O_8 is equally distant from the assay of each party, the cost shall be split equally.

(d) The quantity of ore comprising a lot, as used herein, shall be determined by the Lessee, except that no lot shall exceed one thousand (1,000) tons of ore except as otherwise agreed in writing by the Realty Officer.

APPENDIX C

SPECIFIC REQUIREMENTS AND STIPULATIONS

The Lessee agrees to comply with all applicable statutes and regulations, including but not limited to the following items:

(a) Prior to resuming operations on the Property that were previously approved by DOE, the Lessee shall notify the Realty Officer in writing of its intentions to resume such operation and shall include any changes, additions, or modifications to the original plan that are now proposed. Upon receipt of such notification, the Realty Officer shall review the approved plan along with any new information provided by the Lessee and determine if additional stipulations are warranted. When all pertinent requirements are satisfied, DOE shall provide the Lessee with a written approval to proceed.

(b) All existing serviceable improvements not associated with the Lessee's operation, such as fences, gates, cattle guards, roads, trails, culverts, pipelines, bridges, and water development and control structures, authorized for use by the Lessee, shall be maintained in serviceable condition by the Lessee. Such improvements (if not owned by the Lessee) which are damaged or destroyed by the Lessee's operations shall be replaced, restored, or compensated for by the Lessee.

(c) The Lessee's operations shall not disturb public land survey corner markers or monuments or Atomic Energy Commission (AEC) survey markers without the prior written approval of the Realty Officer. Additionally, the Lessee shall pay all costs associated with the surveys required to preserve or reestablish the true point of any such marker or monument and the replacement of such marker or monument.

(d) Housing and other buildings and support facilities related to community development shall be constructed or located on the Property only upon the prior written approval of the Realty Officer. In constructing and locating such housing, other buildings, and support facilities, the Lessee shall comply with applicable county planning and zoning regulations, subdivision regulations, and mobile home regulations, and shall furnish evidence of such compliance to the Realty Officer upon request.

(e) Prior to any surface disturbing activity, the Lessee shall file a "Notice of Intent to Conduct Prospecting Operations" (Notice) or "Reclamation Permit Application" (Application), whichever is appropriate, with the Colorado Mined Land Reclamation Board (MLRB) in accordance with "Mineral Rules and Regulations" of the Colorado MLRB, as these rules may be amended. All subsequent modifications to the Notice or Application shall be

addressed in accordance with the "Mineral Rules and Regulations" of the Colorado MLRB. The Lessee shall provide the Realty Officer with copies of all pertinent approval documentation including permits issued.

(f) Prior to any surface disturbing activity, the Lessee shall consult with the U.S. Department of Interior—Bureau of Land Management (BLM), the U.S. Department of Interior—Fish and Wildlife Service (USFWS), and/or the Colorado Department of Natural Resources—Division of Wildlife (CDOW), as appropriate, to determine whether threatened or endangered, or sensitive plant or wildlife species occur in the area to be disturbed or whether the agencies have other plant or wildlife concerns in the area to be disturbed. If required, the Lessee shall conduct surveys or provide other documentation to resolve this concern. The Lessee shall provide the Realty Officer with copies of all documents pertaining to this issue.

(g) Prior to any surface disturbing activity, the Lessee shall perform a cultural and historical survey of the area to be disturbed. If cultural or historical resources are found to exist, the Lessee shall consult with the State Historical Preservation Officer for the appropriate measures to be taken. If required, the Lessee shall prepare a mitigation plan to address the protection of the cultural or historical resources. The Lessee shall provide the Realty Officer with copies of all documents pertaining to this issue.

(h) Prior to any surface disturbance activity in a potential floodplain or wetland area, the Lessee shall consult with the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the appropriate state agency to determine whether a jurisdictional floodplain or wetland exists in the area to be disturbed. If required, the Lessee shall prepare a Floodplain/Wetlands Assessment that proposes mitigation measures to be taken to resolve this concern. The Lessee shall provide the Realty Officer with copies of all documents pertaining to this issue.

(i) The Lessee shall use existing roads where practicable, and shall conduct activities employing wheel or track vehicles in such a manner as to minimize surface damage. The Lessee shall wash all tracked vehicles or equipment prior to their being mobilized to the Property. The Lessee shall promptly repair any road damage resulting from the Lessee's operations, restoring such road to its previous condition or to a condition acceptable to the Realty Officer. Where existing access roads across the Property are used principally by the Lessee, the Lessee shall construct surface-water control and drainage structures (culverts, water bars, or grade dips) on such roads to minimize erosion. Plans for such structures shall be included in all Exploration Plans and Mining Plans submitted to the Realty Officer pursuant to Articles XII "EXPLORATION PLAN" and XIII "MINING PLAN" hereof, respectively. The Lessee shall construct new roads and trails on the Property only at locations and to specifications

approved in advance in writing by the Realty Officer or an authorized representative of the Realty Officer, and shall construct and maintain such roads and trails in a manner that will minimize channeling and other erosion. The Realty Officer's approval of plans for new access road construction, culverts, water bars, or grade dips will be guided by standards established by BLM or the U.S. Department of Agriculture—Forest Service (USFS), where appropriate.

(j) The Lessee shall conduct all operations so as to protect all natural resources and the environment including streams, lakes, ponds, waterholes, seeps, and marshes, and protect fish and wildlife resources as required by applicable statutes and regulations. The Lessee shall control all mine wastes, contaminants and pollutants, and sediments associated with stormwater runoff in accordance with existing regulations, and shall comply with all environmental regulations regarding discharge into, or degradation of water resources including streams, springs, stock waters, or groundwater. The Lessee shall not use water from any water source without the written consent of the person having the rights to the use of such water source.

(k) Lessee shall keep the clearing of timber, stumps and snags, and any ground cover to a minimum consistent with the conduct of exploration, development, and mining activities approved hereunder. The Lessee shall abide by any restrictions concerning the bulk removal of vegetation (primarily piñon pine) that are established by the Realty Officer. The Lessee shall use due care to avoid scarring or removal of vegetative ground cover in areas not involved in such operations. Open parks (areas where there is a grass, shrub, and/or sagebrush cover) shall be disturbed as little as possible. If the shrub or brush cover is too high and must be cleared, it shall be cleared at or above ground level. The Lessee shall return all disturbed areas to their original condition or a condition acceptable to the Realty Officer promptly after damage to such areas has occurred and operations under this Lease are no longer being conducted in the disturbed areas.

(l) The Lessee agrees that all underground mine openings shall be supported by pillars, timber, or other ground support devices approved by the Federal or state agencies having jurisdiction over such underground workings. The Lessee further agrees, during the term of this Lease, to substantially fence or permanently close all mine openings/portals, subsidence holes, surface excavations, or other workings resulting from the Lessee's operation that may be considered hazardous to human health or the environment. Such protective measures shall be maintained in a proper and safe condition during the term of this Lease. Prior to abandoning operations, the Lessee shall submit a mine-site reclamation plan to the Realty Officer for approval. Such plan shall include the proposed method(s) of permanent closure for all mine openings/portals including shafts, adits, inclines/declines, ventilation

shafts, and water discharge points. No underground workings or any part thereof shall be permanently abandoned and rendered inaccessible without the prior written approval of the Realty Officer. All mine-site reclamation shall be performed to the satisfaction of the Realty Officer in accordance with the approved reclamation plan.

(m) Surface drill holes and associated disturbances resulting from exploration or development activities shall be abandoned in accordance with existing regulations and in a manner that will protect the surface. All disturbed areas identified by the Lessee as not being needed for future operational activities shall be promptly reclaimed by the Lessee. The Realty Officer, by written notice to the Lessee, shall designate any other areas where reclamation must be undertaken as a result of disturbances caused by the Lessee's operations.

(n) If antiquities or other objects of historic or scientific interest, including but not limited to historic or prehistoric features or ruins, artifacts, or vertebrate fossils are discovered by the Lessee in the performance of operations under this Lease, the Lessee shall cease operations in the vicinity of such discovery and immediately take appropriate steps to protect and save such objects of historic or scientific interest and shall notify the Realty Officer of such discovery. The Realty Officer shall assess the values involved and prescribe such protective measures as deemed necessary.

(o) The Lessee shall make every effort to prevent, control, or suppress any fire in the operating area and to report any uncontrolled fire to the appropriate BLM or USFS official, as designated by the Realty Officer.

(p) The Lessee shall provide detailed haul route information to the Realty Officer for review prior to commencement of any haul activities. The haul route information shall include, at a minimum, expected routes from the mine site to the proposed mill or other facility accepting material from the mine, expected number of trucks per day, size and approximate weights of the ore being shipped, and expected production rates and mining life timeframes. It is expected that the Lessee will utilize only the specified routing. The lessee shall notify the Realty Officer of any significant changes to the haul route plan.

(q) The Lessee shall comply with Colorado State Access Code Section 43-2-147(4), C.R.S., and Section 24-4-103., C.R.S., effective 8/31/98. Pursuant to said code, the Lessee may be required to participate in a Highway Access Pre-Consultation meeting with DOE and the Colorado Department of Transportation after the completion and submittal to DOE of the approved permit from the Colorado MLRB. The details provided within the Mining Plan and permit, and the information provided under paragraph (p) above shall be used to determine the need for the Pre-Consultation meeting and to determine the potential impacts to county and state roads, highways and

intersections from the Lessee's operations, and any resulting mitigation requirements from these impacts. Any revisions or amendments to the permit, or any conversion from one permit type to another approved by the Colorado MLRB shall also be provided to the Realty Officer. The permit revision, modification or conversion may be used to determine any additional impacts to the county roads or state highways from the Lessee's operations, and any resulting mitigation requirements from these additional impacts. Access permits required under this requirement shall be provided to the Realty Officer.

(r) The Lessee shall attend and participate in meetings between DOE and other Federal, state, and local agencies, as required.

EXPLORATION PLAN FORMAT

It is not DOE's intent to require the Lessee to prepare multiple documents for submittal to the appropriate agencies for review and approval. Consequently, at the Lessee's discretion, a copy of the "Notice of Intent to Conduct Prospecting Operations" filed with the Colorado MLRB may be submitted to DOE for review and approval. That document will meet DOE's requirement for submittal of an Exploration Plan providing it contains, at a minimum, the following information:

a. Map showing general area to be explored
    1. Tentative location of drill holes or other exploration activity
    2. Location of roads (existing and proposed)
b. Approximate starting date and duration of drilling
c. Drilling information
    1. Type of drilling and/or other exploration equipment
    2. Size of hole and core, if any, to be recovered
    3. Type of logging
    4. Target horizon and depth
d. Road construction necessary for exploration
    1. Location of roads and drill sites
    2. Measures to be taken for erosion control
e. Abandonment
    1. Procedures for plugging drill holes including the disposition of drill hole cuttings
    2. Surface restoration (grading, revegetation, erosion control measures, etc.)
f. Provisions made to conform with existing state and federal regulations regarding control of fire, pollution of water and air, protection of other natural resources, and public health and safety, both during and upon abandonment of exploration activities
g. Specific measures to be taken to assure compliance with environmental and surface use stipulations of this Lease including the preparation of a site-specific environmental document that assures compliance with NEPA and other environmental regulations.

MINING PLAN FORMAT

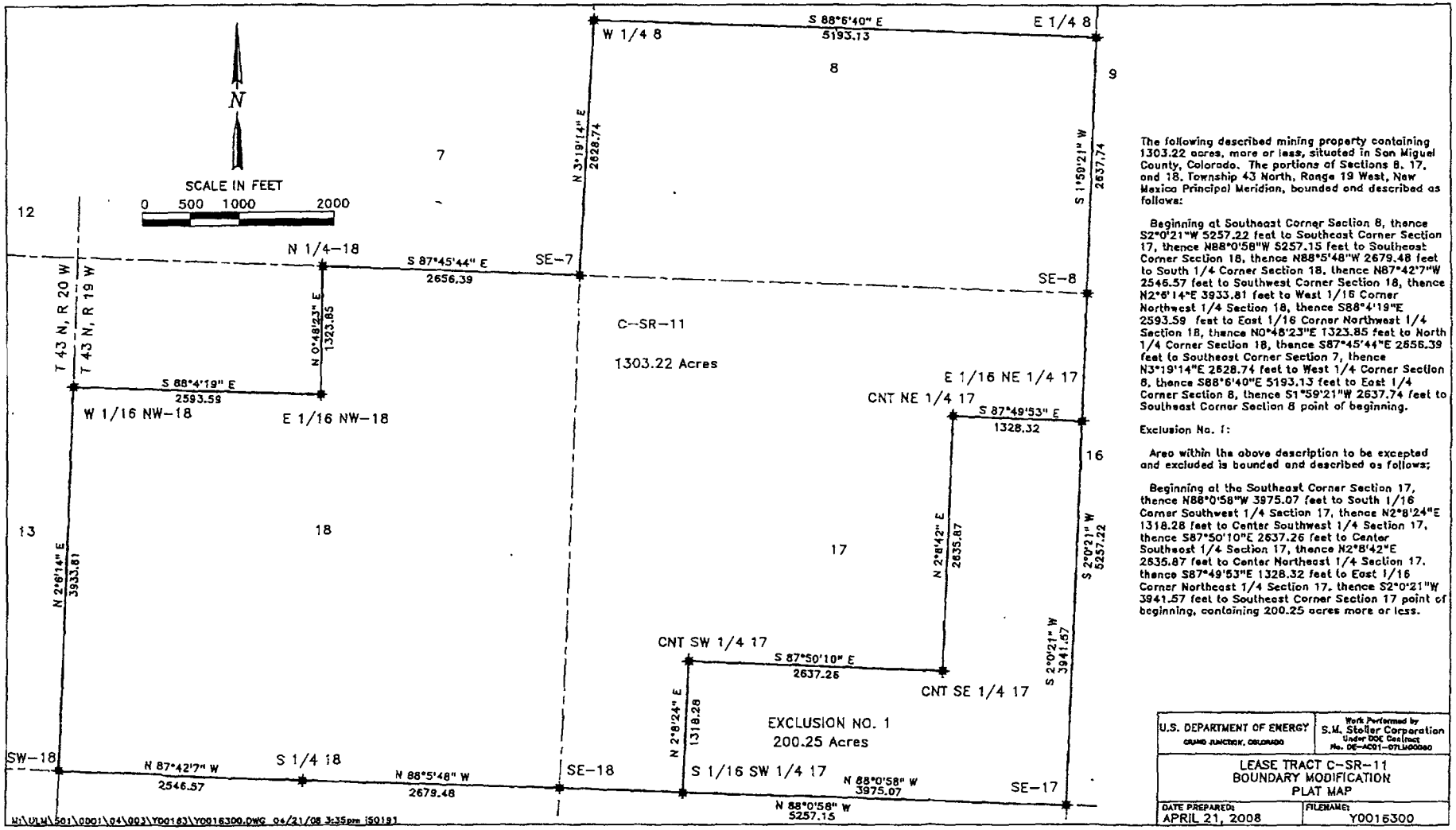
It is not DOE's intent to require the Lessee to prepare multiple documents for submittal to the appropriate agencies for review and approval. Consequently, at the Lessee's discretion, a copy of the "Reclamation Permit Application" filed with the Colorado MLRB may be submitted to DOE for review and approval. That document will meet DOE's requirement for submittal of a Mining Plan providing it contains, at a minimum, the following information:

a. Map showing location of:
    1. Ore body and proposed entry
    2. Any new roads required
    3. Mine plant and associated structures and facilities
    4. Waste dumps and ore storage areas
b. Mining
    1. Initial development plans
        A. Type of entry and haulage method proposed
        B. Stoping method
        C. Estimated rate of daily ore production and mine-life expectations
        D. Provisions to handle mine water
    2. Proposed ventilation and radiation control methods
c. Surface Plant
    1. Buildings, utility lines, and storage/stockpile areas
    2. Sewage and refuse disposal
    3. Compliance with any applicable county planning and zoning regulations
    4. Compliance with EPA stormwater discharge regulations
d. Surface restoration plans
    1. Topsoil removal and storage
    2. Grading and backfilling
    3. Control of stormwater runoff
    4. Revegetation (if required)
e. Abandonment

1. Permanent closure of all mine openings/portals resulting from, or utilized during, the Lessee's operations.
2. Removal of structures and associated features
3. Disposition of mine wastes (contouring, leveling, use for backfill, etc.)

f. Provisions made to conform with existing state and federal regulations regarding control of fire, pollution of water and air, protection of other natural resources, and public health and safety, both during and upon abandonment of mining activities.

g. Specific measures to be taken to assure compliance with environmental and surface use stipulations of the Lease including the preparation of a site-specific environmental document that assures compliance with NEPA and other environmental regulations.



The following described mining property containing 1303.22 acres, more or less, situated in San Miguel County, Colorado. The portions of Sections 8, 17, and 18, Township 43 North, Range 19 West, New Mexico Principal Meridian, bounded and described as follows:

Beginning at Southeast Corner Section 8, thence S2°0'21"W 5257.22 feet to Southeast Corner Section 17, thence N88°0'58"W 5257.15 feet to Southeast Corner Section 18, thence N88°5'48"W 2679.48 feet to South 1/4 Corner Section 18, thence N87°42'7"W 2546.57 feet to Southwest Corner Section 18, thence N2°8'14"E 3933.81 feet to West 1/16 Corner Northwest 1/4 Section 18, thence S88°4'19"E 2593.59 feet to East 1/16 Corner Northwest 1/4 Section 18, thence N0°48'23"E 1323.85 feet to North 1/4 Corner Section 18, thence S87°45'44"E 2656.39 feet to Southeast Corner Section 7, thence N3°19'14"E 2628.74 feet to West 1/4 Corner Section 8, thence S88°6'40"E 5193.13 feet to East 1/4 Corner Section 8, thence S1°59'21"W 2637.74 feet to Southeast Corner Section 8 point of beginning.

Exclusion No. 1:

Area within the above description to be excepted and excluded is bounded and described as follows;

Beginning at the Southeast Corner Section 17, thence N88°0'58"W 3975.07 feet to South 1/16 Corner Southwest 1/4 Section 17, thence N2°8'24"E 1318.28 feet to Center Southwest 1/4 Section 17, thence S87°50'10"E 2637.26 feet to Center Southeast 1/4 Section 17, thence N2°8'42"E 2635.87 feet to Center Northeast 1/4 Section 17, thence S87°49'53"E 1328.32 feet to East 1/16 Corner Northeast 1/4 Section 17, thence S2°0'21"W 3941.57 feet to Southeast Corner Section 17 point of beginning, containing 200.25 acres more or less.

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC01-07LM00080
LEASE TRACT C-SR-11 BOUNDARY MODIFICATION PLAT MAP	
DATE PREPARED: APRIL 21, 2008	FILENAME: Y0016300

N:\ULM\501\0001\04\003\Y00183\Y0016300.DWG 04/21/08 3:35pm jS0191

MODIFICATION OF LEASE

1. CONTRACT ID CODE	

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
M005	See Block 16c		N/A

6. ISSUED BY CODE	7. ADMINISTERED BY *(If other than Item 6)* CODE
U.S. Department of Energy Office of Legacy Management 2597 B 3/4 Road Grand Junction, CO 81503	Steve Schiesswohl (720) 377–9683

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, country, State, and ZIP Code)*	(✓)	9A. AMENDMENT OF SOLICITATION NO.
Cotter Corporation 7800 East Dorado Place, Suite 210 Englewood, CO 80111		9B. DATED *(SEE ITEM 11)*
	X	10A. MODIFICATION OF CONTRACT/ORDER NO. DE–RL13–96GJ89465
CODE / FACILITY CODE		10B. DATED *(SEE ITEM 13)* 20 March 1996

11. RESERVED

12. ACCOUNTING AND APPROPRIATION DATA *(If required)* N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF LEASES, IT MODIFIES THE LEASE AS DESCRIBED IN ITEM 14.

	A. RESERVED.
	B. THE ABOVE NUMBERED LEASE IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation data, etc.)* SET FORTH IN ITEM 14.
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO THE AUTHORITY OF
XX	D. OTHER *(Specify type of modification and authority)* **Agreement between parties pursuant to the provisions of Articles II and V and Appendix B**

E. IMPORTANT: Lessee __ is not, X is required to sign this document and return 3 copies to the issuing office.

14. DESCRIPTION OF MODIFICATION *(Organized by Lease Article)*

Reference: Mining Lease Tract — AT(05–1)–ML–60.8–C–SR–11

(a) In accordance with Article II, TERM of the Mining Lease identified in Block 10A above, the term of the Mining Lease is extended for (1) a period of seventy-one (71) days (to conclude on March 31, 2008), or (2) until a new lease agreement is negotiated, whichever comes first.

(b) In accordance with Article V, ROYALTIES and Appendix B paragraph (a) of said Mining Lease, the amount of annual royalty that is required for this lease extension will be pro-rated for the actual term of the lease extension and will be due and payable to DOE, along with the first annual payment due under the new ten-year lease extension, at the time that such ten-year lease extension is executed, unless other arrangements are agreed to prior to that date.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
Gus Gaviotis Vice President, Accounting and Finance		Steven R. Schiesswohl Realty Officer	
15B. LESSEE Gus M Gaviotis *(Signature of person authorized to sign)*	15C. DATE SIGNED 12-20-07	16B. UNITED STATES OF AMERICA BY Steven R. Schiesswohl *(Signature of Contracting Officer)*	16C. DATE SIGNED 1-8-08

You will find yourself caught up in a conflict of some kind and you have no choice but to take sides. But which side to support? The one that is least likely to desert you in your own moment of need.

TAURUS (April 21 - May 21):
Apply common sense to whatever situation you find yourself in today. Also, make sure you keep your tongue firmly behind your teeth, whatever the provocation may be. This is not a good time to be honest!

GEMINI (May 22 - June 21):
It may be tempting to hit back at those who are giving you a hard time, but the more bad things you say now the more work will have to be done later to patch things up. Let go of vengeful thoughts.

CANCER (June 22 - July 23):
Cancer is a cardinal sign, which among other things means you are ready to fight for and tasks that need doing will be left for the weekend. Today your priority is to patch up a friendship or relationship that has been heading downhill.

LIBRA (Sept. 24 - Oct. 23):
Today's cosmic picture urges you to find a creative way to bleed off the anger and frustration that has been building up inside. Getting your feelings down on paper is an especially good idea – but don't publish them!

SCORPIO (Oct. 24 - Nov. 22):
You are entitled to express your viewpoint forcefully but you are not entitled to stop other people from expressing their own opinions. Free speech is a right worth fighting for – for everyone, not just yourself.

SAGITTARIUS (Nov. 23 - Dec. 21):
It may be the case that you have grown so comfortable doing something one way that it won't be a problem for long. There is a determination about Aquarius that helps you tackle issues that others too easily give up on. Show some of that resolve now.

PISCES (Feb. 20 - Mar. 20):
Take no notice of those who say you are being irresponsible – they are merely jealous. Today's planetary set-up means it is better to be a bit reckless than take no risks at all. Do what feels right – and do it now.

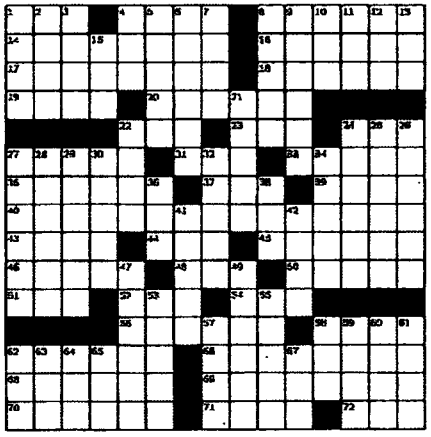
NEW YORK TIMES CROSSWORD

Across

1 Director Roth
4 Biblical word on a wall
8 Something hidden, perhaps
14 Edna Ferber novel
Multitude
Effrontery
18 A speedster may do it
19 About
20 Lug
22 N.L. East city: Abbr.
23 Bal wood
24 AOL, for one
27 Mères' charges
31 Buddyroo
33 Gossip
35 Still
37 ___ sleep
39 Falls to be
40 Title on certain language videos ... with a hint to entering six answers in this puzzle
43 Digging
44 Cuisine whose staple food is sticky rice
45 Competition for truckers
46 Butterfingers
48 Walk-___
50 Liquid fat
51 Gift that's hard to believe
52 Kind of card
54 Slalom path
56 Offer unwanted advice
58 "Now!"
62 So very very
66 Shoot the breeze
68 Genre for Q-Tip
69 Bubble makers
70 Size up
71 Concordes, e.g.
72 Lick, say

Down

1 Parrot
2 "A ___ should have a good memory": Quintilian
3 Some World of Warcraft figures
4 Villain player in "Rocky III"
5 Go off
6 Worthless, as an assistant
7 Abbr. on a business letter
8 Smart ___
9 Woman with many fans?
10 Item in a spoon race
11 Fed. research org.
12 Modern address feature
13 "___ advice?"
15 Kind of dye
21 ___ Joel Osment of "The Sixth Sense"
22 Part of A.M.A.: Abbr.
24 Like some pitched balls
25 Martial arts instructor
26 Popular programming language
27 Locale of some Mayan ruins
28 Caterers' bookings
29 Ragged
30 Sign up
32 93% of the earth's atmosphere
34 Like some pools
36 It may be struck in a field
38 It spent 5,519 days in orbit
41 Biblical woman who changed her name to Mara
42 Ski-___
47 Buzzers
49 Grabs
53 Sporty car roofs
55 Article of female tennis attire
57 Arthur and Benaderet
58 Qty.
59 Look pregnant
60 Israeli port
61 "Hey you!"
62 Cry made with a raised index finger
63 Fleur-de-___
64 CD predecessors
65 Café alternative
67 Alliance created in '48



Puzzle by Mark Feldmeier

ANSWER TO PREVIOUS PUZZLE

A	S	S	A	D		D	S	T		M	A	M	E	T
L	O	O	F	A		E	T	E		A	M	A	R	E
G	O	L	E	M		S	O	T		R	O	X	I	E
			W	A	T	E	R	R	A	T	S			
C	M	D		G	E	R	M	A	N	Y		I	D	S
H	E	R	B	E	R	T		P	E	R	A	T	I	O
A	L	A	E		I	S	A	O	S		T	H	A	N
S	T	U	R	M		U	N	D		D	R	A	N	G
			G	R	O	U	N	D	S	P	E	E	D	
J	O	H	A	N	N			G	Q	E	T	H	E	
O	S	T		D	O	G	S	T	A	R		O	E	N
I	M	B	U	E		R	T	E		O	R	B	I	T
N	O	O	N		M	A	R	C	O		N	E	R	E
E	S	A	I		I	D	E	A	L		O	Y	E	R
D	I	R	T		R	E	S	T	E		M	O	S	S
	S	D	S		O	A	S	E	S		B	U	S	

For answers, call 1-900-285-5656. $1.49 a minute; or, with a credit card, 1-800-814-5554.
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Legal Notices

Public Notice

SR-11 Mine

Cotter Corporation; 7800 E. Dorado Place, Suite 210, Englewood, CO 80111, has filed an amendment application for a Regular (112d) Designated Mining Reclamation Permit from the Colorado Mined Land Reclamation Board under provisions of the Colorado Mined Land Reclamation Act. The existing mine is known as the SR-11 Mine, and is located at or near, Sections 17 and 18 Township 43 North, Range 19 West, New Mexico Principal Meridian, San Miguel County, Colorado.

This is an existing permitted mine with no changes to the original application, and the proposed date of completion is March 2018. This amendment application is to incorporate an Environmental Protection Plan into the permit. The proposed future use of the land is rangeland.

Additional information and tentative decision date may be obtained from the Division of Reclamation, Mining, and Safety, 1313 Sherman Street, Room 215, Denver, CO 80203, (303) 866-3567, or at the San Miguel County Court, 305 West Colorado Avenue, Telluride, Colorado 81435, or the above named applicant.

Comments must be in writing and must be received by the Division of Reclamation, Mining, and Safety by 4:00 p.m. on November 7, 2012.

Published in the Telluride Daily Planet on September 27th, October 3rd, October 10th and October 17th 2012.

TOWN OF TELLURIDE

REQUEST FOR BIDS
Booster Pump Station Shed

Separate sealed bids for construction of a small shed to cover the new Booster Pump Station at 800 Butcher Creek Drive, shall be received by the TOWN prior to 4:00 PM MST, Friday, 5 October 2012. Please address paper submittals to:

Telluride Public Works Department
ATTN: Karen Guglielmone
P.O. Box 397
Telluride, Colorado 81435

Please address electronic submittals in .pdf format to karen@telluride-co.gov.

Bid Documents will be available on Friday, September 21, 2012, at the Telluride Public Works Department or on the Town's website: www.telluride-co.gov. For information, contact Karen Guglielmone at 970-729-1015, karen@telluride-co.gov.

Public Notice

SR-13A Mine

Cotter Corporation; 7800 E. Dorado Place, Suite 210, Englewood, CO 80111, has filed an amendment application for a Regular (110d) Designated Mining Reclamation Permit from the Colorado Mined Land Reclamation Board under provisions of the Colorado Mined Land Reclamation Act. The existing mine is known as the SR-13A Mine, and is located at or near, Sections 19 and 30 Township 44 North, Range 18 West, and Sections 24 and 25 Township 44 North, Range 19 West, New Mexico Principal Meridian, San Miguel County, Colorado.

This is an existing permitted mine with minor changes to the original application, and the proposed date of completion is March 2018. This amendment application is to incorporate an Environmental Protection Plan into the permit. The proposed future use of the land is rangeland.

Additional information and tentative decision date may be obtained from the Division of Reclamation, Mining, and Safety, 1313 Sherman Street, Room 215, Denver, CO 80203, (303) 866-3567, or at the San Miguel County Court, 305 West Colorado Avenue, Telluride, Colorado 81435, or the above named applicant.

Comments must be in writing and must be received by the Division of Reclamation, Mining, and Safety by 4:00 p.m. on October 29, 2012.

Published in the Telluride Daily Planet on September 27th, October 3rd, October 10th and October 17th 2012.