

March 21, 2011

Alex Fischer  
Environmental Supervisor –  
Western Colorado  
Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, CO 80203

Re: Response to review comments for Facility ID #421065, McIntyre Flowback Pits 1 & 2

Mr. Fischer:

SG Interests appreciates your feedback on our application for Facility ID # 421065, the McIntyre Flowback Pits 1 and 2 and the opportunity to address the deficiencies identified in your letter (dated 2/16/2011).

**Form 28, Attachment Checklist**

The application SG Interests submitted to Gunnison County (without the copy of the Form 28 that was marked to cross-reference Gunnison County's requirements) is attached to this submittal (Attachment 1). Gunnison County has responded to this application with a letter stating the application is deficient (Attachment 1). I have also attached a copy of the construction stormwater discharge permit from CDPHE that covers SG Interests' activities in Gunnison and Delta counties (Attachment 2). No other permits have been applied for.

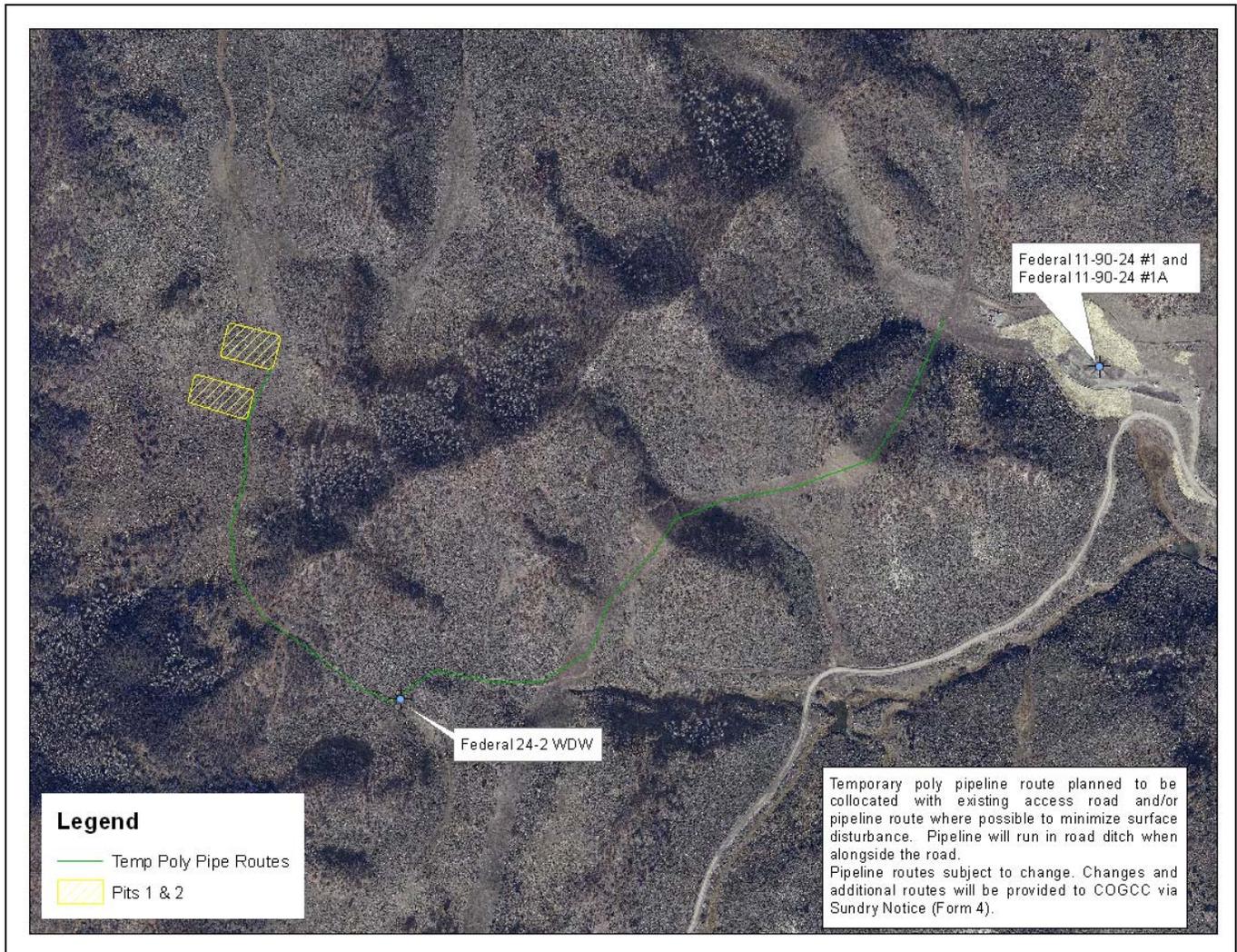
**Form 28, Question 6.**

Please see attached Road Map with Profile for drainage plans for the access roads (Attachment 3).

The attachments to the stormwater management plan and the attached drainage plan for the facility have been revised so that they do not conflict with one another (Attachment 4).

Temporary pipeline routes from the pits to the water disposal well and from the water disposal well to the Federal 11-90-24 #1 well site have been mapped. These routes allow surface poly pipelines to be laid on previously disturbed ground. They would connect the pits to well sites where buried water pipelines can be accessed and used to transfer water. Additional poly pipeline routes and changes to these routes will be identified in the future and provided to COGCC via Form 4, Sundry Notice.

Figure 1. Preliminary poly pipeline routes.



**Form 28, Question 7.**

Please see attached letter from Rock Creek Ranch I, Ltd authorizing SG Interests I Ltd to construct and operate the pits on the ranch property (Attachment 5). Rock Creek Ranch is an entity affiliated with SG Interests.

**Form 28, Question 9.**

The site will be secured with an 8’ high field style fence. The fence is designed to keep livestock and wildlife out of the facility. It is made of woven wire with a t-post every 10 feet and a wooden post every 40’. A string of barbed wire along the top of the fence will deter humans from climbing over the fence. The fence will completely surround the pits. The gate at the access road/staging area entrance will also be 8’ high. There is currently a gate on the access road to the Narrows Road (a private gas well access and

ranch road) where it intersects County Road 265. Two additional gates will be added to the route to the pits; one at the entrance to the Federal 11-90-26 #1 well pad and the other on the pit access road at the Aspen Leaf Ranch/Rock Creek Ranch property line. These gates will be locked with combination locks. The gates are steel. There are no cattle guards planned for this project. The gate to the facility will be kept closed to prevent livestock access.

**Form 28, Question 10.**

Please see revised Construction Layout drawing attached to this letter for fire lane design (Attachment 6).

**Form 28, Question 11.**

Please see revised Construction Layout drawing attached to this letter for additional buffer zone location (Attachment 6).

**Form 28, Question 12.**

The Stormwater Management Plan for this project has been revised and updated to include the revised construction layout (Attachment 4). This plan and the attached drainage plan and narrative detail the drainage control features that will be used at the facility. Cut and fill slopes will be stabilized during construction through compaction. They will be seeded and covered with erosion control blankets. These blankets will be biodegradable so that they do not need to be removed following vegetation growth. Alternatively, the slopes may be seeded, mulched, and tackified using a spray tackifier. Please see the attached Road Map with Profile for detail on surface water diversion structures planned for use along the access road (Attachment 3). If culverts are installed along the access road, the outlet would be appropriately rip-rapped to prevent scouring. Until the area has revegetated, straw would be crimped into the ground at the culvert inlet to prevent scouring.

**Form 28, Question 13.**

The waste acceptance criteria for this facility include only produced water, fresh water, and flowback water. This water will be filtered prior to entering the facility to remove hydrocarbons, fines, and other undesirable materials. No other waste will be put into the pits at this facility. The fluid in the pits will be disposed of as necessary to keep VOC levels below reporting threshold for air quality emissions. The volume of produced water and flowback fluid being pumped into the pits will be limited to those volumes below state reporting limits using calculated and estimated VOC quantities for these fluids. Fresh water will be added to make up the remainder of the fluid volume required to fill the pits.

The US EPA has set National Secondary Drinking Water Regulations for 15 different parameters that can affect the color, odor, and taste of water. These standards are not mandatory or enforceable because they do not present a risk to human health at these levels. When these levels are exceeded, people may notice a difference in drinking water, but at concentrations below these levels, the average person will not notice a particular color, taste or odor associated with the water (EPA, <http://water.epa.gov/drink/contaminants/secondarystandards.cfm>).

The following table was adapted from the EPA's Secondary Drinking Water Regulations website.

Parameter	Secondary MCL	Average level in produced water	Above MCL?	Noticeable Effects above the Secondary MCL
Chloride	250 mg/L	10,032 mg/L	Yes	salty taste
Iron	0.3 mg/L	32.02 mg/L	Yes	rusty color; sediment; metallic taste; reddish or orange staining
pH	6.5 - 8.5	7.0	No	low pH: bitter metallic taste; corrosion high pH: slippery feel; soda taste; deposits
Sulfate	250 mg/L	47.2 mg/L	No	salty taste
Total Dissolved Solids (TDS)	500 mg/L	13,821 mg/L	Yes	hardness; deposits; colored water; staining; salty taste
* mg/L is milligrams of substance per liter of water				

The produced water that will be stored in the flowback pits is very salty and high in iron. It would be noticeable if it were to contact drinking water. Additional testing of the water in the pits will occur as specified in the operating plan. For this testing the list of test parameters from Linda Spry-O'Rourke will be used (list in Operating Plan, Attachment 7).

#### Form 28, Question 14.

Revisions to the engineering data have been provided with this submittal. These include revisions and additional information on drainage, stormwater control, access road design, and liner system material quantities.

#### Form 28, Question 15.

Please see the amended Operating Plan submitted with this letter (Attachment 7).

#### Form 28, Question 17.

Please see the amended Preliminary Closure Plan submitted with this letter (Attachment 8). The closure plan will be used by COGCC to set the financial security for this project.

#### Form 28, Question 18.

Please see the amended Preliminary Closure Plan submitted with this letter (Attachment 8).

#### Form 28, Question 19.

Documentation of communications between SG Interests and Gunnison County have been included in this response (Attachment 1).

**Form 28, Question 20.**

Documentation of communications between SG Interests and Gunnison County have been included in this response (Attachment 1).

**Form 28 Supplement, Rule 908.b.(2)**

Please see attached letter from Rock Creek Ranch authorizing SG Interests to construct the facility on ranch property (Attachment 5).

**Form 28 Supplement, Rule 908.b.(5).A.**

Please see attached Road Map with Profiles for additional information on road design (Attachment 3).

**Photo 1.** Pumps located next to pit with stinger pipes for water transfer and connection to poly pipeline (at left in photo).



Each primary pump will be set at the pit as shown on the construction layout drawing. Aluminum suction pipes will be set at the edge of the pit and will run into the pit to draw water out. Pumps will be set inside spill containment measuring 10' X 20' at each location. The spill containment can be seen under the pumps in photos 1 and 2. Specifications for the primary pumps have been attached to this response (Attachment 9).

Photo 2. Similar pumps set up next to a pit before the pit has been filled. Liner is protected from the pipes by setting them on a piece of liner or other protective layer on pit bottom.



**Photo 3.** Spill containment structure can be seen under this similar pump.



Booster pumps will be placed along the poly pipeline routes when additional pumping is required to maintain the desired water pressure. The locations for these booster pumps will be determined in the field based on topography and other field conditions. A map indicating the location of the booster pumps will be provided to COGCC via Form 4, Sundry Notice whenever it is necessary to use one of these pumps. Specifications for the pumps have been included in the attachments to this response (Attachment 9).

Truck operators that fill water trucks or deliver water to the pit facility will use the hose manifold located next to the staging area and the pits instead of lowering hoses down into the pits, which could damage the pit liner. The hose manifold would have a trough-like secondary containment basin underneath the hose connections at all times to collect and contain any fluids leaked from the hose/manifold connection during water suction and/or delivery. The manifold and containment basin can be seen in the photo below.

No buildings will be located at the facility.

**Photo 4.** Hose manifold system.



**Form 28 Supplement, Rule 908.b.(5).C.**

Please see our response to Form 28, Question 9 above.

**Form 28 Supplement, Rule 908.b.(5).D.**

Please see revised Construction Layout drawing (Attachment 6).

**Form 28 Supplement, Rule 908.b.(5).E.**

Please see revised drainage calculations (Attachment 10). These calculations include those for the sedimentation ponds.

Please see attached Road Map with Profile for detail on access road drainage control (Attachment 3).

**Form 28 Supplement, Rule 908.b.(6).**

The wells are considered one waste stream as the fluid will be mixed in the pits. The mixed fluid will be managed in the pits to control bacterial growth, hydrocarbon content, solids, and VOC content. The average values for the measured parameters in the table below represent the characteristic waste stream as it is currently understood. Once the pits become operational, SG Interests will sample and test the fluid in the pits using the list of parameters provided by COGCC and included in the Operating Plan (list and email from Linda Spry-O'Rourke). An anti-corrosive agent will be present in the fluid as it is used in all water pumped through steel pipelines and stored in steel tanks. Sheen or free product is not allowed in the pits.

Below is a comparison of the average values for several parameters tested for in the pits to the average values for those same parameters tested for in surface and shallow groundwater locations in the vicinity of the pits. In all cases, the baseline water quality results are much lower than the values of those parameters found in the pit water.

Constituent	Average value in pit water mg/L	Average value in sampled groundwater mg/L	Average value in sampled surface waters mg/L
Calcium	1,060.87	61.9	71.73
Chloride	10,032	2	5.67
Iron	32.02	0.4	0.41
Magnesium	209.5	8.15	9.87
Sodium	4,644.6	12.5	20.9
Sulfate	47.2	5	7.33

The constituents measured in the pit water are found at much higher levels than they are in groundwater or surface waters nearby.

The expected average monthly rate of fluid (the waste stream) into the pits (pits 1 & 2) is 30,612 bbl (maximum). This waste stream will be a mixture of fresh water, produced water, and flowback fluid.

The waste acceptance criteria for this facility include only produced water, fresh water, and flowback water. This water will be filtered prior to entering the facility to remove hydrocarbons, fines, and other undesirable materials. No other waste will be put into the pits at this facility. The fluid in the pits will be disposed of as necessary to keep VOC levels below reporting threshold for air quality emissions. The volume of produced water and flowback fluid being pumped into the pits will be limited to those volumes below state reporting limits using calculated and estimated VOC quantities for these fluids. Fresh water will be added to make up the remainder of the fluid volume required to fill the pits. The ratio of fresh water to flowback and produced water that will control VOCs below reporting levels has not been calculated yet (work in progress by Compliance Partners Inc.).

#### **Form 28 Supplement, Rule 908.b.(7).B.i**

Please see the revised waterbody maps attached to this letter (Attachment 11).

#### **Form 28 Supplement, Rule 908.b.(7).B.iii.**

There are two wells within 1 mile of the pit site (State Engineer data available through CDWR accessed 2/18/2011 <http://water.state.co.us/DataMaps/GISandMaps/Pages/GISDownloads.aspx>). One of these two wells is SG Interests' coalbed methane well the Federal 11-90-24 #1, which was permitted as a water well in accordance with CRS 37-90-137(7)b. This permit allows the withdrawal of non-tributary water from formations in order to facilitate natural gas production. None of SG Interests' wells have been converted from gas wells into water wells. Details of this well follow.

Permit #: 69658 F	Comment: OGCC API 05-051-06057
Well name: Federal 11-90-24 #1	Pump rate: 64
UTM location: 293018, 4328997	Depth: 145'
Use: Industrial	Perforations: none listed
Date issued: 6/7/2010	Owner: SG Interests I Ltd.
Date constructed: 7/31/2004	OGCC Job: 49

The other well listed by the State Engineer within 1 mile of the facility is a stock water well, Permit # 263115. This well was not the water sampling location labeled WQ 11-90-13 #2 in our water sampling and testing submittal. SG will attempt to gain landowner permission to find this well and sample the water in the spring of 2011. This permission is not likely to be obtained from the current landowners however. Details on this well are listed below:

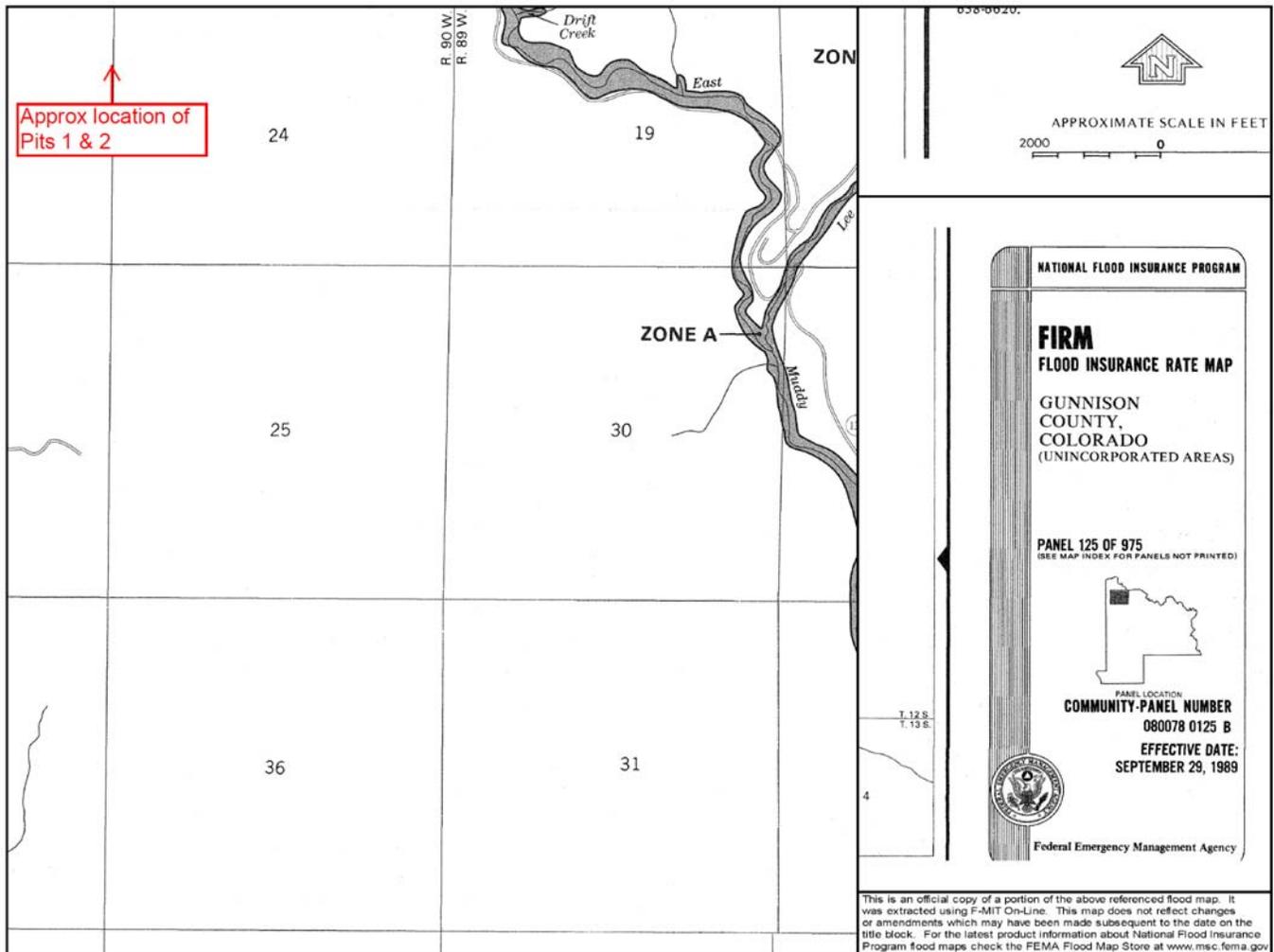
Permit #: 263115	Comment: Part of the Beaver Placer
Well Name: none	Pump rate: 15
UTM location: 293328, 4329861.5	Depth: 0 listed in water well permit
Use: Domestic and Stock	Perforations: 17'-137'
Date issued: 5/3/2005	Yield limit: 2 acre-feet (annual)
Date constructed: 8/23/2006	Owner: William Vannice

These two well permits are attached to this response (Attachment 12)

**Form 28 Supplement, Rule 908.b.(7).B.v.**

The location of the McIntyre Flowback Pits 1 and 2 in relation to nearby floodplains is shown in the map below (produced using FEMA floodplain data). The pits are planned for construction outside of any floodplain area.

**Figure 2.** Facility location in relation to floodplains.



**Form 28 Supplement, Rule 908.b.(7).B.vi.**

All groundwater wells within 1 mile of the facility are discussed above in our response to Form 28, Rule 908.b.(7).B.iii.

Please see the attached letter from Trautner Geotech detailing the groundwater monitoring design (Attachment 13). Two groundwater monitoring wells would be installed at this facility. One would be located up-gradient of the facility and the other would be located down-gradient of the facility.

**Form 28 Supplement, Rule 908.b.(7).C.i.**

Liner Materials and Quantities

<b>SG Interest, LTD</b>			
<b>McIntyre Pits 1 &amp; 2 Pit Liner System Materials</b>			
	<b>Type</b>	<b>McIntyre Pit 1 Quantity</b>	<b>McIntyre Pit 2 Quantity</b>
<b>Primary Liner Thickness</b>	60 mil	32000 s.f.	31000 s.f.
<b>Primary Liner Material</b>	HDPE		
<b>Secondary Liner Thickness</b>	36 mil	32000 s.f.	31000 s.f.
<b>Secondary Liner Material</b>	HDPE		
<b>GeoNet Drain Mat</b>	200 mil	32000 s.f.	31000 s.f.
<b>Bentonite Liner</b>	0.75 lbs/ft <sup>2</sup>	32000 s.f.	31000 s.f.
<b>Perforated 4" PVC</b>	PVC	175 ft.	206 ft.
<b>4" PVC Pipe</b>	PVC	20 ft.	20 ft.
<b>Drain Rock</b>	Rock	9.7 c.y.	11.4 c.y.
<b>Mirifi N160 Rock Wrap</b>	Fabric	875 s.f.	1030 s.f.

The lining system shall be fitted to the as-built constructed pit excavation and installed per the manufacturer’s installation instructions. The anchor trench shall be constructed and the liner anchored as per the manufacturer’s installation instructions. If site conditions do not meet the manufacturer’s installation requirements, additional engineering may be undertaken to ensure anchor trench design, slope stability and slippage issues are addressed.

Extending the primary liner 12” above the finished grade elevation was included to prevent surface runoff from enter the pits. An anchor trench design illustrating this concept is attached (Attachment 14).

The pit capacities shown on the construction layouts are the total capacities. The capacity with required free-board is shown in Attachment F, Engineering Data, Pit Volume Calculations (in original application submittal).

**Form 28 Supplement, Rule 908.b.(7).C.ii**

Please see attached revised Construction Cross-Section Drawing (Attachment 6) and Road Map with Profile (Attachment 3).

**Form 28 Supplement, Rule 908.b.(7).C.iii.**

Please see attached Road Map with Profile for detail on road ditches (Attachment 3). The Drainage Plan and Stormwater Management Plan have been revised to eliminate conflicts between the two plans (Attachments 10 and 4 respectively).

The outlet of the 24-inch CMP shown on the drainage plan will have outlet protection as shown on the revised drawing. The rip-rap was designed to prevent erosion. Utilizing the Urban Drainage and Flood Control District's "Drainage Criteria Manual", dated April 2008, the recommended riprap size is  $d_{50} = 9"$  diameter, that is 50% of the rock should be 9" diameter. The riprap mat or bed should extend 10' beyond the culvert outlet and should be 8' wide.

The facility staging area and the berm surrounding the staging area will be constructed in 1 foot lifts, compacted for each foot in elevation added, with water added as needed to maintain approximately 14% soil moisture content for proper compaction. No permits from DWR or the US ACOE are required to construct the staging area or the berm around it. The pits are not subject to regulation and permitting as dams (Office of the State Engineer, Dam Safety Branch) because they are not dams as defined in these regs ([http://water.state.co.us/DWRIPub/Documents/ds\\_rules07.pdf](http://water.state.co.us/DWRIPub/Documents/ds_rules07.pdf) section 4.2.5 "constructed above the natural surface of the ground for the purpose of impounding water"). Our pits will be constructed entirely in cut soil areas and will not impound water above the natural surface of the ground. These pits are not located in drainages and are not designed to collect surface waters.

Please see the attached letter from Trautner Geotech clarifying the description of the 12-18" of unconsolidated soils found at the project site (Attachment 15). Only the top 8" of these soils will be salvaged as topsoil for use in reclamation as per the recommendation of SG Interests' contract biologist with Rocky Mountain Ecological Services, Inc.

The topsoil salvaged from the surface of the pit location will be used over the portions of the berm and staging area that will be seeded and stabilized for temporary reclamation. Remaining topsoil will be stored on a permitted well location. This topsoil pile will be seeded and surrounded by silt fence or other sedimentation control device. SG Interests does not anticipate having the space to store the topsoil piles on or adjacent to the facility.

**Form 28 Supplement, Rule 908.b.(7).C.iv.**

Drainage system and sedimentation details are included in the revised Drainage Plan and accompanying narrative (Attachment 10).

**Form 28 Supplement, Rule 908.b.(7).C.v.**

Access road construction drawings are included in this submittal. Access road ditches are shown and described on the Road Map with Profile (Attachment 3).

A daily inspection form has been added to the Operating Plan to cover the daily inspections of the temporary surface water pipelines (Attachment 7).

**Form 28 Supplement, Rule 908.b.(8).**

A revised Operating Plan is attached to this submittal (Attachment 7).

**Form 28 Supplement, Rule 908.b.(9).A.**

Water wells within 1 mile of the facility are discussed in section Form 28 Supplement, Rule 908.b.(7).B.iii. above. Future water testing associated with this facility will be according to COGCC Rule 608.b.2 and will include all parameters listed.

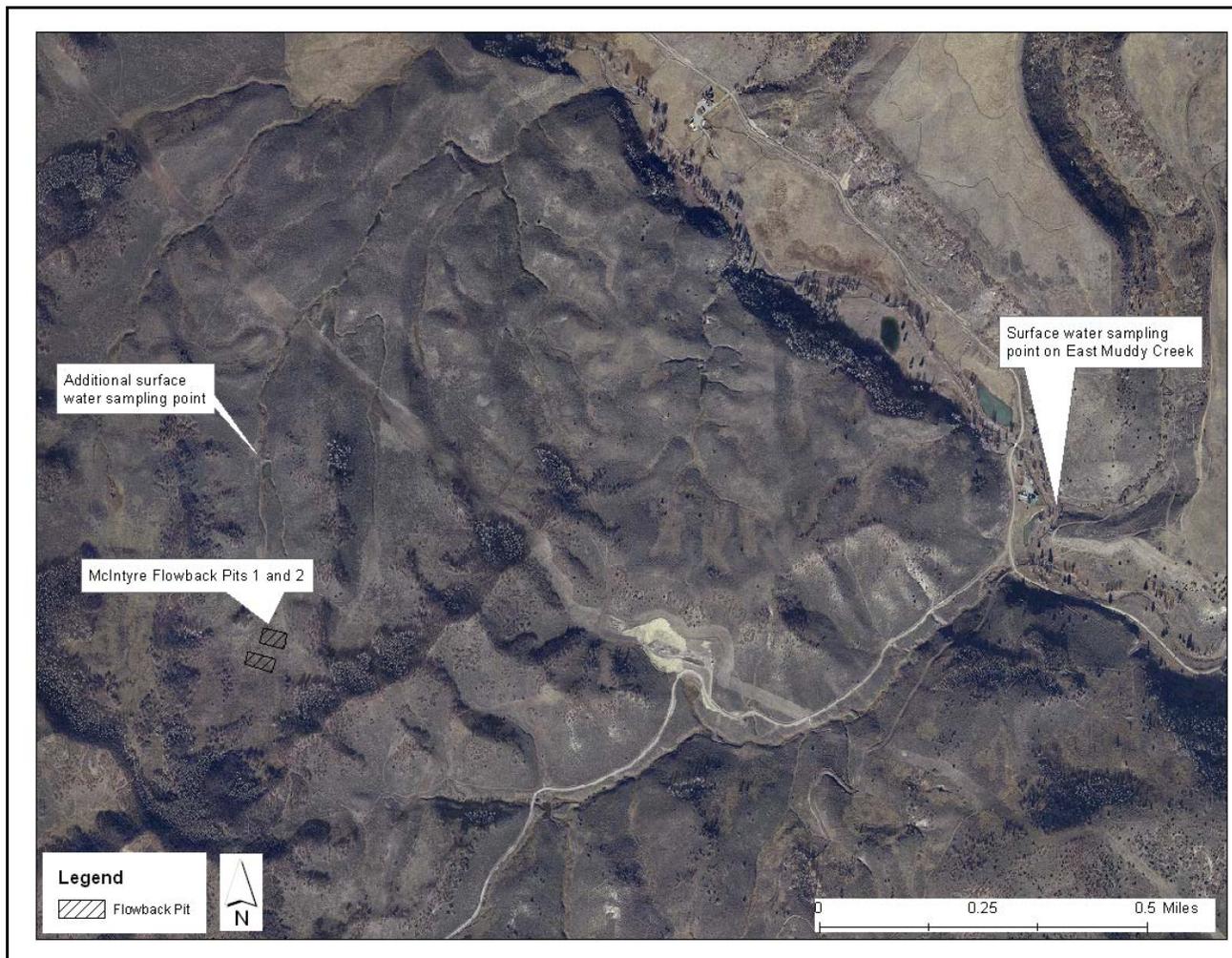
**Form 28 Supplement, Rule 908.b.(9).B.i.**

Please see the attached letter from Trautner Geotech detailing the groundwater monitoring design (Attachment 16). Two groundwater monitoring wells would be installed at this facility. One would be located up-gradient of the facility and the other would be located down-gradient of the facility.

**Form 28 Supplement, Rule 908.b.(10).**

A surface water sampling location will be added downstream of the facility between the facility and East Muddy Creek. There are two stock ponds along ephemeral drainages that are tributary to East Muddy Creek. One of these ponds will be selected for sampling prior to beginning operations at the facility by SG Interests' contract wildlife biologist based on flow at the time of sampling. These ponds are on property owned by Rock Creek Ranch. Another surface water sampling point will be added on a separate parcel of Rock Creek Ranch. East Muddy Creek passes through this parcel and it is downstream of the junction to East Muddy Creek of the tributary that drains the area near the pits.

**Figure 3.** Location of additional water sampling points.



**Form 28 Supplement, Rule 908.d**

The Preliminary Closure Plan has been revised to include additional closure activities and their estimated costs (Attachment 8).

**Form 28 Supplement, Rule 908.g.(1).A&B**

The facility is expected to remain in use for twenty-five years.

Please see attached revised Preliminary Closure Plan including detail on soil sampling and post-closure groundwater monitoring (Attachment 8).

**Form 28 Supplement, Rule 908.h**

Documentation of communications between SG Interests and Gunnison County have been included in this response (Attachment 1).

Again, thank you for the opportunity to provide more detail on our McIntyre Flowback Pits project. Please do not hesitate to contact me for further detail or clarification.

Sincerely,



Catherine Dickert  
Environmental and Permitting Manager

Attachment 1

Gunnison County Permit Application and

Gunnison County Response

McIntyre Flowback Pits 1 and 2  
Application for Oil and Gas Permit – Gunnison County  
SG Interests I, LTD.

SG Interests I, Ltd. presents an application to Gunnison County for the McIntyre Flowback Pits #1 and #2 under the county's Temporary Oil and Gas Regulations. Under these regulations, an applicant may submit a permit application that has been presented to Colorado Oil and Gas Conservation Commission (COGCC) if "it contains information sufficient to demonstrate compliance with these regulations and that information is highlighted". The COGCC application is currently under review by that agency's staff, who have advised SG Interests that the application is substantially complete (facility #021465). Any additional information provided to the COGCC as part of this application will be provided to the county as well. This application contains the COGCC Form 28, Centralized E&P Waste Management Facility Permit (Attachment I) and a Form 2A, Location Assessment for each pit (Attachment II). Below, the relevant sections are cross-referenced and these sections are highlighted in the attached forms.

1) Applicant:

SG Interests I Ltd.  
Catherine Dickert  
Environmental and Permitting Manager  
1544 Oxbow Drive, Suite 202  
PO Box 26  
Montrose, Colorado 81402  
Phone: 970-209-6464  
Fax: 970-252-0636  
Email: cdickert@sginterests.com

- 2) Surface Ownership: Please see Form 28, Surface Ownership section and Item 7 on Form 2A for surface owner contact and notification information.
- 3) Mineral Ownership: The proposed project does not impact mineral ownership. The minerals beneath the proposed pits are owned by the federal government. The boundary of the mineral lease is shown in item 9 of this application (Site Map, below).
- 4) Parcel Location: The legal location of the proposed pits is described in Item 4 of each Form 2A. The parcel legal description as posted on the Gunnison County Assessor's web page is: 2430.31 acres in Sec. 2, 10, 11, 13, 14, 15, 22, 23, 24, 25, 26 T11S R90W (Inc HES 80 & Part of Ute Placer) #564338. This is parcel # 2921-000-00-033. A copy of the recorded deed to this parcel is attached (Attachment III).
- 5) Identification of Previously Approved Uses: The Gunnison County Assessor's web page lists the following parcel notes:

UTE PLACER MS #5902 PATENT B189 P569  
OIL & GAS LEASE B667 P142  
STATE PAPERS B700 P585  
EASEMENT B753 P268

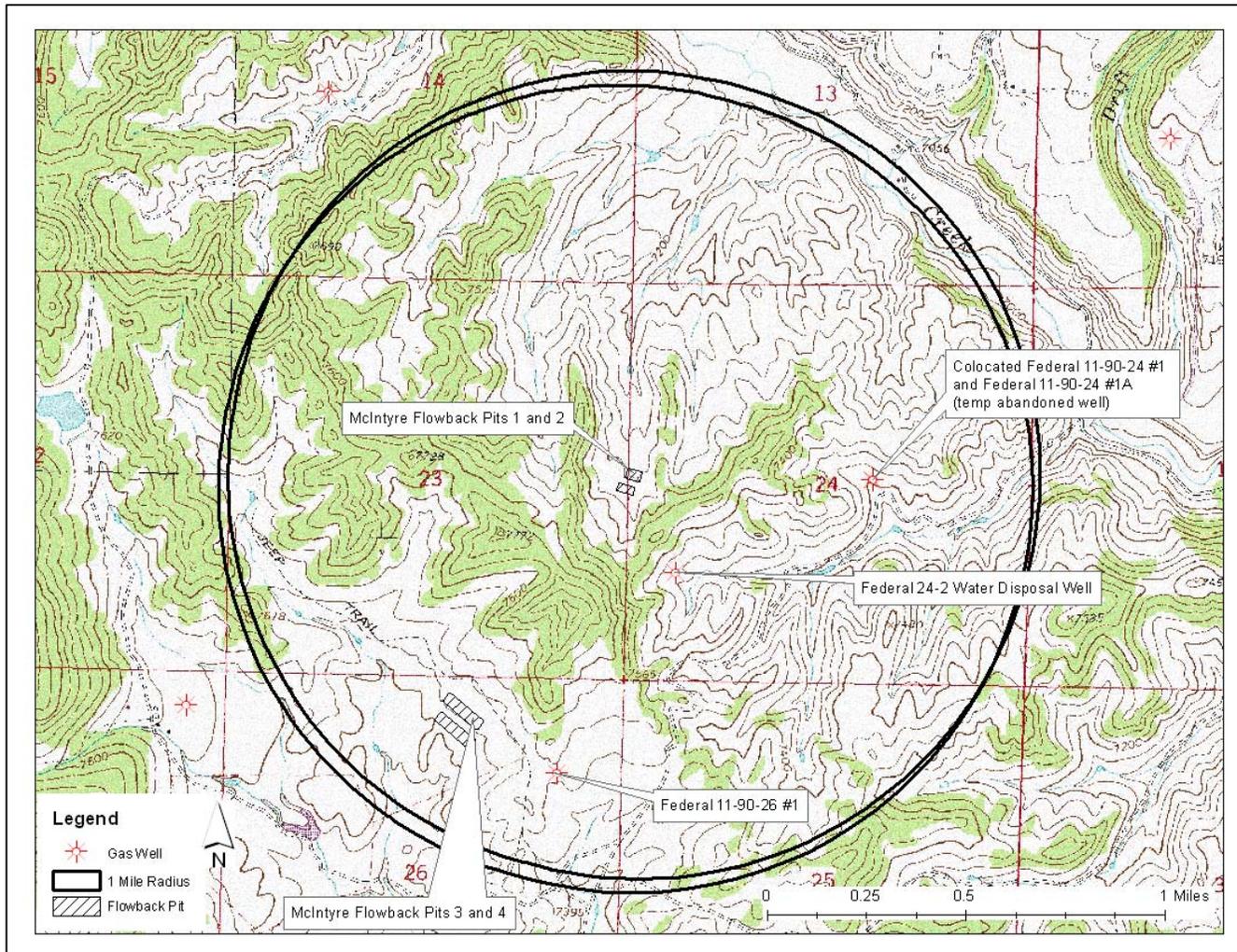
SMALL EASTERLY PT OF HES #258 IN SEC 11  
 BSD #551862 PIPELINE EASEMENT MAR 18 2005  
 BSD #551863 RIGHT OF WAY EASEMENT MARCH 18 2005  
 TOTAL PARCEL = 2,430.31 AC  
 FENCELINE AGRMNT #559135 OCT 7 2005  
 STATEMENT OF AUTHORITY #564334 APR 12 2006  
 DECLARATORY JUDGEMENT #564335 APR 12 2006  
 SURFACE USE AGREEMENT #564339 APR 12 2006  
 ASSIGNMENT #564337 APR 12 2006 FENCELINE AGREEMENT  
 RESOLUTION #563088 SUBD EXEMPTION FEB 22 2006

- 6) Characteristics and Current Condition of the Operation Location: This information can be found in Attachment A, Site Description to Form 28 (geology including geotechnical report, hydrology, and topography). Attachment B, Form 28 includes the Land Use Description. Topo maps are included in Attachment C to Form 28. The current condition of the project and access road locations can be seen in Attachment 1 to the Form 2As, Location Pictures. A hydrology map is included in each of the Form 2As as Attachment 3. Additional information on soils in the project area is included in Attachment 6 to the Form 2As, NRCS Map Unit Data.
- 7) List of Adjacent Landowners:

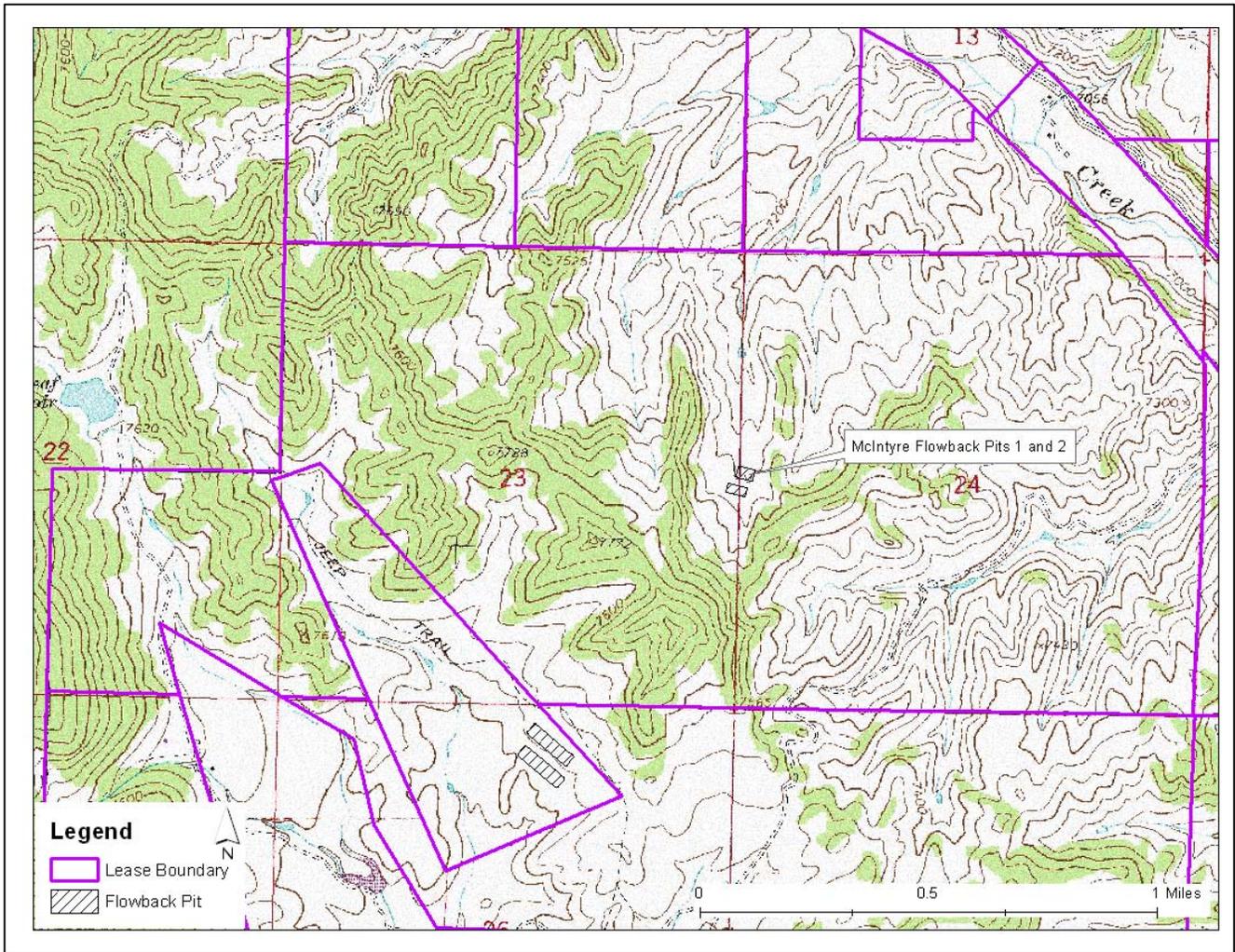
Parcel #	Owner	Address	City	State	Zip	Land Use
2919-000-00-010	VANNICE, WILLIAM RAY, ET AL.	2192 COUNTY RD 265	SOMERSET	CO	81434	Agricultural
2919-000-00-012	HUGHES, NICK R	708 1250 RD	DELTA	CO	81416	Agricultural
2919-000-00-014	HUGHES, NICK R	708 1250 RD	DELTA	CO	81416	Agricultural
2921-000-00-004	SILVERTIP PROPERTIES LLC	1324 SILVERTIP LN	EVERGREEN	CO	80439	Agricultural
2921-000-00-013	PEARCE, JAMES T JR.	PO BOX 1004	ASPEN	CO	81612- 1004	Vacant
2921-000-00-014	DOREMUS FAMILY LIMITED PARTNERSHIP	85 GLEN GARRY DR	ASPEN	CO	81611	Agricultural
2921-000-00-015	VANNICE, WILLIAM RAY ET AL.	2192 COUNTY RD 265	SOMERSET	CO	81434	Agricultural
2921-000-00-034	MCINTYRE, LARRY R	1690 M RD	FRUITA	CO	81521	Agricultural
2921-000-00-035	MCINTYRE, VERGINIA M	1690 M RD	FRUITA	CO	81521	Agricultural
2921-000-00-020	ASPEN LEAF RANCH INC.	4956 OLD WAGON RD	DELTA	CO	81416	Mixed Use
2921-000-00-021	HUGHES, NICK R	708 1250 RD	DELTA	CO	81416	Agricultural
2921-000-00-022	HUGHES, NICK R	708 1250 RD	DELTA	CO	81416	Agricultural
2921-000-00-032	USDA FOREST SERVICE	PO BOX 2000	WASHINGTON	DC	20013- 2000	Federal
2921-000-00-012	FALCON SEABOARD DIVERSIFIED INC.	109 N POST OAK LN STE 540	HOUSTON	TX	77024	Agricultural

List of Adjacent Landowners continued						
Parcel #	Owner	Address	City	State	Zip	Land Use
2921-000-00-029	SPERRY LAND CO	20215 F RD	DELTA	CO	81416	Agricultural
2921-000-00-001	USDA FOREST SERVICE	PO BOX 2000	WASHINGTON	DC	20013-2000	Federal

8) Vicinity Map: Please see Attachment C, Topo Map, to Form 28. Access Road Maps are included in Attachment 4 to the Form 2As. All waterbodies within 2 miles of the proposed pits are shown in Attachment H, Waterbodies Map, to Form 28. Existing oil and gas operations (gas wells and the proposed McIntyre Flowback Pits 3 and 4) are shown on the map below.



9) Site Plan Map: Existing improvements and utilities are shown in relation to the proposed project in Attachment 2, Location Drawing, to the Form 2As. The project is not located in a floodplain as indicated in Attachment 9, Sensitive Area Determination, attached to Form 2A. Topo Maps are included as attachments to Form 28; Attachment C, Topo Maps. The proposed facilities are shown on the facility layout drawings in Attachment F, Engineering Data to Form 28 (see Construction Layout Drawing, both plan and profile, as well as the leak detection and vent typicals and liner system specs). The mineral lease boundary is shown in relation to the proposed project in the map below.

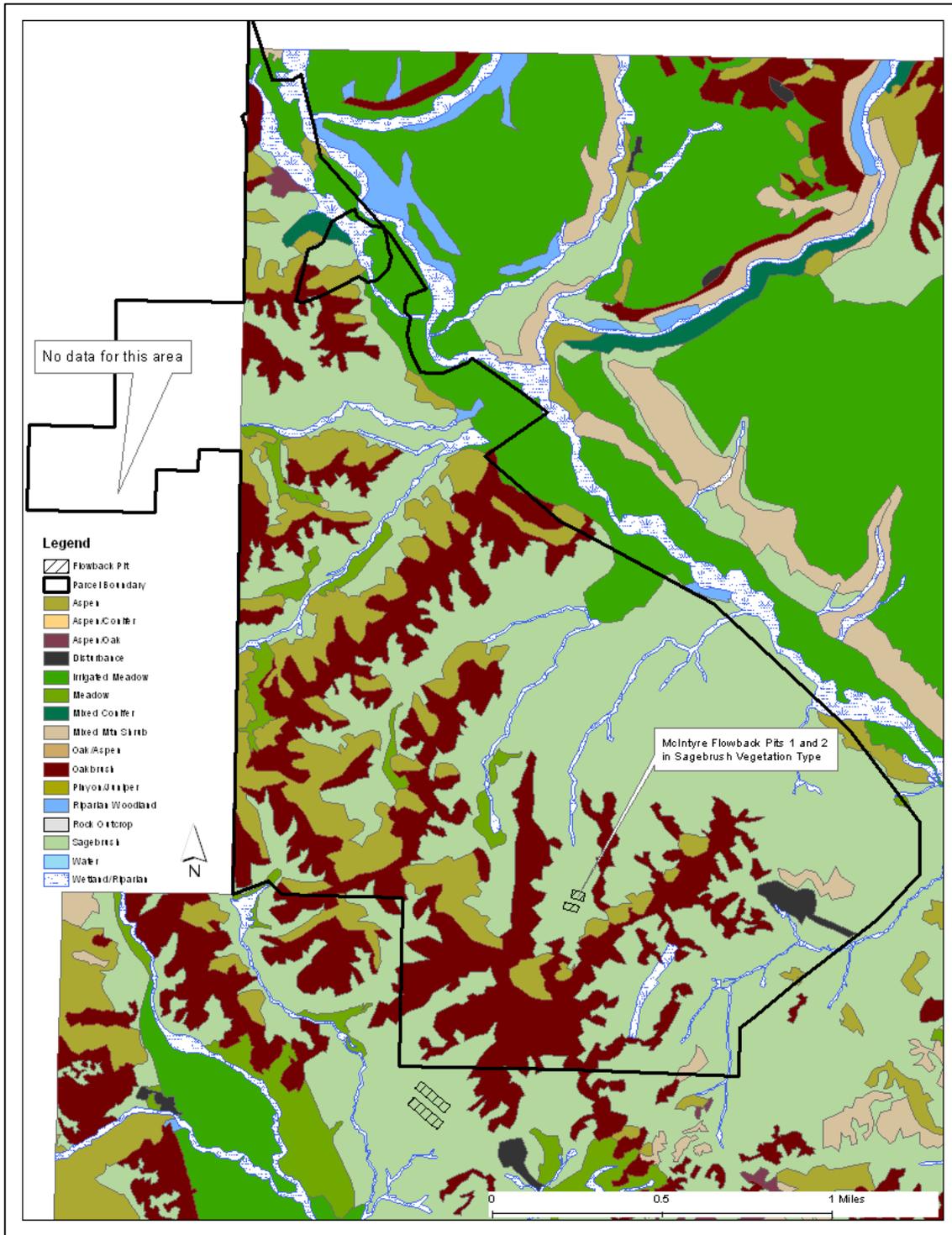


- 10) Applications and Permits: The application to COGCC is attached as Attachment I and II. SG Interests has a field-wide stormwater pollution prevention permit through the Colorado Department of Public Health and Environment under which this project is covered (#COR-039711). The stormwater plan is included in Operating Plan, Attachment G to Form 28. The stormwater permit is attached to this application as Attachment IV.
- 11) Operation Plan: The operation plan is included in Attachment G to Form 28, Operating Plan. SG Interests plans to begin construction on these flowback pits in the late spring (June) of 2011. Construction is estimated to take about two months. A preliminary closure plan (according to COGCC rule 908.g.1) is included in Attachment J to Form 28. A final closure plan will be completed according to COGCC rule 908.g.2 and can be provided to the county at that time.
- 12) Weed Management Plan: A weed management plan is attached to this application (Attachment V).
- 13) Access and Transportation Routes: The access route is shown in Attachment 4, Access Road Map to each Form 2A. During operation of the pits, an estimated 2 pick-up trucks per day (5,200 lbs) are expected to access the site. Most of the water will be transported to the pits via pipeline, but water trucks will be needed to deliver some of the water.

During the two month construction period SG Interests estimates the following vehicles would be required:

Type	Weight	Round Trips
Bulldozer on Lowboy Trailer with Truck	120,000	4
Crew cab Pick Ups	5,200	360
Scrapers on Lowboy Trailer with Truck	50,800	4
Delivery Truck	58,800	4
Pick-up Truck with Trailer	8,000	25
80 bbl water trucks	54,000 loaded 25,000 empty	6-8 trips for dust control
Trackhoe on Lowboy Trailer with Truck	91,000	4
Utility Tractor and Truck with Low Boy Trailer	40,000	2

- 14) Identification of Water Structures: Irrigation ditches and other water structures are shown in Attachment 3, Hydrology Map to each Form 2A. The project will have no impact to water structures or water rights. Water stored in the pits will be composed of produced water from SG Interests' wells in the area, flowback water resulting from well stimulation activities, and fresh water. The wells that will provide this water are listed in Attachment H, Water Analysis Reports. The list of wells is attached to Form 26 in this section of Form 28. Fresh water will be purchased from local landowners or permitted water supplies.
- 15) Roadway Impact Analysis: Please see section 13, Transportation and Access above for a list of vehicles and equipment associated with this project and the predicted number of round trips that these vehicles will make. Oversize/overweight load permits will be acquired as necessary from Public Works prior to use of the County Road 265. County Road 265 is the only public road associated with this project that is under the jurisdiction of Gunnison County. Colorado Department of Transportation will issue the permits for use of State Highway 133 as needed. SG Interests, Gunnison Energy Corporation, and Gunnison County have entered into an agreement to maintain CR 265 by grading and applying magnesium chloride (LI #10-241). Gunnison County Public Works will grade the road yearly and apply the magnesium chloride as needed with reimbursement by SG Interests and Gunnison Energy Corporation. By following the terms of the agreement with Gunnison County and the stipulations attached to road use permits, SG will mitigate any potential impacts to roadways in the county.
- 16) Wildlife and Wildlife Habitat Analysis: The US Fish & Wildlife Service has advised that they do not need to be involved in this process on private lands where there are no threatened or endangered species. The Colorado Division of Wildlife was contacted and a subsequent on-site meeting was held on August 10th, 2010. SG Interests will follow 1048 Rules and utilize the COGCC Wildlife maps. A copy of the Wildlife and Vegetation Assessment Report has been furnished to Kirk Madariaga, CDOW and is attached to this application (Attachment VI).
- 17) Vegetation: The proposed project would disturb approximately 4 acres of land and would result in temporary vegetation loss. The site would be reclaimed back to approximately 2 acres in size with the 2 acres of temporarily disturbed area seeded with the CDOW-recommended seed mix following interim reclamation. More information on vegetation at the project site is in Attachment VI, Wildlife and Vegetation Assessment Report and on the map below.



18) Emergency Response Plan: An emergency response plan is included in Attachment G, Operating Plan (Part E) to Form 28. SG Interests I, Ltd. will reimburse emergency response service providers for costs incurred in connection with an emergency as required.

19) Water Quality Non-Point Source Impacts

a) Identification of All Water Bodies: Water bodies are identified on the Water Body Map, Attachment H to Form 28. The proposed project is not within 500' of a water body.

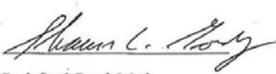
- b) Description of Existing Water Quality: The current baseline water quality analysis is included in Attachment H to Form 28. See the sections on shallow ground water and surface water sampling and testing.
  - c) Non-Point Source Impacts to Water Quality: Non-point source pollution could result from construction of the McIntyre Pits, construction and use of the access road, and use of existing roads. This pollution would be the result of erosion of disturbed soils and sedimentation of area water bodies.
  - d) Mitigation and Avoidance: SG Interests would implement the Best Management Practices (BMPs) described in the Stormwater Management Plan and Site Drainage Map. The Stormwater Management Plan for SG Interests' gas field in Gunnison County includes site-specific BMPs to be used during project construction (see Attachment G, Operating Plan to Form 28). The Site Drainage Map in Attachment D to Form 28 shows how drainage will be controlled on the project site and includes 100-year, 24-hour storm events.
- 20) Cultural Survey: A Class III Cultural Resource Inventory was declined by the surface owner. A copy of this letter is below.

<b>SG Interests I, Ltd.</b>	P.O. Box 26	Montrose, CO 81402
-----------------------------	-------------	--------------------

---

**Waiver of "Archaeological Survey"**

I/we, as listed below, are the owner(s) of the surface lands described below. I/we understand that SG Interests I, Ltd. will construct flowback pits on the property listed below. The construction of this pit will necessarily require the preparation of a road and other associated disturbances. These activities will create a disturbance to the surface of the earth on the lands described below. With this understanding, I/we do not require that SG Interests, I, Ltd. conduct an "archaeological survey" of the lands disturbed by the subject flowback pits and associated construction and road activities.

Surface land owner(s):  Date: 8-12-2010

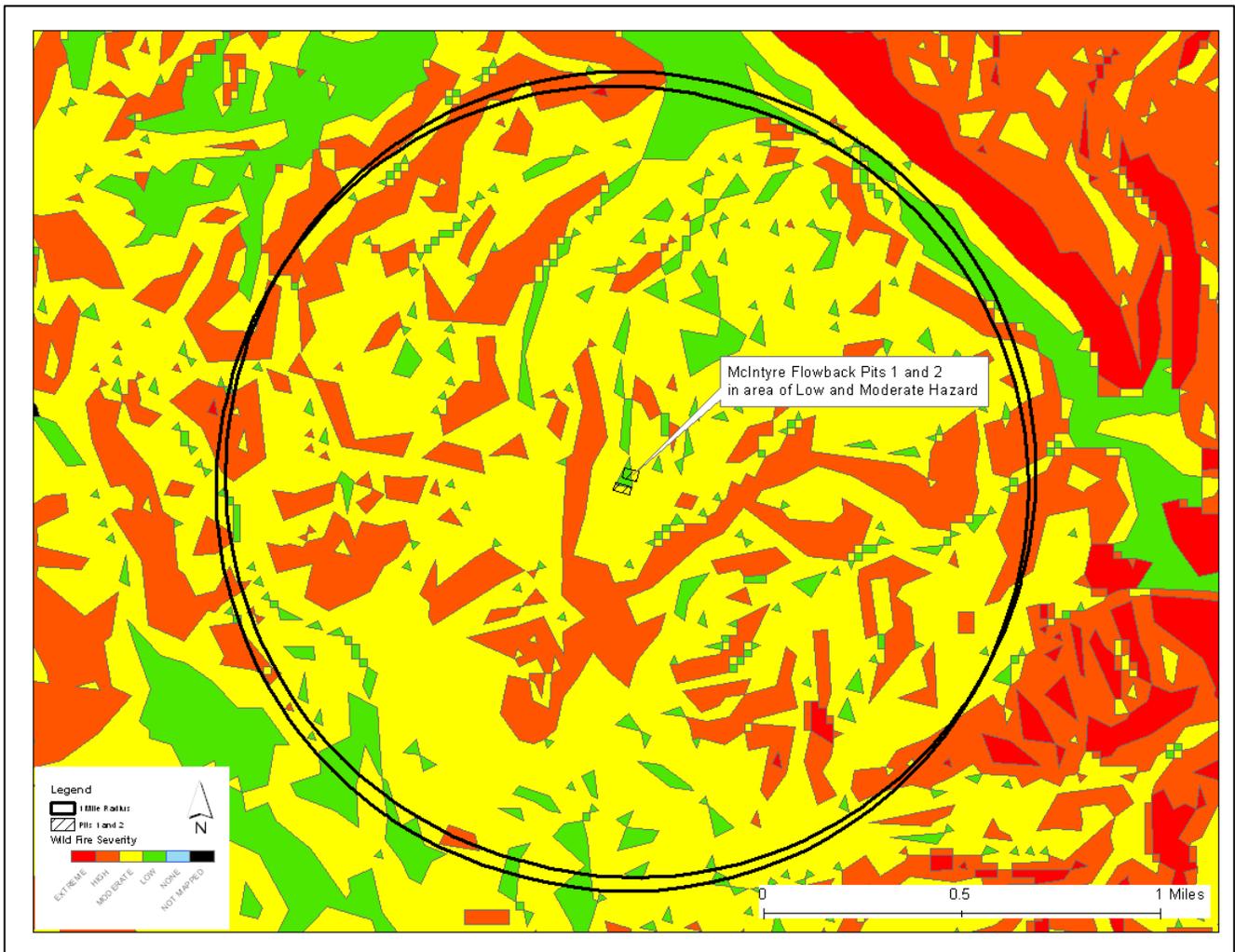
Rock Creek Ranch I, Ltd.

Legal description of lands: Township 11S, Range 90 W, Section(s) 23 and 24

---

SG Interests I, Ltd., A Limited Partnership (970) 252-0696 Fax: (970) 252-0636	Gordy Oil Company, General Partner
---	------------------------------------

- 21) Drainage and Erosion Control Plan: The Stormwater Management Plan for SG Interests' gas field in Gunnison County includes site-specific BMPs to be used during project construction (see Attachment G, Operating Plan to Form 28). The Site Drainage Map in Attachment D to Form 28 shows how drainage will be controlled on the project site and includes 100-year, 24-hour storm events. The drainage calculations are included in Item 12 attached to Form 28.
- 22) Wildfire Hazards: The proposed pits are in an area rated "moderate" for severity of wildfire hazard (see map below). If required or deemed necessary due to dry conditions, separate firefighting equipment consisting of 400 bbls of fresh water, a high pressure pump, and 300' of fire hose will be kept in the immediate vicinity.



- 23) Geologic Hazards: A preliminary geotechnical study of the project site was performed by Trautner Geotech LLC and is included in Attachment A to Form 28 (see letter to C. Dickert dated November 19, 2010). No geologic hazards were identified.
- 24) Existing and Future Land Uses: The parcel is currently used for grazing. At the end of the useful life of the pits, the pits and the entire location of the pits will be reclaimed and the uses of the entire parcel will be unchanged. See Attachment B, Land Use Description to Form 28 for more detail.
- 25) Technical Infeasibility Waiver Request: There is no economical technology commercially available to place and utilize the proposed temporary surface poly lines referenced in this application in compliance with Gunnison County's prescriptive waterbody setback. In some

instances it will be necessary to cross wetlands or water bodies with the temporary surface poly water pipelines. These linear elements will be placed over the wetland or waterbody inside a secondary pipeline casing as shown in Attachment F, Engineering Data, to Form 28 (see Sensitive Area Pipeline Crossing text and typical). In the cases where avoidance is not economical utilizing commercially available technology, SG Interests requests a Technical Infeasibility Waiver from Gunnison County Temporary Regulations for Oil and Gas, Section 1-107 (H) Waterbody Setbacks. Whenever a pipeline route is chosen by SG Interests, a Sundry Notice will be provided to COGCC including a map of that route. In cases involving wetland or water body crossings, the Sensitive Area Pipeline Crossing design described above will be employed and a copy of the COGCC notice will be provided to Gunnison County. The granting of this Technical Infeasibility Waiver will not cause substantial injury to the owner or occupant of adjacent lands and will not cause substantial injury to the environment.

ATTACHMENT I

COGCC FORM 28

Submitted to COGCC separately

ATTACHMENT II

COGCC FORM 2A

(ONE FOR EACH PIT)

Submitted to COGCC separately

ATTACHMENT III

RECORDED DEED



### WARRANTY DEED

**McINTYRE LIVESTOCK CORPORATION**, a Colorado corporation, whose address is 1690 M Road, Fruita, CO 81521 ("Grantor"), for the consideration of Ten Dollars and Other Good and Valuable Consideration (\$10), in hand paid, hereby sells and conveys to **ROCK CREEK RANCH I, LTD.**, a Texas limited partnership, whose legal address is 909n Fannin Street, Suite 2600, Houston, TX 77010 ("Grantee") the following real property in the Counties of Gunnison and Delta, and State of Colorado, to wit:

#### I. REAL PROPERTY

H.E.S. 257 embracing a portion of Section 6 of Township 11 South, Range 90 West, and a portion of Section 31 in Township 10 South, Range 90 West, and a portion of Section 36 in Township 10 South, Range 91 West, 6<sup>th</sup> P.M., as more particularly described in Patent recorded May 31, 1922 in Book 184, at Page 328 of the records of Gunnison County, Colorado.

H.E.S. 268 embracing a portion of Sections 31 and 32 in Township 10 South, Range 90 West, 6<sup>th</sup> P.M., as more particularly described in Patent recorded July 16, 1926 in Book 235, at Page 60 of the records of Gunnison County, Colorado.

H.E.S. 269 embracing a portion of Sections 29, 30, 31, and 32 in Township 10 South, Range 90 West, 6<sup>th</sup> P.M., as more particularly described in Patent recorded October 9, 1928 in Book 235, at Page 209 of the records of Gunnison County, Colorado.

H.E.S. 270 embracing a portion of Section 1 in Township 11 South, Range 91 West, and Section 36 in Township 10 South, Range 91 West, and Section 6 in Township 11 South, Range 90 West, 6<sup>th</sup> P.M., as more particularly described in Patent recorded August 31, 1925 in Book 223, at Page 399 of the records of Gunnison County, Colorado.

H.E.S. 312 embracing a portion of Section 6 in Township 11 South, Range 90 West, and Section 36 in Township 10 South, Range 91 West, 6<sup>th</sup> P.M., according to the official survey of said land on file in the Gen. Land Office as stated in Patent recorded December 14, 1933 in Book 235, at Page 369 of the records of Gunnison County, Colorado.

H.E.S. 258 embracing a portion of Sections 3, 10 and 11 in Township 11 South, Range 90 West, 6<sup>th</sup> P.M., as more particularly described in Patent recorded November 12, 1921 in Book 184, at Page 291 of the records of Gunnison County, Colorado.

H.E.S. 80 embracing a portion of Sections 22, 23, and 26 in Township 11 South, Range 90 West, 6<sup>th</sup> P.M.

Township 11 South, Range 90 West, 6<sup>th</sup> P.M.

- Section 2: Lot 12
- Section 10: SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 11: Lots 3, 4, 8, 9, 10, SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>
- Section 13: Lot 5, 11, 12, 13, S<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>
- Section 14: Lots 2, 3, NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, NW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>
- Section 15: E<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>N<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>
- Section 23: Lots 1, 2, 3, 6, 7, NE<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 24: All, except that portion of said section conveyed to Gerald Rentz and Emma C. Rentz in Warranty Deed recorded August 26, 1994 in Book 751 at page 49.



Ute Placer Mining Claim, U.S. Survey 5902 in the Muddy Mining District, described by Metes and Bounds as follows:

**Tract #1 (Wray/Patterson)**

Beginning at Station 0, a point on the boundary of said claim whence Corner No. 18 of said claim bears S. 29 degrees 0' E. 656.6 feet, and running thence North 72 degrees 15' East 360.2 feet to Station 1;  
thence North 9 degrees 13' West 288.1 feet to Station 2;  
thence North 8 degrees 30' East 313.0 feet to Station 3;  
thence North 2 degrees 55' West 398.8 feet to Station 4;  
thence North 38 degrees 34' West 218.8 feet to Station 5;  
thence North 18 degrees 50' West 264.9 feet to Station 6;  
thence North 45 degrees 57' West 277.3 feet to Station 7;  
thence North 29 degrees 09' West 295.7 feet to Station 8;  
thence North 83 degrees 58' East 261.4 feet to Corner No. 12, said Ute Placer Claim;  
thence North 41 degrees 44' West 1662.3 feet to corner No. 13, said claim;  
thence North 12 degrees 51' West 1319.2 feet to Corner No. 14, said claim;  
thence South 54 degrees 54' West 1141.7 feet to Corner No. 15, said claim;  
thence South 23 degrees 48' East 1,472.2 feet to Corner No. 16, said claim;  
thence South 38 degrees 17' East 1747.1 feet to Corner No. 17 said claim;  
thence South 29 degrees 00' East 1319.8 feet to Station 0, the place of beginning, situated in Sections 11 and 14 of Township 11 South, Range 90 West, 6<sup>th</sup> P.M.

**Tract #2 (Toland)**

Beginning at Station 0, a point on the boundary of said claim whence Corner No. 18 of said claim bears South 29 degrees 00' East 656.6 feet, and running thence North 72 degrees 15' East 360.2 feet to Station 1;  
thence North 9 degrees 13' West 288.1 feet to Station 2;  
thence North 8 degrees 30' East 313.0 feet to Station 3;  
thence North 2 degrees 55' West 398.8 feet to Station 4;  
thence North 38 degrees 34' West 218.8 feet to Station 5;  
thence North 18 degrees 50' West 264.9 feet to Station 6;  
thence North 45 degrees 57' West 277.3 feet to Station 7;  
thence North 29 degrees 09' West 295.7 feet to Station 8;  
thence North 83 degrees 58' East 261.4 feet to Corner No. 12 of said claim;  
thence South 33 degrees 38' East 2274.7 feet to Corner No. 11 of said claim;  
thence South 54 degrees 24' East 1441.5 feet to Corner No. 10 of said claim;  
thence South 54 degrees 36' West 1198.7 feet to Corner No. 19 of said claim;  
thence North 53 degrees 37' West 1433.6 feet to Corner No. 18 of said claim;  
thence North 29 degrees 00' West 656.6 feet to Station 0, the place of beginning.  
Containing, in both tracts, a total of 160.00 acres, more or less, and being situated in Sections 11 and 14 in Township 11 South, Range 90 West, 6<sup>th</sup> P.M.

Grantor quitclaims to Grantee all right, title and interest, including possessory interests, owned or held by Grantor to real property located in Township 10 South, Range 90 West, Township 11 South, Range 90 West, Township 10 South, Range 91 West, and Township 11 South, Range 91 West, of the 6<sup>th</sup> P.M.

SAVE AND EXCEPT, Grantor retains and reserves the surface estate only, and the water and ditch rights in and to the following two parcels included in the Real Property Described in Part I above.

**PARCEL 1 (Larry's Parcel)**

A parcel of land lying in the SE¼NW¼ and in the N½SW¼ of Section 11, Township 11 South, Range 90 West of the Sixth Principal Meridian, embracing in part a portion of the Ute Placer - U.S. Survey No. 5902, bounded and described as follows: Beginning at a point whence the West 1/4 corner of said Section 11 bears N63°54'W 1107 feet, and running thence N63°39'E 248 feet; thence N22°02'E 373.5 feet; thence N59°29'E 270 feet; thence N63°54'E 137.5 feet to a point on the west line of the County road; thence along the West line of the County road S14°05'E 90.5 feet; thence S48°57'E 77 feet; thence S56°00'E 177 feet; thence S68°35'E 70.5 feet; thence S80°49'E 144 feet; thence,



leaving the road S24°31'E 169 feet; thence S4°14'E 172 feet; thence S28°08'E 137.5 feet; thence S13°37'W 216 feet; thence S47°41'W 227 feet; thence S72°27'W 164 feet; thence N54°50'W 157 feet; thence S61°50'W 658 feet; thence S69°42'W 293 feet; thence N81°45'W 133 feet; thence N13°18'E 814.5 feet to the point of beginning containing 28.18 acres, together with all water and water rights, ditch and ditch rights appurtenant thereto including a cumulative 0.50 cubic feet of water per second of time out of either or both of the following water rights to be used in connection with the captioned property: those rights decreed to Ditch ID No. 1115, No. A-42, Ditch No. 3 (The Divide Creek Ditch No. 3) with a source of supply from East Muddy Creek, Priority No. A-47, for Four (4) cubic feet of water per second of time with a priority date of June 17, 1897; and the McIntyre Enlargement of Ditch No. 3, also known as Divide Creek Ditch No. 3, Priority No. E-175 for so much water as will flow therein as the ditch is now constructed, not to exceed 5.00 cubic feet per second of time as of the priority date of September 1, 1960.

Also, water rights in McIntyre Well No. 2 Permit No. 66805 issued by the Colorado Division of Water Resources for a domestic well appurtenant to the above-described property.

### PARCEL 2 (Dan's Parcel)

A parcel of land lying in the W½SE¼ of Section 11, Township 11 South, Range 90 West of the Sixth Principal Meridian, and being a part of the Ute Placer - U.S. Survey No. 5902, bounded and described as follows: Beginning at Corner 11, said Ute Placer, whence the East ¼ corner of said Section 11 bears N35°34'E 2506 feet, and running thence S46°38'W 124 feet; thence S67°28'W 394.5 feet; thence N88°15'W 345.5 feet to a point on the East line of the County road; thence along the East line of the County road N28°17'W 281 feet; thence N15°31'W 175 feet; thence N13°23'W 187.5 feet; thence N13°57'E 250.5 feet; thence N34°51'W 143.7 feet; thence N10°27'W 80 feet; thence N16°53'E 157 feet; thence leaving the County road, N68°00'E 322 feet to a point on the East line of said Ute Placer; thence S33°38'E 1296 feet along the East line of the Ute Placer to the point of beginning, and containing 19.25 acres, together with all water and water rights, ditch and ditch rights appurtenant thereto, including rights in the Wray Ditch, No. 105, with a source of supply from Little Spring Creek, tributary to the East Muddy Creek and the North Fork of the Gunnison River sixty-six hundredths (.66) of one cubic foot of water per second of time, designated as Property No. H-69, from the first day of May 1908, and an enlargement of one (1) cubic foot of water per second of time requested by Application for Water Rights (Surface) approved by the District Court, Water Division No. IV, State of Colorado, on January 17, 2006, in Case Number 05 CW 122.

Also, rights in McIntyre's Well No. 4 under Permit No. 100706 issued by the Colorado Division of Water Resources for a domestic well appurtenant to the above-described property.

## II. SEVERED MINERAL INTERESTS

Grantor quit claims to Grantee all of Grantor's right, title and interest in and to all coal, oil, gas and other minerals lying in and under the following described tracts:

Tract 1: H.E.S. 255 embracing a portion of Sections 24 and 25 of Township 10 South, Range 91 West and Section 30 of Township 10 South, Range 90 West, 6<sup>th</sup> P.M., as reserved in Warranty Deed dated March 6, 1992, recorded on March 18, 1992, in Book 703, Page 120, Gunnison County Records, and

Tract 2: Those certain tracts described above as Parcels 1 (Larry's Parcel) and Parcel 2 (Dan's Parcel).

Located in the Counties of Gunnison and Delta, Colorado.



**III. DECREED SURFACE WATER & DITCH RIGHTS  
DOMESTIC WELL RIGHTS AND  
LIVESTOCK WATER TANK RIGHTS**

**A. Water Rights, Ditch & Ditch Rights Appurtenant Thereto**

Grantor quitclaims to Grantee, all water and water rights, ditch and ditch rights, well and water tank rights appurtenant thereto, including but not limited to the following:

1. Rights in the Ragged Mountain Water Users Association, Ditch No. 3 for 4 cubic feet per second of time.
2. Bainard Ditch No. 1 with a source of supply from the South fork of Bainard Creek and an adjudicated appropriation of fifty hundredths (.50) of 1 cubic foot of water per second of time designated as Priority No. H-20 from the first day of September 1894.
3. Bainard Ditch No. 2 with a source of supply from the South fork of Bainard Creek with a decreed appropriation of two and twelve hundredths (2.12) cubic feet of water per second of time, designated as Priority No. H-19 from the first day of August 1894.
4. Bainard Ditch No. 3 with a source of supply from the South fork of Bainard Creek with a decreed appropriation of eight-eight hundredths (.88) of one cubic foot of water per second of time, designated as Priority No. H-19 from the first day of August 1894.
5. Bainard Ditch No. 4 with a source of supply from the South fork of Bainard Creek with a decreed appropriation of fifty hundredths (.50) of one cubic foot of water per second of time, designated as Priority No. H-21 from the first day of August 1895.
6. Bainard Ditch No. 5 with a source of supply from the South fork of Bainard Creek with a decreed appropriation of sixty-two hundredths (.62) of one cubic foot of water per second of time, designated as Priority No. H-21 from the first day of August 1895.
7. Bainard Ditch No. 6 with a source of supply from the North Branch of Bainard Creek with a decreed appropriation of fifty hundredths (.50) of one cubic foot of water per second of time, designated as Priority No. H-11 from the first day of August 1890.
8. Bainard Ditch No. 7 with a source of supply from the North Branch of Bainard Creek with a decreed appropriation of one and twenty-five hundredths (1.25) cubic feet of water per second of time, designated as Priority No. H-143 from the first day of May 1928, with the appropriated amount limited to fifty hundredths (.50) of one cubic feet of water per second of time "until said claimant has with due diligence reduced to cultivated or pasture land more than 20 acres of land, AND PROVIDED FURTHER, that such additional water shall be allowed in the ratio and proportion of one (1) cubic foot of water per second of time for each additional forty acres of land."
9. J.F. Toland Ditch No. 154, with a source of supply from Spring Creek and the muddy branch of East Muddy Creek, and a decreed appropriation of three (3) cubic feet of water per second of time, designated as Priority No. H-105, from 22<sup>nd</sup> day of August 1916.
10. McIntyre Ditch No. 143, with a source of supply from the Little Henderson Creek, a tributary of East Muddy Creek, with a decreed appropriation of two and seventy-five hundredths (2.75) cubic feet of water per second of time, designated as Priority No. H-96, from the first day of June 1914, limited to one and fifty hundredths (1.50) cubic feet of water per second of time, until said claimant has,



with due diligence added sixty acres of cultivated land, and PROVIDED FURTHER, "that such additional water shall be allowed in proportion of one cubic foot of water per second of time for each additional forty acres of land reduced to irrigation by means of said ditch.

- 11. Beaver Dam Ditch derives its source of supply from Bainard Creek, a natural stream, tributary of the muddy fork of the East Muddy Creek in Water District Court No. 40, Colorado, with a headgate located on Bainard Creek and a decreed appropriation of two and one-half (2.50) cubic feet of water per second of time, designated Property No. H-129 from June 15, 1922.
- 12. McIntyre Ditch No. J-219, with a source of supply from Little Henderson Creek, a tributary of East Muddy Creek, and a decreed appropriation of 2.75 second feet of water from Henderson Creek, which is enlarged by 1.25 second feet of floodwater, which is gone early in the irrigation season, and a decree of 1.25 cubic feet per second of time, designated as Priority No. J-263, from June 2, 1946.
- 13. Three and five hundredths (3.5) of cubic feet of water per second of time to Ditch ID No. 1115, Decree A-42, Ditch No. 3 (the Divide Creek Ditch No. 3), whose source of supply is East Muddy Creek with an appropriation of four (4) cubic feet of water per second of time, Priority No. A-47, from 17<sup>th</sup> day of June 1897, and the McIntyre Enlargement of Ditch No. 3, also known as Divide Creek Ditch No. 3, Priority No. E-175, for so much water as will flow therein as the ditch is now constructed, not to exceed 5.0 cubic feet per second of time as of the priority date of September 1, 1960.
- 14. Water Rights decreed on January 17, 2006, by the District Court, Water Division IV, State of Colorado, for the following structures, tributary to Muddy Creek and/or East Muddy Creek, which are tributary to the North Fork of the Gunnison River, located in the 6<sup>th</sup> P.M.

Name	¼ ¼ ¼	Sec.	Twn.	Rng.
Toland Spring	NE NW NW	32	10 South	90 West
Foot Draw Ditch	SE NW NW	14	11 South	90 West
IX Pond	NW NW NE	1	11 South	91 West

for the following amounts and usages with an appropriation date of June 1, 1940.

Name	Amount	Uses
Toland Spring	0.033 cfs	Irrigation of one-half acre, domestic in one single-family dwelling, and stockwater
Foot Draw Ditch	2.000 cfs	Irrigation of 40 acres
IX Pond	28.0 acre-feet	Irrigation of 40 acres

**B. Domestic Well Rights**

- 1. Rights in McIntyre Well #1 under Permit No. 66084 issued by the Colorado Division of Water Resources for a domestic water well appurtenant to the "Burgin Cabin."
- 2. Rights in McIntyre Well #3 under Permit No. 72500 issued by the Colorado Division of Water Resources for a Domestic Water Well appurtenant to the "Wray Place."
- 3. Rights in McIntyre Rowley Well, under Permit No. 236849 issued by the Colorado Division of Water Resources for a Domestic Water Well appurtenant to the Rowley Cabins.

**C. Livestock Water Tank Rights**

Number	Name	Location all in T11S, R90W, 6 <sup>th</sup> P.M.
7636	McKibben Cabin Tank	NE $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 24
7637	Lost Tank	NW $\frac{1}{4}$ NW $\frac{1}{4}$ , Section 24
7638	Over Ridge Tank	NE $\frac{1}{4}$ NE $\frac{1}{4}$ , Section 23
7639	Corral Tank	NW $\frac{1}{4}$ NE $\frac{1}{4}$ , Section 23
7640	Hice Tank No. 1	SE $\frac{1}{4}$ SW $\frac{1}{4}$ in HES 80, Section 23
7641	Hice Tank No. 2	NW $\frac{1}{4}$ SW $\frac{1}{4}$ in HES 80, Section 23
7642	Upper Deer Tank	NE $\frac{1}{4}$ NW $\frac{1}{4}$ , Section 23
7643	Lower Deer Tank	SE $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 14
7644	Middle Pond	SW $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 13
7645	Wray Tank No. 1	SW $\frac{1}{4}$ NE $\frac{1}{4}$ , Section 14
7646	Wray Tank No. 2	SE $\frac{1}{4}$ NW $\frac{1}{4}$ , Section 14
7647	Wray Tank No. 3	NE $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 14
7648	Wray Tank No. 4	NW $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 14
7649	McIntyre Cabin Tank	NW $\frac{1}{4}$ SW $\frac{1}{4}$ , Section 13

All approved 2/28/61, State of Colorado, Division of Water Resources, State Engineer

**IV. GRANTEE'S RIGHT OF FIRST REFUSAL**

Under the Contract to Buy and Sell Real Estate dated February 21, 2006, between the Grantor and Grantee (the "Contract"), at ¶24, Additional Provisions, subparagraph (c), Grantor granted to the Grantee a right of first refusal governing the sale or transfer of title to Parcel I ("Larry's Parcel") or Parcel II ("Dan's Parcel") on the terms and conditions therein set forth. Grantor confirms the Grantee's rights under the Contract are to be construed as a covenant running with the ownership of Parcel I ("Larry's Parcel") and Parcel II ("Dan's Parcel").

with all its appurtenances, and, except for the real property interests and water rights quit claimed herein, Grantor warrant(s) the title to the same, subject to: general taxes for the year 2006 and all subsequent taxes; and those specific Exceptions described by reference to recorded documents as reflected in the Title Documents accepted by Grantee in accordance with Section 8a (Title Review) of the Contract relating to the above-described property; distribution utility easements (including cable TV); those specifically described rights of third parties not shown by the public records of which Grantee(s) has actual knowledge and which were disclosed by Grantor's letter of March 9, 2006, and accepted by Grantee in accordance with Section 8b (Matters Not Shown by the Public Records) and Section 8c (Survey Review) of the Contract relating to the above-described real property.

Witness my hand and seal, 2006  
 STATE OF COLORADO )  
 ) ss.  
 COUNTY OF MESA )

McINTYRE LIVESTOCK CORPORATION, a Colorado corporation

By: Larry R. McIntyre  
 Larry R. McIntyre, President

The foregoing instrument was acknowledged before me this 7<sup>th</sup> day of April, 2006, by McIntyre Livestock Corporation, a Colorado corporation, by Larry R. McIntyre, President.

My commission expires:  
 Witness my hand and official seal.

Joan L. Carrico  
 Notary Public



My Commission Expires 10/24/2006

ATTACHMENT IV

STORMWATER DISCHARGE PERMIT

# STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION  
TELEPHONE: (303) 692-3500



**CERTIFICATION TO DISCHARGE  
UNDER  
CDPS GENERAL PERMIT COR-030000  
STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION**

Certification Number **COR039711**

This Certification to Discharge specifically authorizes:

***S.G. Interests I, Ltd.***

LEGAL CONTACT:  
*Lynn Garner, Oper. Mgr.  
S.G. Interests I, Ltd.  
P.O. Box 26  
Montrose, CO 81401  
Phone # 970/252-0696  
lgarner@sginterests.com*

LOCAL CONTACT:  
*Lynn Garner, Oper. Mgr./Agent,  
Phone # 970/252-0696  
lgarner@sginterests.com*

During the Construction Activity: **Oil & Gas Field Development**  
to discharge stormwater from the facility identified as **S.G. Interests I Oil field  
Common Plan of Development**  
which is located at:

**Map In File  
, Co**

**Latitude 39/07/03, Longitude 107/28/11  
In Gunnison/Delta County**

**to: -- E. Muddy Creek**

Anticipated Activity begins **05/01/2006** continuing through **12/31/2015**  
On **30 acres (30 acres disturbed)**

Certification is effective: **07/01/2007** Certification Expires: **06/30/2012**

Annual Fee: \$245.00 (**DO NOT PAY NOW** – A prorated bill will be sent shortly.)

ATTACHMENT V

WEED MANAGEMENT PLAN

**Noxious Weed Management Plan**  
**Natural Gas Facilities in the Bull Mountain Unit**  
**SG Interests I, Ltd. Montrose, CO**



**SG INTERESTS I, LTD.**

**December 2010**

## 1.0 Introduction

This Noxious Weed Management Plan (plan) identifies measures to be taken by SG Interests I, Ltd. (SG) and its contractors (Contractor) to minimize the spread and establishment of noxious weeds and non-native invasive species.

Measures identified in this plan apply to work within the project area defined as well pads, pipeline rights-of-way, access roads, temporary use areas, and other areas used in association with the natural gas development within the Bull Mountain Unit and adjacent areas in Gunnison County.

### 1.1 Purpose

SG is committed to preventing the introduction of noxious weeds during construction and controlling the expansion of existing noxious weed populations over the life of the project. All noxious weeds as defined by Gunnison County and the state of Colorado (Colorado Weed Management Act CRS Title 35, Article 5.5 as amended) will be controlled. The purpose of this plan is to prescribe methods to treat existing weed infestations, prevent introduction and spread of infestations during construction, and monitor and treat infestations after construction is complete.

## 2.0 Noxious Weed Management

### 2.1 Weed Identification

The following noxious weeds are listed noxious weeds in the state of Colorado or in the Gunnison Basin Weed District Management Plan. The goal for Colorado A Listed weeds is eradication. The goal for B Listed weeds is to stop their spread. C Listed weeds are those weeds that are managed by local jurisdictions within the state of Colorado.

Weed Name	Scientific Name	Gunnison Co. Listed	Colorado List (A, B, or C)
Absinth wormwood	<i>Artemisia absinthium</i>	√	B
African rue	<i>Peganum harmala</i>		A
Black henbane	<i>Hyoscyamus niger</i>	√	B
Bull thistle	<i>Cirsium vulgare</i>		B
Burdock	<i>Arctium minus</i>		C
Camelthorn	<i>Alhagi pseudalhagi</i>		A
Canada thistle	<i>Cirsium arvense</i>		B
Chicory	<i>Chichorium intybus</i>		C
Common crupina	<i>Crupina vulgaris</i>		A
Common St. Johnswort	<i>Hypericum perforatum</i>		C
Cypress spurge	<i>Euphorbia cyparissias</i>		A
Dalmation toadflax	<i>Linaria dalmatica</i>	√	B
Dame's rocket	<i>Hesperis matronalis</i>	√	B
Diffuse knapweed	<i>Centaurea diffusa</i>	√	B
Dyer's Woad	<i>Isatis tinctoria</i>		A
Field bindweed	<i>Convolvulus arvensis</i>	√	C
Giant salvinia	<i>Salvinia molesta</i>		C
Halogeton	<i>Halogeton glomeratus</i>		C
Hoary cress	<i>Cardaria draba</i>	√	B
Houndstongue	<i>Cynoglossum officinale</i>		B
Hydrilla	<i>Hydrilla verticillata</i>		A
Jointed goatgrass	<i>Aegilops cylindrica</i>		B

Weed Name	Scientific Name	Gunnison Co. Listed	Colorado A List
Leafy spurge	<i>Euphorbia esula</i>	√	B
Meadow knapweed	<i>Centaurea pratensis</i>		A
Mediterranean sage	<i>Salvia aethopis</i>		A
Medusahead	<i>Taeniatherum caputmedusae</i>		A
Myrtle spurge	<i>Euphorbia myrsinites</i>		A
Musk thistle	<i>Carduus nutans</i>	√	B
Orange hawkweed	<i>Hieracium aurantiacum</i>	√	
Oxeye Daisy	<i>Chrysanthemum leucanthemum</i>	√	B
Plumeless thistle	<i>Carduus acanthoides</i>	√	B
Poison hemlock	<i>Conium maculatum</i>		C
Puncturevine	<i>Tribulus terrestris</i>		C
Purple loosestrife	<i>Lythrum salicaria</i>	√	A
Rush skeletonweed	<i>Chondrilla juncea</i>		A
Russian knapweed	<i>Centaurea repens</i>	√	B
Russian olive	<i>Elaeagnus angustifolia</i>		B
Sericea lespedeza	<i>Lespedeza cuneata</i>		A
Scotch thistle	<i>Onopordum acanthium</i>	√	B
Spotted knapweed	<i>Centaurea maculosa</i>	√	B
Squarrose knapweed	<i>Centaurea virgata</i>		B
Tamarisk	<i>Tamarix parviflora, T. ramosissima</i>	√	B
Tansy ragwort	<i>Senecio jacobaea</i>		A
Yellow starthistle	<i>Centaurea solstitialis</i>		A
Yellow toadflax	<i>Linaria vulgaris</i>	√	B

## 2.2 Preventative Measures

The following preventative measures will be implemented to prevent the spread of noxious weeds:

- If soil stockpiles are created in infested areas, these stockpiles will be kept as close as possible to the infested areas. No soil from infested areas will be moved until they are leveled and used. Soil from an infested area will not be used in any other area beside where it was collected.
- Vehicles and equipment will be required to arrive at the work site clean, power-washed, and free of soil and vegetative debris capable of transporting weed seeds or other propagules.
- Materials used for erosion control and reclamation (i.e. straw bales and seed mixes) will be obtained from sources that are weed-free. Seed mixes will also be weed free.
- Disturbed areas will be reseeded in accordance with the Surface Use Agreement and any applicable permit stipulations as soon as possible after construction activities have been completed.

## 2.3 Weed Treatment Measures

Depending upon the species of weed and the time planned for construction, methods of weed pre-treatment may include:

4

- Mechanical—mowing, pulling by hand, or tillage could be used.
- Chemical—application of an approved herbicide by a licensed applicator. Herbicides will be

selected based on recommendations by local weed control district or BLM/FS and subject to fee-landowner approval. All herbicides will be applied in accordance with all applicable laws and regulations on BLM/FS and fee-lands.

- Cultural – employing practices such as reseeding with non-invasive species that can outcompete noxious species. This type of treatment will be conducted in some fashion on all disturbed areas associated with the project.

Effective control measures vary for different weed species. For many species, a combination of measures should be employed to be most effective. The following table lists the known and potential weeds within the Bull Mountain Unit as well as the best control measures for each.

**Table 2.3-1 Noxious weeds and appropriate controls**

<b>Weed Name</b>	<b>Herbicide Used?</b>	<b>Herbicide details</b>	<b>Mechanical measures used?</b>	<b>Type of mechan. control</b>	<b>Cultural Control Used?</b>	<b>Type of cultural control</b>
Bull thistle	Yes (ex. Tordon)	Spray rosettes in early spring	Yes	Removal of rosettes and mowing of bolting plants	Yes	Seeding w/desirable species
Burdock	No	NA	Yes	Sever tap root	Yes	Seeding w/desirable species
Canada thistle	Yes	Mow then spray in late summer or fall	Yes	Mowing prior to spraying	Yes	Seeding w/desirable species
Chicory	Possibly	Contact county specialist	No	NA	Yes	Seeding w/desirable species
Common St. Johnswort	Yes(ex. Roundup Ultra)	Spray green plants, preflowering	No	NA	Yes	Seeding w/desirable species
Dalmation toadflax	Yes (ex. Tordon K)	Herbicide w/surfactant in early stages	Yes	Hand grubbing during summer	Yes	Seeding w/desirable species
Diffuse knapweed	Yes	Spray at rosette stage	Yes	Hand pulling of rosettes and plants early in bolting stage	Yes	Seeding w/desirable species
Dyer's Woad	Yes	Spray rosettes in spring or fall	Yes	Hand pull bolting plants, bag any heads	Yes	Seeding w/desirable species

<b>Weed Name</b>	<b>Herbicide Used?</b>	<b>Herbicide details</b>	<b>Mechanical measures used?</b>	<b>Type of mechan. control</b>	<b>Cultural Control Used?</b>	<b>Type of cultural control</b>
Field bindweed	Yes (ex. Roundup Ultra)	Spray green plants, early flowering stage	No	NA	Yes	Seeding w/desirable species
Halogeton	No	NA	No	NA	Yes	Seeding w/desirable species
Hoary cress	Yes	Spray pre or early bloom stage	No	NA	Yes	Seeding w/desirable species
Houndstongue	Yes	Spray prebud or rosette state	Yes	Hand pull after bolting stage, if flowers bag heads	Yes	Seeding w/desirable species
Jointed goatgrass	No	NA	Yes	Mow just after seed heads form	Yes	Seeding w/desirable species
Leafy spurge	Yes (ex. Tordon 22K)	Spray in spring pre flowering and in fall	No	NA	Yes	Seeding w/desirable species
Mediterranean sage	No	NA	Yes	Cut flowering plants and bag heads	Yes	Seeding w/desirable species
Musk thistle	Yes (ex. Tordon 22K)	Spray rosettes and early bolting stages	Yes	Hand pull, sever tap root, bag heads, mow large infestations at bolting or early flowering	Yes	Seeding w/desirable species
Oxeye Daisy	Yes	Spray preflowering stage	No	NA	Yes	Seeding w/desirable species
Plumeless thistle	Yes (ex. Tordon 22K)	Spray rosette to early bolting stage	Yes	Sever tap root, bag heads, mow large infestations bolting to early flower stage	Yes	Seeding w/desirable species

<b>Weed Name</b>	<b>Herbicide Used?</b>	<b>Herbicide details</b>	<b>Mechanical measures used?</b>	<b>Type of mechan. control</b>	<b>Cultural Control Used?</b>	<b>Type of cultural control</b>
Poison hemlock	Yes (ex. phenoxy herbicides or glyphosate)	Spray young plants	No	NA	Yes	Seeding w/desirable species
Puncturevine	Yes (ex. chlorsulfuron and 2, 4-D)	Chlorsulfuron preemergence and 2, 4-D, soon after emergence	Yes	Cut or hoe plants prior to seeding, bag any heads	Yes	Seeding w/desirable species
Purple loosestrife	Yes (2,4-D and glyphosate)	Spray in spring preflowering fall spraying w/removal of flower heads	Yes	Hand pull small plants, mow larger infestations	Yes	Seeding w/desirable species
Russian knapweed	Yes (ex. Curtail)	Spray in bud to bloom stage in summer and fall	No	NA	Yes	Seeding w/desirable species
Russian olive	Yes (ex. Garlon)	Spray cut stump or apply to basal bark	Yes	Cut trees down or cut basal bark (follow up with chemical treatment)	Yes	Seeding w/desirable species and plant willow cuttings, Carex plugs
Scotch thistle	Yes (ex. Milestone)	Spray rosettes using surfactant added spray	Yes	Dig rosettes, sever root	Yes	Seeding w/desirable species
Spotted knapweed	Yes (ex. Tordon 22K)	Spray rosettes	No	NA	Yes	Seeding w/desirable species

Weed Name	Herbicide Used?	Herbicide details	Mechanical measures used?	Type of mechan. control	Cultural Control Used?	Type of cultural control
Tamarisk	Yes (ex. Garlon 4)	Paint stump w/herbicide, spray sprouts, use basal bark treatment for small diameter trees	Yes	Cut tree (follow up with chemical treatment)	Yes	Seeding w/desirable species, plant willow cuttings, Carex plugs
Yellow starthistle	Yes (ex. Tordon 22K)	Spray rosettes & early bolting stages	Yes	Hand pull small infestations	Yes	Seeding w/desirable species
Yellow toadflax	Possibly	Consult specialists	Possibly	Consult specialists	Yes	Seeding w/desirable species

Best Management Practices for the Noxious Weeds of Mesa County recommendations with some herbicide recommendations from 2006 North Dakota Weed Control Guide (<http://www.ag.ndsu.edu/weeds/w253/w253w.htm>) and additional information from Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas, The Nature Conservancy.

If any soil stockpiles are maintained for longer than 90 days, these stockpiles will be treated for weeds.

### 3.0 Reseeding

#### 3.1 Seed Mix

The seed mix will be chosen by the landowner, stipulated in permit conditions of approval, or dictated by the surface management agency. Some possible seed sources are:

- Arkansas Valley Seed Solutions 877-957-3337; 4625 Colorado Blvd, Denver, CO 80216
- Pawnee Butte Seed Co. 970-356-7002; P.O. Box 1604, Greeley, CO 80632
- Sharp Bros, Seed Co. 800-421-4234 104 East 4th Street Road Greeley, Colorado 80631
- Southwest Seed, 13260 County Road 29, Dolores, CO 81323

#### 3.2 Planting Schedule

Areas slated for reclamation will be returned to near pre-construction grades and contours. Topsoil will then be replaced over the disturbed area from which it was stripped.

Final cleanup after work in waterbodies and wetlands (primarily associated with pipeline installation) will be concluded, seeding accomplished, and mulching or erosion control mats installed, prior to the end of the following time frames.

- waterbodies—24 hours after initial in-stream disturbance
- wetlands—within 10 days of backfilling in that wetland

There are exceptions to these time frames, as noted below:

- Seeding and installation of erosion control matting may be deferred until final cleanup (i.e.,

temporary bridge is removed and waterbody banks across the travel lane are restored to pre-construction conditions) if the streambanks and all disturbed slopes above the waterbody are stabilized with an application of mulch extending 25 feet up the slope.

- If reclamation and seeding is deferred more than 10 days after final grade restoration near waterbodies and wetlands, all disturbed slopes above waterbodies and wetlands will be temporarily stabilized by applying straw mulch for a minimum distance of 200 feet above the edge of the waterbody or wetland. Wetlands will not be seeded unless noxious weeds are present. Successful recolonization by wetland species is generally related to effective topsoil salvage methods and sources of seed and rhizomes in adjacent areas. Streambanks will be seeded immediately upon completion of final cleanup.
- Specific permit conditions may alter the wetland and waterbody timelines.
- Weather constraints may alter the time frames.

### **3.3 Seeding Methods and Procedures**

SG's contractor will employ broadcast or drill seeding as site conditions allow. Seeding activities will be contingent upon weather and soil conditions. Seeding will not be permitted if there is more than 2 inches of snow on the ground unless approved by the surface landowner or surface management agency. On BLM/FS lands and where approved by the fee-landowner, the contractor will randomly distribute any windrowed trees and shrubs or other remaining vegetation debris over the right-of-way (after seeding) by hand or appropriate equipment so as not to disturb the seedbed.

Drill seeding is the preferred seeding method and will be employed wherever soil characteristics and slope allow effective operation of a rangeland seed drill. Drill seeding will be performed perpendicular to the slope. Seed will be placed in direct contact with the soil at an average depth of 0.5-inches, covered with soil, and firmed to eliminate air pockets around the seeds. Seed will be applied using a rangeland seed drill with a seed release and agitation mechanism sufficient to allow seeds of various sizes and densities to be planted at the proper seeding depth.

Broadcast seeding will be employed only in areas where drill seeding is unsafe or physically impossible. Seed will be applied using manually operated cyclone-bucket spreaders, mechanical spreaders, or blowers. Seed will be uniformly broadcast over disturbed areas. Broadcast application rates will be twice that of drill rates. Seed will be applied so that uniform coverage of 20 seeds per square foot is obtained. Immediately after broadcasting, the seed will be uniformly raked, chained, dragged, or cultipacked to incorporate seed to a sufficient seeding depth. If the area is seeded prior to a soil crust forming, harrowing or raking may not be necessary.

### **3.4 Evaluating Reclamation Success**

SG will conduct intensive monitoring after the first growing season in accordance with Colorado Discharge Permit System (CDPS) requirements. Monitoring will occur routinely thereafter to assess soil stability and revegetation success (as required by CDPS permit).

## **4.0 Monitoring**

SG will continue to monitor the distribution and density of noxious weeds for the life of the project. Surveys will be conducted concurrently with reclamation monitoring and will occur as early in the year as feasible to identify and control noxious weeds before they produce seed. Monitoring data collected will include the noxious weed species, location, and extent of infestation. At locations where new populations have been identified or pre-existing populations have expanded, SG will take action to eradicate the population or control their spread. The selection of control methods will be based on the available technology and information of the weed species.

ATTACHMENT VI

WILDLIFE AND VEGETATION ASSESSMENT REPORT



**ROCKY MOUNTAIN ECOLOGICAL SERVICES, INC.**  
NEPA•WILDLIFE•VEGETATION•WILDFIRE MITIGATION•WETLANDS•PLANNING



## Wildlife and Vegetation Assessment Report

### **McIntyre Flowback Pits 1 & 2**

Gunnison County, Colorado

Prepared for:

Gunnison County Planning Department

and

SG Interests I, Ltd.

February 2011

---

PO BOX 833 • GLENWOOD SPRINGS • COLORADO • 81602  
PHONE/FAX: (970) 945-9558 • CELL: (970) 309-4454  
EMAIL: EPETTERSON@RMES-INC.COM • WWW.RMES-INC.COM

## Table of Contents

1	PROJECT DESCRIPTION .....	2
1.1	Flowback Pit Operations .....	2
1.2	Access Roads .....	3
1.3	Flowback Pit Site Location .....	3
1.4	Flowback Pit Construction .....	3
1.5	Flowback Pit Reclamation .....	3
1.6	Figure 1: Project Area Location .....	5
1.7	Figure 2: McIntyre Flowback Pits 3 & 4 Location .....	6
2	EXISTING CONDITIONS .....	7
2.1	Vegetation and Habitat .....	7
2.1.1	Figure 3: Vegetation Communities around Pit Site .....	9
2.2	Species Observed in Project Area .....	10
3	WILDLIFE SPECIES CONSIDERED .....	11
3.1	Table 4: CDOW Species of Concern Considered/Evaluated .....	11
3.2	Table 5: USFWS Listed Species in Gunnison County .....	16
3.3	Species Excluded from Further Analysis .....	17
3.3.1	Northern Pocket Gopher .....	17
3.3.2	Colorado River Endangered Fish .....	17
3.3.3	Greenback Cutthroat Trout .....	18
4	WILDLIFE SPECIES CONSIDERED FOR FURTHER EVALUATION .....	21
4.1	Mule Deer .....	21
4.1.1	Impacts to Mule Deer and Habitat .....	23
4.1.2	Figure 4: Modeled Indirect Impact Area .....	27
4.2	Elk .....	28
4.2.1	Impacts to Elk and Habitat .....	34
4.2.2	Figure 4: Elk Winter Ranges .....	36
4.3	Moose .....	37
4.4	Black Bear .....	37
4.5	Brewers Sparrow .....	37
4.5.1	Impacts to Sparrow and Habitats .....	39
4.6	Summary of Impacts to Wildlife .....	39
5	RECOMMENDED IMPACT MINIMIZATION AND MITIGATIONS .....	40
5.1	Roads .....	40
5.2	Revegetation .....	40
5.3	Domestic Dogs .....	41
5.4	Bears .....	41
5.5	Other Recommendations .....	41
6	CDOW STANDARD OPERATING PROCEDURES .....	42
6.1	Figure 5: Wetland Areas around the McIntyre Flowback Pits 1 & 2 Location .....	50
7	APPENDIX I: QUALIFICATIONS OF REPORT AUTHOR .....	51
8	LITERATURE CITED & GENERAL REFERENCES .....	54



# 1 Project Description

Pursuant to Gunnison County's Temporary Regulations for Oil and Gas Operations, this Wildlife and Vegetation Assessment Report details the habitats and wildlife use patterns within the project area for SG Interests' proposed construction, operation, and maintenance of two temporary co-located pits, to be used for temporary storage of produced water, flowback water and fresh water for the next 15 years. At this site there will also be facilities for the operation of the pits (e.g., pumps, small shed, etc.). The site is called the McIntyre Flowback Pits 1 & 2 (referred to as "pits 1 & 2" or simply "pits" hereafter in this report). This report presents recommended minimization and mitigation measures as well as CDOW standard operating procedures currently under review by the COGCC. Per Gunnison County's Temporary Regulations for Oil and Gas Operations, this report was produced to fulfill the requirement of, "...the applicant shall provide an analysis of existing wildlife and sensitive wildlife habitat, an evaluation of the impacts of the Operation on wildlife and sensitive wildlife habitat, and proposed mitigation."

The two pits are located on Rock Creek Ranch (T11N, R90, Section 23 & 24) north of SG Interests' existing Fed 24-2 Water Disposal Well (WDW) site in Gunnison County, Colorado (see **Figures 1 & 2**). The surface area around the pits is owned privately. The location of the pits was determined by utilizing GIS in order to avoid steep slopes and wetlands to the extent practicable, while also incorporating the desires of the landowners, the Rock Creek Ranch and Aspen Leaf Ranch. The project would impact approximately 4 acres of sagebrush dominated vegetation types.

During an on-site review of the site, Mr. Kirk Madariaga, Paonia District Wildlife Manager, and Mr. Jon Holst, Energy Liaison with the Colorado Division of Wildlife, were consulted regarding the development of these pits. CDOW raised concerns about impacts to water quality and impacts from pipes laid on the surface during the summer months.

For a full description of this project through the Form 28 application to COGCC, which contains a full description of this facilities designs and plans please see Facility #421065 on the Colorado Oil and Gas Conservation Commission website at:

<http://ogccweblink.state.co.us/results.aspx?id=4210665>

## 1.1 Flowback Pit Operations

These pits would service many possible well drilling and frac'ing operations across the northern half of the Bull Mountain Unit. Water would be delivered to the flowback pits through surface poly pipe and the existing water pipeline network for temporary storage prior to and after frac'ing operations. Temporary water pumps would draw water from the flowback pits into the temporary surface pipes and existing buried water pipelines to pump water to well sites (in order to reduce truck-based fluid hauling). Water would be mixed with frac'ing sands and chemicals on a pad site prior to injection into a bore-hole. Some waters would be delivered to well site by truck.

After frac'ing operations for a well are complete, used frac fluids would be flowed back out of a well bore, filtered on the pad site, and then pumped into transportation trucks (to be trucked to the flowback pits) or pumped into an existing water pipeline and/or temporary surface poly pipe for delivery to a flowback pit for temporary storage. These used fluids could then be re-used for additional frac'ing operations during the same season.

Bird-netting would be stretched over the pits to prevent bird entry when pits contain fluids (pits would be drawn down during the winter months). Bird netting would be reinforced to withstand snow-loading and would be checked daily year-round. Year-round wildlife fencing and silt fencing would be



required around all flowback pits to prevent terrestrial wildlife entry into a full or empty flowback pit. Additionally, flowback pit sites would have a second set of fencing around the entire perimeter and be gated to prevent livestock entry onto the flowback pit site itself.

## 1.2 Access Roads

An existing improved haul road accesses the pit site, from Highway 133 and County Road 265 and up and around the Fed. 24-2 WDW pad site. No additional access to the pits location would be necessary. All traffic to the project area would use existing roads, including Highway 133 and County Road 265, as well as the unnamed roads on private lands owned by Rock Creek Ranch.

Construction is planned to begin in the late summer of 2011. Pit construction would likely take around two months. During this time, it is assumed that at least 20 vehicle trips per day would be generated, with most of these trips being from pickup trucks, but delivery of gravels, pit lining materials and other supplies could occur almost daily during this construction period. Any excess top soil or subsoils which do not fit within the confines of the project area may also be trucked off-site to a temporary storage facility on SG-owned lands for subsequent re-use.

Once operational, daily traffic to the pits would include water trucks and pickup trucks, and daily traffic from operations and inspections of the pits is likely. The post-construction traffic to the pit site would range from one to 20 vehicle trips per day.

## 1.3 Flowback Pit Site Location

McIntyre Pits 1 and 2 are located on Rock Creek Ranch, which was historically the McIntyre Ranch and is now owned by a subsidiary of SG Interests. The locations of the flowback pits were developed based on placement on acceptable topography (to reduce cut-and-fill needs), distance from surface waters, and proximity to other facilities and infrastructure (water pipelines and roads). Temporary surface poly piping would be used to transport water between the flowback pits and existing gathering system water pipelines, likely originating at the Fed. 24-2 WDW pad site as this site has existing water piping, storage and staging.

## 1.4 Flowback Pit Construction

Flowback pit construction would involve the salvaging of topsoils, the excavation of the pit itself, and compaction of the pit interior, impacting approximately 4 acres. Pits would then be lined with a primary and secondary liner and would have leak detectors. A drainage plan has also been prepared which prevents any waters from running onto, or out of the facility. The drainage plan was developed for a 100-year, 24-hour event and is available on the COGCC website (see above).

## 1.5 Flowback Pit Reclamation

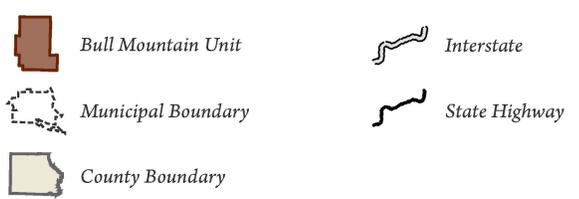
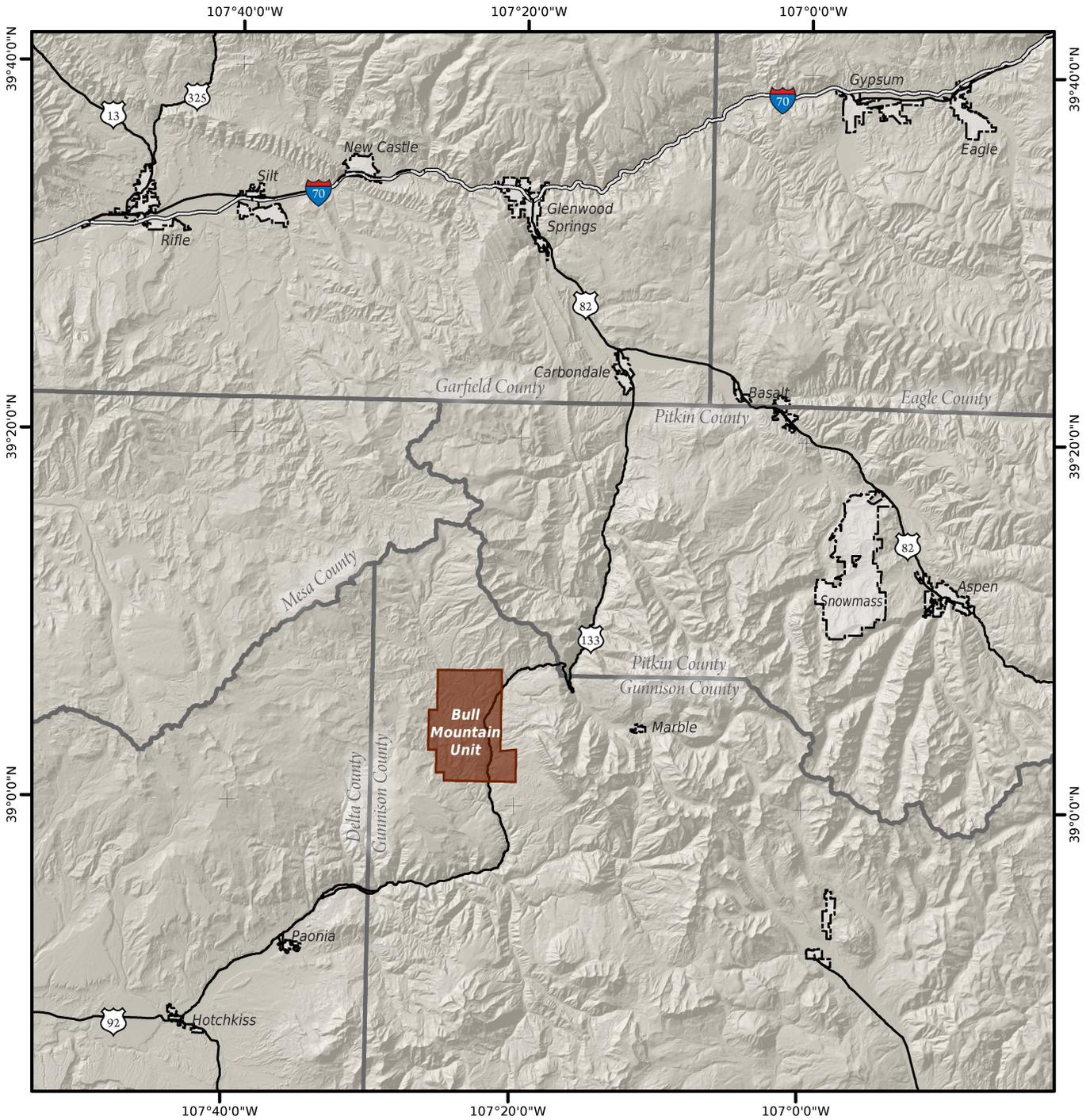
Upon completion of pit construction, the two pits and surrounding area would be cleared of all unused tubing, materials, trash, and debris. When pits are no longer needed for operations (in approximately 15 years) the reserve pits would be backfilled and reclaimed. Prior to backfilling the flowback pit, the fence surrounding the pits and all debris in the pits would be removed. Prior to any dirt work associated with flowback pit restoration, the flowback pits would be drained and subsoils would be tested. The pit liner would be cut off at the solids level, per the BLM Gold Book, and perforated prior to backfilling. After backfilling, salvaged topsoil would be placed on top of the backfill material. These temporarily disturbed areas would then be reseeded. Revegetation efforts would be considered satisfactory when soil erosion resulting from the operation has been stabilized, and a vegetation cover equal to 70% of pre-existing or seeded-in vegetation is re-established (both cover and diversity of species as evidenced by pre-and post construction photo-point monitoring



and/or vegetation plots/transects). SG would monitor interim and final reclamation progress at one, three, and five-year intervals.

If satisfactory reclamation progress is not being made at year one or year three monitoring intervals, or if final reclamation is not achieved by year five, additional reseeding would be required.





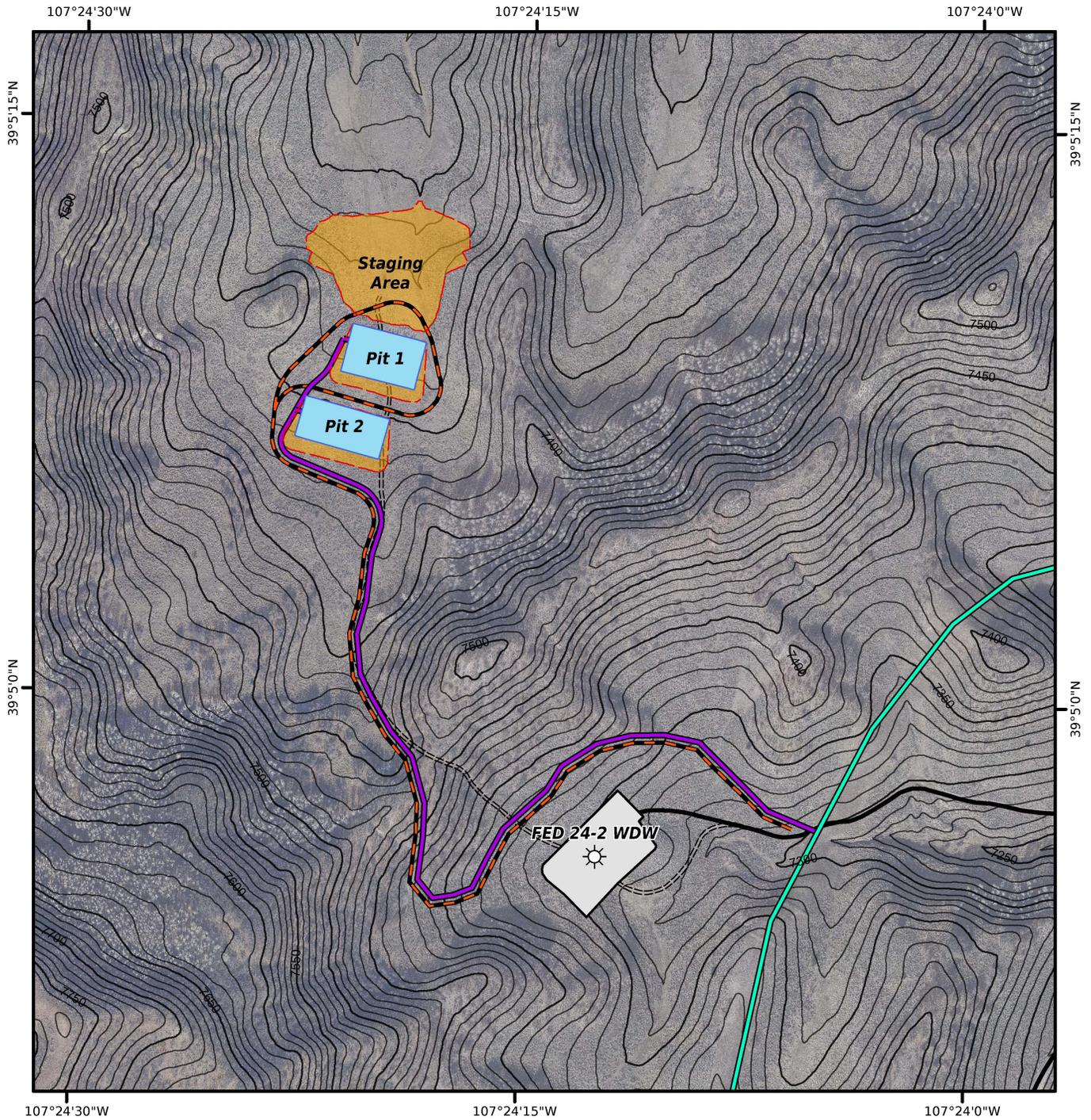
**FIGURE 1**  
**Bull Mountain Unit**  
**McIntyre Flowback Pits 1 & 2**  
*Regional Location Map*

0      5      10  
 Miles

Scale: 1" = 50,000'

Prepared By: PENDO solutions  
 Prepared For: SG Interests I, Ltd.  
 Date: February 2011

**Disclaimer:**  
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.



-  Proposed Pit
-  Proposed Pit Disturbance
-  Existing Well
-  Existing Pad

-  Proposed Access Road
-  Improved Dirt Road
-  Two-Track Road
-  Proposed Pipeline
-  Existing Gathering System

**FIGURE 2**  
**Bull Mountain Unit**  
**McIntyre Flowback Pits 1 & 2**  
 Site Layout

0      200      400      800  
 Feet

Scale: 1" = 400'


 Prepared By: PENDO solutions  
 Prepared For: SG Interests I, Ltd.  
 Date: February 2011

**Disclaimer:**  
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

## 2 Existing Conditions

The project area is privately owned. The land immediately around the pit site is owned by the Rock Creek Ranch, which is owned by SG Interests. This ranch supports a cow-calf leased grazing operation, with grazing occurring from May 15<sup>th</sup> through December. The maximum cow-calf pairs are 100 pairs on 2,500 acres of pasture. No cattle are grazed during the winter/spring months on the ranch. There is no irrigation or haying activities on the ranch.

Despite the extremely high grazing pressure in the past, the area has a very good distribution of grasses and forbs in the understory of the sagebrush and Gambel oak (*Quercus gambelii*) habitat types.

In the past few years, SG Interests and Gunnison Energy Corporation have begun to develop natural gas resources in the area, which has resulted in the improvement of existing roads and construction of pipeline corridors. Road improvements and increased traffic has had some direct and indirect impacts on wildlife habitat in this area. At this time, SG has completed 15 well pad sites in the Muddy Basin area including the improvement of existing roads and construction of pipeline corridors. The improvement of roads and increases of construction traffic in the greater area has had some direct and indirect impacts on wildlife habitat at this time, but given the low level of development at this time, widespread noticeable changes in wildlife use patterns is not likely.

The direct impact to wildlife habitat is most noticeable in the loss of sagebrush canopy cover along pipeline corridors. Although some sagebrush is beginning to reclaim these pipeline corridors, there is assumed to be a decrease in use of the existing pipeline corridors and nearby habitats by sagebrush obligates such as Brewer's sparrow. Other species decreased use of these pipeline corridors is also likely, but would be difficult to quantify given that many species in the area are not sagebrush habitat obligates. During road improvement, construction and other construction-related gas-field operations, road traffic levels are fairly high, and wildlife species have been observed to avoid lingering near high activity areas.

### 2.1 Vegetation and Habitat

Approximately 958 feet northeast of the edge of the northern pit, a wetland corridor extends down to an unnamed tributary to East Muddy Creek. This project would avoid any direct or indirect impacts to these wetlands.

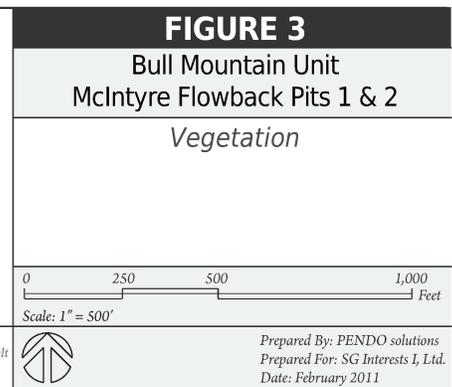
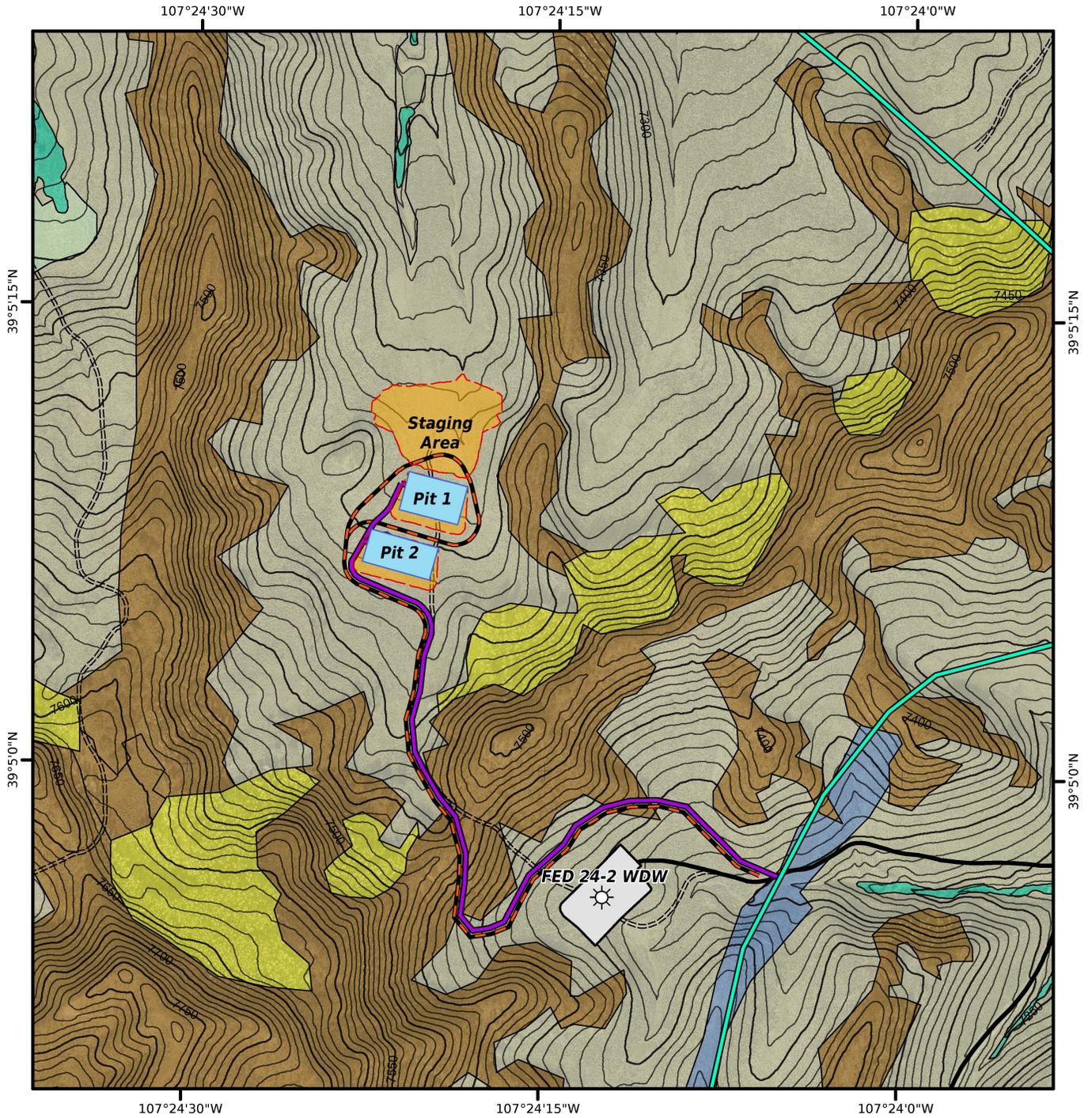
As part of SG Interests' Master Development Plan for the Bull Mountain Unit, quantitative vegetation transects were established throughout the unit in the dominant vegetation communities, including: Aspen, Mountain Shrub, Sagebrush and Meadow community types. Baseline vegetation transects were established to help set revegetation goals for vegetation cover as well as species composition, as per the guidance from CDOW. While vegetation transects were not placed at the McIntyre Pits 1 & 2 site, transects were placed in sagebrush communities immediately south of the pit location around the current Fed. 24-2 WDW location in similar habitats to areas around the pit site. Inferences from these transects can be made as to the existing conditions of the vegetation communities and habitat around the pit site and along the access road.

The average vegetation cover in the sagebrush transects was 55.3% +/- 12.5%, with bare soil averaging 14.7% +/- 20.2% and litter averaged 30% +/- 7.9%. Shrubs are the most common life form in the area comprising approximately 26% cover. Mountain sagebrush (*Artemisia tridentata var vaseyana*) accounted for 22% of that shrub cover or 85% of all shrub cover. Other shrubs present included Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), and snowberry (*Symphoricarpos rotundifolius*). Cool



season perennial grasses averaged 9% cover, which calculates to about 17% of the total vegetation cover. Dominant grasses include Kentucky bluegrass (*Poa pratensis*) and Thurber's fescue (*Festuca thurberi*). Perennial forb cover is relatively high averaging about 13% cover or about 24% of the total cover. Dominant forbs include western yarrow (*Achillea lanulosa*), lupine (*Lupinus argenteus*) and sandwort (*Arenaria kingi*). There are a few invasive and/or noxious plants in the area including musk thistle (*Carduus nutans*) and Japanese brome (*Bromus japonicus*).





**Disclaimer:**  
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

## 2.2 Species Observed in Project Area

While this is not a complete list, it does provide an accounting of the likely observable species in the area and further provides the typical species assemblages likely to occur in the area.

### Mammals

- Chipmunk  
(*Tamias minimus* & *T. umbrinus*)
- Golden-mantled ground squirrel  
(*Spermophilus lateralis*)
- Rock squirrel (*S. variegatus*)
- Wyoming ground squirrel (*S. elegans*)
- Coyote (*Canis latrans*)
- Red fox (*Vulpes vulpes*)
- Gray fox (*Urocyon cinereoargenteus*)
- Black bear (*Ursus americanus*)
- Bobcat\* (*Lynx rufus*)
- Mountain lion (*Felis concolor*)
- Moose (*Alces alces*)
- Elk (*Cervus elaphus*)
- Mule Deer (*Odocoileus hemionus*)
- Mountain cottontail (*Sylvilagus nuttallii*)
- Northern pocket gopher  
(*Thomomys talpoides fossor*)
- Various microtine rodents

### Birds

Potential bird species are not mentioned, as it is likely that many various bird species pass through this area.

- Violet-green swallow
- Tree swallow
- Dusky flycatcher
- MacGillivray's warbler
- Lesser goldfinch
- Western scrub jay
- Magpie
- Black-headed grosbeak

- Spotted-towhee
- Virginia's warbler
- Red-tailed hawk
- Green-tailed towhee
- House wren
- Golden eagle
- Robin
- Red-naped sapsucker
- Vesper sparrow
- Yellow-rumped warbler
- Blue-gray gnatcatcher
- Prairie falcon
- Townsend's solitaire
- Red-shafted flicker
- Downy woodpecker
- Hairy woodpecker
- Mourning dove
- Kestrel
- Black-capped chickadee
- Mountain chickadee
- Bushtit
- Mountain bluebird

### Herpetofauna

- Western chorus frog (*Pseudacris triseriata*)
- Northern leopard frog  
(*Lithobates pipiens*)
- Smooth green snake  
(*Liochlorophis vernalis*)
- Western terrestrial garter snake  
(*Thamnophis elegans*)



### 3 Wildlife Species Considered

Information on species status, distribution, and ecology was derived from USFWS recovery plans, Colorado Natural Heritage Program maps and reports, Colorado Division of Wildlife (CDOW) habitat mapping, various scientific studies and reports, and field reviews. The CDOW's list of Threatened, Endangered, and Species of Concern for Gunnison County was referenced to determine if any species had potential habitat on or adjacent to the property. Additionally, the US Fish and Wildlife list of Threatened and Endangered Species was used to determine if any species potentially occurred within or adjacent to the project site.

Research was conducted by Rocky Mountain Ecological Services, Inc. (RMES) to determine relevant habitat associations, life history traits, the rangewide or statewide distribution of known populations, and current status and trend of each species. Habitat surveys were conducted in the fall of 2009 by Eric Petterson, Principal Ecologist of RMES. Species in **Bold** have been selected for additional evaluation due to direct, indirect, or cumulative impacts.

#### 3.1 Table 4: CDOW Species of Concern Considered/Evaluated

Species	Occurrence	Habitat Association	Potential Habitat in Project Area?	Surveys Warranted?
<b>BIRDS</b>				
American peregrine falcon ( <i>Falco peregrinus anatum</i> )	Widespread throughout Colorado	Nest on cliffs, forage over forests and shrublands	No	No
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Widespread throughout Colorado	Forages by roosting along larger rivers, stream and waterbodies, also around big game winter ranges	No	No
Burrowing owl ( <i>Athene cunicularia</i> )	Mostly found in eastern grasslands, some occurrence on west slope	Arid grassland and shrublands	No	No
Ferruginous hawk ( <i>Buteo regalis</i> )	Migrant in Colorado on large grassland areas	Grasslands and semi-desert shrublands, winter resident	No	No
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Widespread historic records on forest; Currently in northern Summit Co. and adjacent to Eagle and HX Dist in Routt and northern Eagle County	Large sagebrush shrublands	No	No
Least Tern ( <i>Sterna antillarum</i> )	Larger Reservoirs in southeast Colorado	Large waterbodies	No	No
Lesser Prairie Chicken ( <i>Tympanuchus pallidicinctus</i> )	Extreme southeastern Colorado	Great plains grasslands and shrublands	No	No
Long-billed curlew ( <i>Numenius americanus</i> )	Larger reservoirs and river systems in Colorado, mostly on eastern plains	Beaches, reservoirs	No	No
Mexican Spotted Owl ( <i>Strix occidentalis lucida</i> )	Southwestern Colorado and east of Colorado Springs	Canyons with mixed conifer old growth	No	No
Mountain Plover ( <i>Charadrius montanus</i> )	Eastern plains of Colorado	Summers on eastern plains in native short-grass steppe, winters in S. California & Mexico	No	No
Piping Plover ( <i>Charadrius melodus</i> )	Larger rivers on eastern plains of Colorado	Sandbars and beaches along larger rivers in eastern Colorado	No	No



Species	Occurrence	Habitat Association	Potential Habitat in Project Area?	Surveys Warranted?
Plains Sharp-Tailed Grouse ( <i>Tympanuchus phasianellus</i> )	Extreme northeastern Colorado	Grasslands, river canyons	No	No
Southwestern Willow Flycatcher ( <i>Empidonax traillii extimus</i> )	Extreme southwest Colorado, and Rio Grande River	Brushy riparian habitats at lower elevations	No	No
Western Snowy Plover ( <i>Charadrius alexandrinus</i> )	Extreme eastern Colorado	Sandy beaches and barrens	No	No
Western Yellow-Billed cuckoo ( <i>Coccyzus americanus</i> )	North Fork of Gunnison, Colorado, Dolores, Yampa and Rio Grande rivers	Large cottonwood stands along larger rivers	No	No
Whooping crane ( <i>Grus americana</i> )	Winters in southern US, summers in Canada, migrates through Colorado	Bosques in winter, marshes, ponds, bogs in Canada & Wisconsin	No	No
<b>MAMMALS</b>				
<b>Gray wolf (<i>Canis lupus</i>)</b>	<b>Northern Rockies</b>	<b>Woodlands, plains, mountains</b>	<b>Yes</b>	<b>No</b>
Spotted bat ( <i>Euderma maculatum</i> )	Low elevations on western slope, highest record was one on south rim of Glenwood Canyon	Montane forests, P-J open semidesert shrublands; rocky cliffs for roosts	No	No
Black-footed ferret ( <i>Mustela nigripes</i> )	Rio Blanco & Moffat Counties	Reintroduced to Rio Blanco County, in white-tailed prairie dog colony	No	No
Preble's meadow jumping mouse ( <i>Zapus hudsonius preblei</i> )	Front range of Colorado north into Wyoming	Foothills riparian areas and along front range streams	No	No
Lynx ( <i>Lynx canadensis</i> )	High mountain areas with large expanses of conifer forests in Colorado	Spruce/fir and lodgepole pine forests, sometimes aspen, shrublands	No	No
Wolverine ( <i>Gulo gulo</i> )	Historical documentation several locations in Colorado-likely extinct	Boreal forests and tundra- large ungulate populations important	No	No
River otter ( <i>Lontra canadensis</i> )	Widespread in larger montane river systems	Riparian habitats that traverse a variety of other habitats. Mainly larger river systems.	No	No
Kit fox ( <i>Vulpes macrotis</i> )	Colorado and Lower Gunnison River valleys	Desert shrublands near Delta	No	No
<b>Townsend's Big-eared bat (<i>Plecotus townsendii townsendii</i>)</b>	<b>Documented in Colorado in several cave locations</b>	<b>Semidesert shrublands, P-J, open montane forests; caves and abandoned mine roosts.</b>	<b>Yes</b>	<b>No</b>
Black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	Eastern plains of Colorado	Shortgrass steppe	No	No
Botta's pocket gopher ( <i>Thomomys bottae</i> )	Lower elevations along Utah border and Arkansas Valley	Sandy soils of valley bottom riparian areas	No	No
<b>Northern pocket gopher (<i>Thomomys talpoides</i>)</b>	<b>Common above 5,000 feet elevation</b>	<b>Many various habitat associations</b>	<b>Yes</b>	<b>No</b>
Swift fox ( <i>Vulpes velox</i> )	Eastern plains of Colorado	Shortgrass prairie and riparian woodlands on plains	No	No



Species	Occurrence	Habitat Association	Potential Habitat in Project Area?	Surveys Warranted?
<b>AMPHIBIANS</b>				
Boreal toad ( <i>Anaxyrus boreas boreas</i> )	Small disjunct populations across higher elevations in the State	Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, and lakes.	No	No
Couch's spadefoot toad ( <i>Scaphiopus couchii</i> )	Arkansas River valley on eastern plains	Shortgrass prairie, mostly fossorial	No	No
Great plains narrowmouth toad ( <i>Gastrophryne olivacea</i> )	Baca and Las Animas Counties	Rock-rimmed canyons with grasses	No	No
Northern cricket frog ( <i>Acris crepitans</i> )	Eastern plains of Colorado	Muddy, sandy gently sloping wetland edges	No	No
Northern leopard frog ( <i>Lithobates pipiens</i> )	Common throughout mid-and lower-elevations of Colorado	Wet meadows, marshes, ponds, beaver ponds, streams.	No	No
Plains leopard frog ( <i>Rana blairi</i> )	Eastern plains	Ponds, marshes, wetlands on eastern plains	No	No
Wood frog ( <i>Rana sylvatica</i> )	Northern Larimer, Jackson Counties, and Grand County	Montane ponds in forests	No	No
<b>FISHES</b>				
Arkansas darter ( <i>Etheostoma cragini</i> )	Arkansas River drainage in eastern Colorado	Clear, shallow, spring-fed streams with moderate current and lots of rooted aquatic vegetation	No	No
Bonytail ( <i>Gila elegans</i> )	No known populations remain in Colorado	Large, swift-flowing waters of the Colorado River system	No	No
Brassy minnow ( <i>Hybognathus kankinsoni</i> )	Native to Republican and South Platte basins, possibly in Colorado River drainage	Moderately clear tributary streams with sand or gravel bottoms, also in small ponds	No	No
Colorado pikeminnow ( <i>Ptychocheilus lucius</i> )	Colorado, Dolores, Green, Gunnison, San Juan, White and Yampa	Large, swift-flowing rivers that are seasonally turbid with warm backwaters	No	No
Colorado River cutthroat trout ( <i>Oncorhynchus clarkii pleuriticus</i> )	Widespread localized reaches	Headwater streams and lakes	No	No
Roundtail chub ( <i>Gila robusta</i> )	Colorado River through Glenwood Canyon, downstream on White River, Milk and Divide Creeks	Larger rivers of Colorado River basin	No	No
Common shiner ( <i>Luxilus cornutus</i> )	South Platte basin	Lakes, rivers and streams, most common in the pools of streams and small rivers	No	No
Flathead chub ( <i>Platygobio gracilis</i> )	Arkansas River basin	Main branches of turbid streams and rivers, fast currents with sand or gravel substrates	No	No
Greenback cutthroat trout ( <i>Oncorhynchus clarkia stomias</i> )	Front Range mountain streams, recently on west slope	Montane clear, cold streams	No	No



Species	Occurrence	Habitat Association	Potential Habitat in Project Area?	Surveys Warranted?
Humpback chub ( <i>Gila cypha</i> )	Green, Yampa and Colorado Rivers	Pools and eddies in areas of fast-flowing, deep, turbid water, often associated with cliffs and boulders	No	No
Iowa darter ( <i>Etheostoma exile</i> )	Northeastern plains streams, Eleven mile Reservoir & Shadow Mountain Resrv.	Clear, slow flowing streams and lakes with undercut banks and some vegetation or algal mat	No	No
Lake Chub ( <i>Conesius plumbeus</i> )	Boulder Creek and Cache la Poudre River	Lakes and large pools	No	No
Mountain sucker ( <i>Catostomus platyrhynchus</i> )	Numerous small to medium streams below 8600' elevation.	Throughout west on both sides of Continental Divide-prefer clear cold creeks and small to medium rivers with rubble, gravel, or sand substrate	No	No
Northern redbelly dace ( <i>Phoxinus eos</i> )	South Platte basin	Small slow-flowing streams and connected lakes with vegetation	No	No
Plains minnow ( <i>Hybognathus placitus</i> )	Arkansas & South Platte basins	Main channels of rivers, also in pools below diversion projects	No	No
Plains orangethroat darter ( <i>Etheostoma spectabile</i> )	Arikaree and Republican River drainages	Small, clear, spring-fed streams with sand, gravel or rocky bottoms and no silt	No	No
Razorback sucker ( <i>Xyrauchen texanus</i> )	Lower Yampa and lower Colorado Rivers	Deep, clear to turbid waters of large rivers and reservoirs, with silt, mud, or gravel substrate. Quite, soft-bottom river backwaters	No	No
Rio Grande Chub ( <i>Gila pandora</i> )	Rio Grande basin	Pools and streams with gravel substrate and overhanging banks and brush	No	No
Rio Grande cutthroat trout ( <i>Oncorhynchus clarkia virginalis</i> )	Rio Grande basin	Clear, cold, swift moving creeks and streams in montane environs	No	NO
Rio Grande sucker ( <i>Catostomas plebeius</i> )	Rio Grande basin	Stream obligate using slow moving reaches	No	No
Southern redbelly dace ( <i>Phoxinus erythrogaster</i> )	Arkansas River basin	small, low-order streams where the habitat includes permanent springs, seeps, and mats of vegetation	No	No
Suckermouth minnow ( <i>Phenacobius mirabilis</i> )	South Platte and Arkansas River drainages	Shallow, clear riffles with sand and gravel substrates	No	No
Stonecat ( <i>Noturus flavus</i> )	South Platte and Republican basins	Fast riffles and runs in streams with sand or gravel bottoms with some rocks- found under rocks and debris	No	No
<b>REPTILES</b>				
Triploid Checkered whiptail ( <i>Cnemidophorus neotesselatus</i> )	Arkansas drainage in Eastern Colorado	Hillsides, arroyos and canyons associated w/ Arkansas River valley	No	No
Midget faded rattlesnake ( <i>Crotalus viridis concolor</i> )	Lower elevations in western Colorado	Semi-arid shrublands, rocky arroyos, max. elevation around 5,000'	No	No
Longnose leopard lizard ( <i>Gambelia wislizenii</i> )	Extreme western Colorado, along Utah boarder	Flat or gently sloping shrublands & desert plains	No	No



Species	Occurrence	Habitat Association	Potential Habitat in Project Area?	Surveys Warranted?
Yellow mud turtle ( <i>Kinosternon flavescens</i> )	Republican, Arkansas and Cimarron River drainages below 5,000'	Permanent and intermittent streams, ponds, isolated ponds and surrounding grasslands	No	No
Common king snake ( <i>Lampropeltis getula</i> )	Extreme southwest and southeast Colorado	Low elevation, semi desert shrublands, and around waterways below 5,000'	No	No
Texas blind snake ( <i>Leptotyphlops dulcis</i> )	Extreme southeast Colorado	Canyon sideslopes in shrubby, arid habitats	No	No
Texas horned lizard ( <i>Phrynosoma cornutum</i> )	Southeast Colorado	Plains and grasslands, with large patches of bare ground	No	No
Roundtail horned lizard ( <i>Phrynosoma modestum</i> )	One cluster of records from Otero County	Short grass steppe with large patches of bare ground	No	No
Common garter snake ( <i>Thamnophis sirtalis</i> )	Northern Front Range	Marshes, ponds and edges of streams	No	No
Massasagua ( <i>Sistrurus catenatus</i> )	Southeast Colorado below 5,500'	Dry plains grasslands and sandhills	No	No
<b>MOLLUSKS</b>				
Cylindrical papershell ( <i>Anodontooides ferussacianus</i> )	Boulder County	Headwater creeks and streams with silty/muddy substrates	No	No



### 3.2 Table 5: USFWS Listed Species in Gunnison County

Listed or candidate wildlife, fish and plant species that were considered and evaluated for this assessment include those identified by the U.S. Fish and Wildlife Service as potentially occurring in Gunnison County (accessed January 31, 2011). Species in **Bold** have been selected for additional evaluation due to direct, indirect or cumulative impacts.

Species & Status	Occurrence	Habitat Association	Species Range or Habitat in Project Area? (Yes/No)	Surveys Conducted
<b>MAMMALS</b>				
Canada lynx (FT) <i>(Lynx canadensis)</i>	High mountain areas with large expanses of conifer forests in Colorado	Spruce/fir forests, sometimes aspen, lodgepole & shrublands	No	No
Gunnison's prairie dog (FC) <i>(Cynomys gunnisoni)</i>	Southcentral Colorado and northern New Mexico	Montane and high desert grasslands & shrublands	No	No
<b>BIRDS</b>				
Yellow-billed cuckoo (FC) <i>(Coccyzus americanus)</i>	North Fork of Gunnison, Colorado, Dolores, Yampa and Rio Grande rivers	Large cottonwood stands along larger rivers	No	No
<b>FISHES</b>				
Colorado pikeminnow (FE) <i>(Ptychocheilus lucius)</i>	Occurs in the mainstem of the Colorado, and Yampa Rivers in Colorado, downstream through Utah	Colorado River; Green River, Lower Yampa & White Rivers	No	No
Razorback sucker (FE) <i>(Xyrauchen texanus)</i>	Occurs in the mainstem of the Colorado, and Yampa Rivers in Colorado, downstream through Utah	Colorado River; Green River, Lower Yampa & White Rivers	No	No
Humpback chub (FE) <i>(Gila cypha)</i>	Occurs in the mainstem of the Colorado, and Yampa Rivers in Colorado, downstream through Utah	Colorado River; Green River, Lower Yampa & White Rivers	No	No
Bonytail chub (FE) <i>(Gila elegans)</i>	Occurs in the mainstem of the Colorado, and Yampa Rivers in Colorado, downstream through Utah	Colorado River; Green River, Lower Yampa & White Rivers	No	No
<b>Greenback cutthroat trout (FT)</b> <b><i>(Oncorhynchus clarki stomias)</i></b>	<b>Recent genetic testing has indicated that this species occurs on the western side of the Continental Divide</b>	<b>Clear, cold running mountain streams</b>	<b>No</b>	<b>No</b>
<b>INSECTS</b>				
Uncompahgre fritillary butterfly (FC) <i>(Boloria acrocnema)</i>	Alpine habitats in San Juan Mountains of southwestern Colorado	Needs snow willow ( <i>Salix nivalis</i> ) habitats above treeline	No	No
† Status Key: FE= Federally Endangered: FT= Federally Threatened: FC= Federal Candidate Species				



### 3.3 Species Excluded from Further Analysis

If there is no potential habitat in the project area and no surveys were warranted, the species were excluded from further analysis (except the northern pocket gopher, greenback cutthroat trout and the four endangered Colorado River fish – see below). Some species with potential habitat in the project area were also excluded from further analysis; the reasons for dismissing them are presented here.

**Greater sandhill crane** (State Species of Concern [SC]) has been observed to migrate through the area in the spring and fall, and intermittently stop in meadows and riparian areas to feed during their migration. This project would have no significant impact to sandhill crane's ability to migrate through the area due to the insignificant impacts to potential surface use in the greater area.

There are currently no **gray wolf** populations within the state. In 2009 a confirmed sighting of a female wolf occurred in northern Colorado, but she was shot and killed. As gray wolves do not occur in the area of northern Gunnison County, and this project would have no direct impact on wolves (as wolves do not occur in the area) nor would this project affect their ability to disperse into Colorado, this project would have no impact to gray wolves.

This project does not occur near mines or caves suitable for roosting by **Townsend's big-eared bat**, and this project would not impact bats ability to forage or procure insects. This project would have no impact on Townsend's big-eared bats.

Due to a lack of suitable habitat in the project area, and/or a lack of direct or indirect impacts, the following species listed for protection under the Endangered Species Act: **Canada lynx, Gunnison's prairie dog, yellow-billed cuckoo, Colorado River endangered fish, greenback cutthroat trout and Uncompahgre fritillary butterfly** have been excluded from further analysis.

The following section details considerations for the northern pocket gopher (SC), the Colorado River Endangered (FE) fish, and greenback cutthroat trout (FI).

#### 3.3.1 Northern Pocket Gopher

The northern pocket gopher (*Thomomys talpoides*) is a small fossorial mammal that is common throughout central and western Colorado, mostly in more mesic areas above 5,000 feet in elevation, being most abundant in montane and subalpine meadow ecosystems. This gopher can be found in drier sites as well. Its range extends south into mountainous areas in New Mexico and north across mountainous northern states and into southern Canada. They are wide ranging, and are found in agricultural and pasture lands, semidesert shrublands, grasslands, mountain parks and forests, and up into alpine tundra ecosystems (Armstrong 1972, Hansen and Reid 1973, Miller 1964, Fitzgerald et al. 1994).

While CDOW lists northern pocket gopher as a sensitive species, their primary interest is in three subspecies: *T. t. marotis*, *T. t. rostralis* and *T. t. retrorsus* (D. Neubaum, CDOW pers. comm. 2/4/2010). These subspecies are of interest due to their narrow ranges along the Front Range of Colorado, where much of their habitats have been impacted by residential and commercial development. These subspecies do not occur in Gunnison County or in Western Slope (the subspecies indigenous to the area is actually *T. t. fossor*), and this project would have no impact on their habitats or populations, and this species is therefore dropped from further consideration.

#### 3.3.2 Colorado River Endangered Fish

The four endangered fish species existing in the Colorado River are generally found below the Rifle/DeBeque area, near Grand Junction and further downstream. Some fish may be found along



lower reaches of the Gunnison River, from Delta downstream towards Grand Junction. The US Fish and Wildlife Service lists the humpback chub (*Gila cypha*), bonytail chub (*G. elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*) as endangered under the Endangered Species Act. Endemic to the Colorado River Basin, populations of these fishes had declined throughout their historic range due largely to habitat loss or habitat degradation (mainly through dams and water diversions) and introduction of competitive and predatory nonnative fish species. The Upper Colorado River Endangered Fish Recovery Implementation Program was established in 1988 with the goal of recovering these four endangered fishes in the face of current and foreseeable future water depletions from the Upper Colorado River Basin.

This project will have no net water depletions associated with construction of the pits as produced water would be utilized to fill the pits and for frac'ing. If produced water is not utilized, and irrigation water is utilized, SG Interests has a water augmentation plan in place redirecting agricultural waters for instream flow; therefore the project would have no indirect impact on water resources or habitats required by Colorado Pikeminnow, razorback sucker, humpback chub, and bonytail chub. There has not been consultation with US Fish and Wildlife Service over this augmentation plan. SG Interests is implementing Best Management Practices and a Stormwater Management Plan that is designed to minimize sedimentation. Based on the distance from the pits to drainages, sedimentation delivery to tributaries is highly unlikely, and further the project is sufficiently distanced from the Gunnison and Colorado Rivers and occupied habitats that incidental sediment delivery to tributaries of occupied habitats would be adequately diluted with background waters so that no realized sedimentation would have any measureable impacts to the fish. Therefore, this project would have no impact on these species or their habitats. As a result, these species are dropped from further detailed consideration in this report. The US Fish and Wildlife Service has determined that any water depletion from a system, even if mitigated through augmentation will result in a "likely to adversely affect" determination. Augmentation and signing the Recovery Agreement is considered compensatory mitigation, and SG Interests has signed the Recovery Agreement (2008).

### 3.3.3 Greenback Cutthroat Trout

The greenback cutthroat trout is currently listed as Federally Threatened under the Endangered Species Act. Since 2006, a number of genetic studies have been undertaken to try to determine the genetic relationships between greenback (*Onchorhynchus clarkii stomias*), Colorado River (*Onchorhynchus clarkii pleuriticus*), and Rio Grande cutthroat trout (*Onchorhynchus clarkii virginalis*) (Mitton et al. 2006, Metcalf et al. 2007, Metcalf 2007, Rogers 2008). Mitton et al. (2006) found all 3 subspecies to be closely related, and did not believe that any of them warranted subspecific designation. Their studies revealed two divergent lineages within the ranges of greenback and Colorado River cutthroat trout, which they determined corresponded with the two described subspecies. These lineages are known as GB (greenback) and CR (Colorado River). Subsequent sampling and analysis found that of 45 assumed Colorado River cutthroat populations, 12 were assigned to lineage GB. In addition, of 12 assumed greenback populations present on the east side of the Continental Divide, 11 were assigned to the CR lineage (Rogers 2008). Since publication of Rogers (2008), additional sampling has identified additional lineage GB populations on the west slope of Colorado and in eastern Utah (Rosenlund 2009, as cited by USFWS 2009, CDOW 2010).

Although once abundant, greenback cutthroat trout numbers declined in the late 1800's due to loss of habitat caused by mining and agriculture, water diversion projects, over-harvest, and the introduction of non-native trout species. The greenback was extirpated from most of its range east of the Divide by the early 1900's and Greene (1937) considered the subspecies extinct. In 1973 two small populations were



confirmed that represented approximately 2,000 greenbacks in 4.6 km of stream. Obviously, populations in western Colorado were not known about during this period.

The greenback cutthroat trout was subsequently classified as “endangered” in 1973, and downlisted to “threatened” in 1978. As a result of recovery efforts, captive broodstocks were established, non-native trout were removed from suitable habitat, and greenbacks were reintroduced to small isolated streams that were naturally fishless or that had been chemically treated to eliminate nonnative trout. About 60 transplants of greenbacks have been made in both the South Platte and Arkansas drainages.

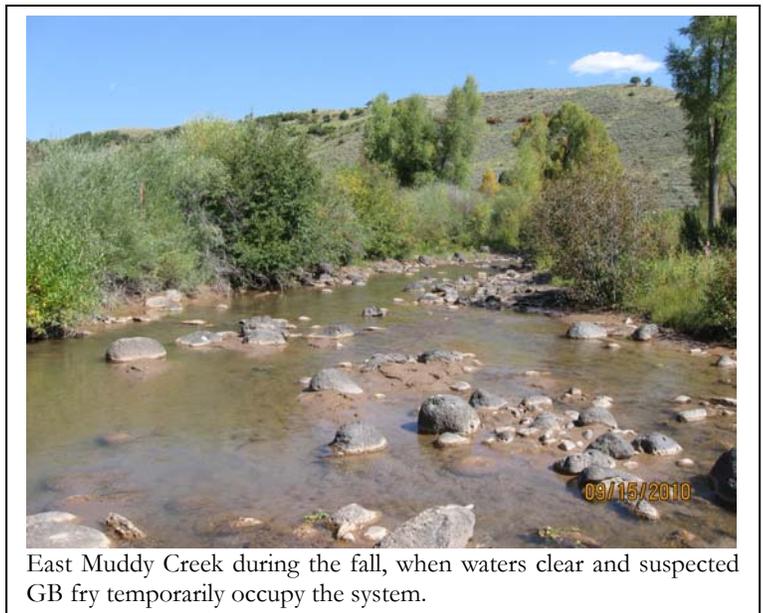
Several restoration projects that attempted to restore greenback cutthroat trout in small streams after chemical treatment to remove brook trout (*Salvelinus fontinalis*) failed because not all the brook trout were eliminated. Even if a few brook trout survive the chemical treatment, within a few years the brook trout rapidly repopulate the stream and eliminate the newly established greenback population (Behnke and Tomelleri 2002, Guenther-Gloss pers. comm. 1999, Hirsch pers. comm. 2010).

### Environmental Baseline

Genetic testing through the AFLP process has determined that populations of cutthroat trout in Roberts Creek and Dyke Creek (both creeks are tributaries in the Muddy Creek basin) are not CR lineages as previously thought, but are actually GB lineages (C. Speas USFS pers. comm. 1/26/2010, D. Kowalski CDOW 2010). The Roberts Creek population is 96% genetically pure GB and the Dyke Creek population is 98% genetically pure GB, and any population that is at shows at least 80% GB genetic purity would be subject to the requirements of the Endangered Species Act (C. Speas pers. comm. 1/26/2010). Cutthroat trout populations in Henderson Creek have not undergone the AFLP genetic testing process, but mitochondrial DNA testing has shown them to have GB lineage. In 2010 CDOW sampled native cutthroat trout in Roberts Creek again (Kowalski pers. comm. 2010), but it is assumed GB likely occurred throughout the Muddy Creek drainage. It is unknown if Drift Creek contains GB. The competitive brook trout are known to also occur within the Muddy Creek drainage.

As GB occurs within the East Muddy Creek drainage, it is assumed that GB may occur at times in East Muddy Creek and nearby tributaries at least sometimes seasonally. Salmonid fry were observed in East Muddy Creek in September and October 2010 by the author and Steve Moore (Regulatory Biologist with the US Army Corps of Engineers), and BLM has indicated that their biologists have observed fry in East Muddy Creek in the fall.

The banks of East Muddy Creek are dominated by willow, narrowleaf cottonwood and river birch. The substrate has high levels of embeddedness, with larger cobbles and boulders protruding. East Muddy Creek drains the 2 mile-wide Muddy Slide area approximately 8 river miles upstream from the project site. This natural slide occurred hundreds, or perhaps thousands of years ago, and now delivers aeolian deposited silts into the river system. Every spring and through much of the summer, the snowmelt and rain-swollen East Muddy Creek is extremely turbid, to the point that it is considered non-fish bearing. This turbidity has effectively



isolated many of the tributaries from each other for much of the year, and is likely why relict populations of GB continue to persist in the headwaters. However, as evidenced by site visits and consultations with area biologists, salmonid fry (the exact species is unknown) are commonly observed in East Muddy Creek during the late summer and fall months. As native cutthroat trout fry move down-stream after emergence (Young 1995), it is reasonable to assume that some of the fry observed in East Muddy Creek are likely from Roberts, Henderson, Drift, the Clear Fork and other fish-bearing tributaries.

Because of the massive sediment loading and flashy silt-laden events which typify East Muddy Creek, aquatic macroinvertebrates likely have low or depressed species diversity and density, and sediment sensitive taxa, including species in the Orders of Ephemeroptera (mayflies), Trichoptera (caddisflies) and Plecoptera (stoneflies) likely have very low densities in East Muddy Creek (Suttle et al. 2004). Despite this, during the fall season the creek may be occupied by GB fry at least until the onset of winter snows and subsequent melting on east facing slopes, at which time the creek once again would become very turbid, and hostile to GB fry. Because of this, the US Fish and Wildlife Service and US Forest Service consider any greenback cutthroat trout occurring within

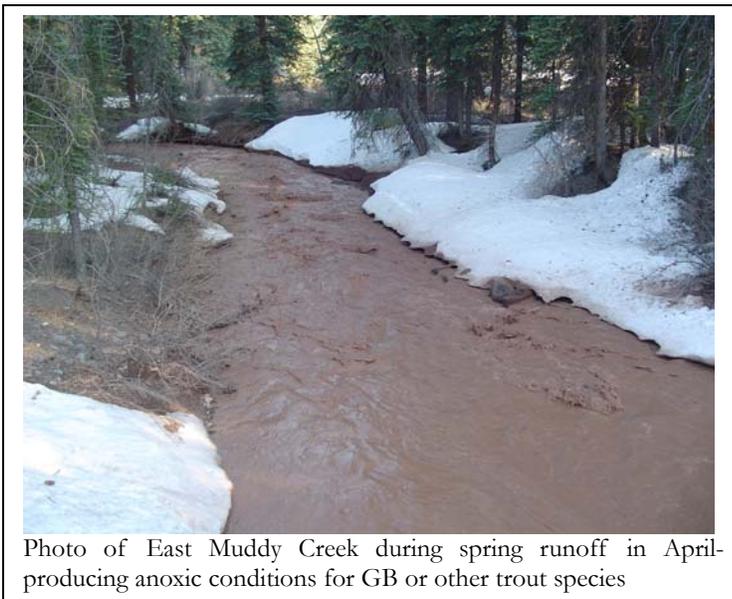


Photo of East Muddy Creek during spring runoff in April-producing anoxic conditions for GB or other trout species

East Muddy Creek as outside of a conservation population (which occurs in suitable habitats in upstream tributaries), and therefore these agency biologists do not consider East Muddy Creek a fish-bearing stream. Therefore because of the hostile conditions of East Muddy Creek for much of the year, these fish are effectively lost from the population (P. Gelatt, USFWS pers. comm. 10/9/2010).

Because East Muddy Creek is not considered viable habitat for GB, the McIntyre Flowback Pits project would have no indirect impacts on this species through either possible siltation or other foreseeable impacts. Obviously, if a major breach or spill occurred it would be treated as an emergency and cleaned up, and such a spill could indeed have impacts to water quality in downstream aquatic habitats. However, given the safety redundancies in the construction plans, one must assume that a massive breach or leak in the flowback pits that could reach East Muddy Creek is not a relatively foreseeable occurrence. As SG is planning to use produced water (as a byproduct from existing natural gas wells) for frac'ing, there should be no dewatering impacts to area hydrology. If agricultural waters are used to fill the pits, then SG would utilize their water augmentation plan through releases from Bainard Reservoir to offset any decreases of instream flows through East Muddy Creek and downstream reaches. As the McIntyre Flowback Pits 1 & 2 is not a federal project, a Biological Assessment and section 7 consultation with the US Fish and Wildlife Service (USFWS) is not appropriate at this time. However, SG Interests, through their consultant (RMES) has informally consulted with the USFWS on GB and their occurrence within the East Muddy Creek drainage (P. Gelatt USFWS pers. comm. 10/9/2010). Currently the USFWS is only concerned with potential impacts to GB in suitable and occupied tributary streams in headwaters to Muddy Creek. The mainstem of East Muddy Creek is not



considered to be a viable fishery by the USFWS, and activities which may impact East Muddy Creek do not need to be consulted on with the USFWS with regards to GB at this time.

## 4 Wildlife Species Considered for Further Evaluation

Species chosen for detailed impacts analysis have high biological, political, and public interest, and/or regulatory guidance. Although they are not on the CDOW list of species of concern, mule deer, elk, moose and black bear are in the Natural Diversity Information Source (NDIS) database and were considered relevant and appropriate for analysis for this project. Individual wildlife species and groups not specifically mentioned in this assessment are not “insignificant,” they are just not presently at issues because the limited extent of the proposed project would avoid or minimally impact these unmentioned species and their habitats.

The following wildlife species either had habitat on or adjacent to the project location and/or they may be affected by the proposed project:

- Mule Deer
- Elk
- Moose
- Black Bear
- Brewer’s Sparrow

### 4.1 Mule Deer

Mule deer (*Odocoileus hemionus*) occur throughout Colorado, and are relatively common in the west. Colorado’s subspecies (*O. h. hemionus*) is the largest subspecies. Males can weigh up to 440lbs., but the average size of males is closer to 155 lbs. Does are fully grown at 2 years of age, but buck can continue to grow until they are 9 or 10 years of age.

Male antlers branch equally (dichotomously) to form four main tines although many individuals have more than that number. Young males have either simple spikes or a single fork near the tips of the antlers. The antlers are shed annually in late February or March.

During the early 1900s populations of mule deer in Colorado were greatly depleted because of market hunting. The meat was used by newly arrived settlers, and was also shipped east. The advent of a conservation ethic and a Department of Fish and Game (now called Colorado Division of Wildlife) led to recovery of this species in the State. Although mule deer populations across the western US declined in the 1950s through the 1970s, mule deer populations in Colorado still increased. In the late 1990s through 2007, mule deer populations across the state have shown a downward population trend. This is partly due to chronic wasting disease and habitat loss generally in winter ranges.

Mule deer occupy all ecosystems in Colorado from grasslands to alpine tundra, but they reach their greatest densities in shrublands on rough, broken terrain, which provides abundant browse and cover. Their wide distribution and general adaptability make for broad diets. However, deer are considered to be browsers (primarily eating shrubs and twigs), as opposed to grazers (which eat mostly grasses). In Colorado the winter diets of mule deer consist of browse from a variety of trees, shrubs (74%) and forbs (15%). In the spring, browse contributes 49% of the diet, and forbs and grasses make up about 50%. Summer diets are about 50% browse, and forb consumption increases to 46%. Browse use increases in the fall to 60%, and forb consumption decreases to 30% (Fitzgerald et al. 1994). Several



studies in Colorado have indicated that diets containing 30% or more of sagebrush (*Artemisia* spp.) or juniper (*Sabina* spp.) reduce rumen microbes and are therefore deleterious (Carpenter 1976, Nagy and Tengerdy 1967, Nagy et al. 1964, Alldredge et al. 1974). Mule deer can consume no more than about 1% of available sagebrush forage on western rangelands without deleterious effects. When heavy snows bury grasses and forbs on such rangelands and force mule deer to consume high amounts of sage and juniper, mortality rates increase due to malnutrition.

Mule deer seem to be able to survive without free water except in very arid environments. However, they do drink available water and also eat snow (Fitzgerald et al. 1994).

Mule deer are mostly nocturnal or crepuscular in the warmer months, becoming more diurnal during winter. Activity depends on local conditions including temperature, season, weather, and forage. Over much of Colorado the species is migratory, summering at higher elevations and moving downslope to winter ranges. In some areas of Colorado migrations may be over 55 miles, but in most areas migrations are closer to around 5 miles. The routes followed are often habitual, and deer show a certain amount of fidelity to these routes. Snow depths of 8 to 16 inches appear to trigger fall movements, and depths over 3 feet prevent use of an area (Loveless 1967). In some areas of northwestern Colorado mule deer begin migrations before snow accumulation (Garrott et al. 1987, as cited in Fitzgerald et al. 1994). They suggest that better quality forage on winter range at that time of year triggers the movements. Throughout the winter mule deer will move about winter ranges, depending on snowfall and snow-melting events, but generally linger on more south facing slopes where snow depth is shallowest.

Spring and summer ranges are most typically mosaics of meadows, aspen (*Populus tremuloides*) woodlands, alpine tundra and Krummholz, or montane forest edges. Montane forests and pinyon-juniper woodlands with good shrubby understories are often favored winter ranges. Because of mule deer's seasonal migratory movements, estimation of home ranges is somewhat difficult; however deer appear to be seasonally sedentary, staying within areas of 100 to 2,200 acres. In areas where the animals do not migrate significant distances, annual home ranges are 1,700 acres to 5,400 acres (Mackie et al. 1982). Migrating individuals show strong winter and summer range site fidelity.

In Colorado, mule deer breed in November and December (Fitzgerald et al. 1994). Females are in estrus for just a few hours but will repeat estrous cycles every three to four weeks until bred. About 70% of breeding occurs in a 20-day span in some populations. Does short estrus cycles can explain observations of fawning occurring from late May through late July in Colorado. Yearling females typically produce a single fawn and older females in good condition produce twins. Fawns are precocial at birth and typically weigh about 9 lbs. They can consume vegetation at two to three weeks of age but are not weaned until fall. Sex ratios at birth favor males slightly, but with increasing age females commonly exceed males by ratios of 2:1, 5:1 or higher (Fitzgerald et al. 1994). Does are solitary during fawning but soon form groups of yearlings, does, and fawns when the young a few months old.

Mortality in mule deer varies with age class and region. Fawn annual mortality varies from 27% in Utah to 67% in Colorado in one study (Anderson and Bowden 1977). Fawn mortality is due to predation and starvation. Larger fawns are more likely to survive and smaller fawns are more likely to starve. However, predators will likely take any size of fawn. Winter mortality of fawns may approach 75% annually. Mortality of adult deer is mostly from hunting and starvation (Carpenter 1976). Predators include coyotes, bobcats, golden eagles, mountain lions, black bears, and domestic dogs. Locally, coyote and mountain lion predation on fawns can account for significant mortality within populations. Mule deer may survive up to 20 years in the wild but such longevity is very rare, and in most populations 28



to 43% of the population is replaced each year. About half of this mortality is from fawns, 15% is from does, and 35% is from bucks.

### **Project Area Conditions**

The project area is not located within any mule deer winter ranges (including Mule Deer Winter Range, Winter Concentration area, or Severe Winter Range), as mapped by CDOW NDIS data. Some deer activity on south facing slopes is likely during the early winter and early spring months, but most deer leave the area during the winter months. Deer use of the site occurs during the summer months, and the site is mapped as Mule Deer Summer Range by CDOW NDIS mapping. Some fawning likely occurs in the general area, given the suitable Gambel oak habitats (which provide good cover), and abundant water sources from frequent stock tanks and creeks. During the winter, deer mainly use pinyon/juniper habitats further south in lower elevations, but some winter use may still occur in the area of the pipeline during mild winters. Deer use within nearby irrigated meadows is likely infrequent due to a lack of cover and the presence of domestic sheep and sheep dogs.

During the fall months and during hunting seasons, deer likely congregate in these middle-elevation areas typified by the pits area, and likely use some of the private ranches in the area as “hunting refuges”. Although some guided and permitted hunting occurs within private lands in the area, hunting pressure is significantly less than on adjacent public lands. “Hunting refuges” can create problems with illegal hunting within ranches, and can increase the likelihood of poaching. Management of deer herd sizes by CDOW is also difficult when deer utilize sizable hunting refuges. During the fall hunters were known to be legally guided on Rock Creek Ranch. Continued hunting of the area will be important to keep deer herds moving off of the ranches onto public lands, and will help with managing deer herd sizes.

At this time, mule deer are continuing to pass through the greater area, and yet are also likely modifying daytime movement patterns around the more active wells and roads to avoid human activities and traffic. It is documented that deer stress levels, and thus overall fitness, is compromised when mule deer utilize winter range habitats near and within areas of significant natural gas development (Sawyer et al 2006). However, relevant research on how mule deer utilize summer ranges around natural gas extraction activities is not available. At this time, the level of natural gas development is less than 1% of the area within the Bull Mountain Unit, and even less when considering areas outside the Unit, and while there is likely some changes in mule deer behavior in the area around wells and some of the more heavily used roads, detectable impacts to deer population levels in the area is unlikely.

#### **4.1.1 Impacts to Mule Deer and Habitat**

The largest impact to mule deer from the development of the flowback pits will come from decreased use of otherwise available habitats around the road and the pit site itself (indirect impacts) through avoidance due to high levels of traffic, noise and human activities. While the 4-acre footprint of the site is large, there are ample habitats in the surrounding area for deer at this time. The period of greatest impact to mule deer would be during the snow-free months when the pits are being used during SG’s active drilling season (SG would draw down the pits during the winter months, but would still check the site once a day to ensure bird-netting is functional, etc.) which will coincide with summer foraging seasons. However, simply stating that observed behavior responses may occur does very little to quantify potential impacts to fitness (i.e. fawn:doe ratios, population levels, survival). Further, as pre-development population status and population parameters are not available within the Muddy Creek basin, and the ability to track changes in deer populations solely from natural gas development activities would be difficult at best, quantifying the impacts to populations and deer fitness is not possible at this



time. Therefore, indirect impact determinations are based on available literature and professional opinion.

A quantitatively determined area was modeled in GIS to approximate indirect impacts and loss of habitat effectiveness around the access road and pad site for activities associated with the construction, and summertime use phases. This information should be relevant for both mule deer and elk. The impact area was delineated assuming that summertime vegetation screening and topographical screening would prevent deer (and elk) from seeing visual cues and hearing audible cues loud enough that would elicit a behavioral response (i.e. fleeing, avoidance, to reductions in foraging or resting). We used the following buffer distances for the vegetation types found along the access road and around the pad site:

1. Sagebrush buffer- 700-foot buffer
2. Oakbrush buffer- 400-feet
3. Conifer buffer- 400-feet
4. Aspen buffer- 400-feet

As part of SG Interests' Bull Mountain Unit Master Development Plan (in process), major vegetation types were mapped based on high-resolution aerial photo interpretation and ground-truthing exercises. Vegetation data was then entered into a GIS database. We then utilized a GIS-based visual model using an observer eye-level of 4-feet (approximately the eye-height of a deer or elk), and modeled what an animal could see given topographical constraints along the access road and pad site. The furthest extent we chose for visual modeling was 700-feet, which is likely the maximum distance a deer or elk would be able to see in the vegetation present in the project area, as well as elicit a behavioral response (i.e. flee, change movement trajectories, cease eating, etc.). For example, the presence of a ridgeline or other topographical feature may shorten the buffered distance, given that the animal could not see over the bare-ground, and areas with dense vegetation would have shorter buffered areas, when compared to an area adjacent to a meadow with no topographical features shielding the view of an animal. Of note, is that the 400-foot buffers for oakbrush, conifer forests, and aspen were assumed to be a conservative average estimation; it is unlikely that wildlife could see 400 feet through such vegetation, but they may hear noises associated with construction that may elicit a behavioral response.

This modeled impact area came out to be approximately 105.4 acres (see **Figure 4**). Within this 105.4 acre area, mule deer would likely not linger for long periods of time, would have decreased foraging, and would generally avoid the area due to heavy traffic during construction. Because of topographical relief and vegetation screening, this impact area is much less than what is observed in published research studies in the flat, low-vegetation height (sagebrush) habitats in central Wyoming (see Sawyer et al 2008). The impact area is assuming that if mule deer (and elk) cannot see human activities and vehicle traffic, and rig/vehicle noises are muffled by vegetation and topography, mule deer would be more likely to utilize habitats closer to pads and roads compared to sites in sagebrush steppe habitats. In consultations with research biologist H. Sawyer (pers. comm. 12/31/2009, WEST, Inc.), he commented that in his gas field study sites in Wyoming, winters are very cold and snow depths limit deer to almost exclusively a low-nutrition sagebrush diet. Wintering deer are very sedentary, and any elicited movements due to visual or audio cues can have significant impacts on deer metabolic budgets. Conversely in habitats around the flowback pits, summer range foraging opportunities are abundant, and topography and vegetative screening would likely reduce the severity of impacts compared to impacts on wintering deer. While it is very likely that some level of mule deer activity will continue to occur within the 105.4 acre area around the access road and pad site during the construction periods, overall modified use patterns and avoidance of the area is likely. The low level of gas field



development and abundance of summer range habitat for deer in the area is not likely having measureable impacts to deer at this time, but there is likely some threshold at which deer utilization of the area for summer range or transitional range would occur and deer use of the area would decrease. Without formal studies, it would be impossible to quantify the resultant impacts on deer fitness.

In **Figure 4**, we also showed a ¼ mile buffer to indicate a rough area showing where beyond which noise and human activities would not have realized impacts to deer, elk and moose utilizing the general area. This area totaled 295 acres.

Direct loss of habitat (as opposed to indirect impacts) would come from the development of the access road and new construction of the pits and topsoil stockpiling. Based on the current land uses of the area, there are many areas available for deer summertime use, and displaced deer would likely have ample available habitat in the area. Deer population levels would not show changes from this project, but the development of the pits will incrementally add to direct habitat loss from roads and pads in the area, and will incrementally add to indirect impacts from increased traffic and human activity in the area.

As fawning does are very sensitive to human activities, there is less of a likelihood that does would fawn near the McIntyre pits. Cumulatively, domestic sheep grazing and associated guard dogs occur on adjacent private lands. These guard dogs have been observed to hunt for wildlife prey species around flocks, and deer would likely avoid the general area when sheep bands are nearby.

Traffic along access roads during the construction season and subsequent summer operation seasons will also likely reduce deer use of the travel route through CR 265 to Highway 133. Again, although deer uses of this area will likely continue reduced activity is likely especially during daylight hours. Modified behaviors, indirect loss of habitat, and other impacts to deer along Highway 133 are already assumed be occurring due to the 1,400 vehicles per day that utilize this stretch of highway (CDOT 2010). Post-construction, daily truck traffic to the flowback pits is assumed to be highly variable. During operations involving filling the pits or removing fluids from the pits traffic may range from one to 20 vehicle trips per day; however, during periods when the pits are not being used, it is likely that one vehicle trip a day may occur.

### **Summary of Impacts to Mule Deer**

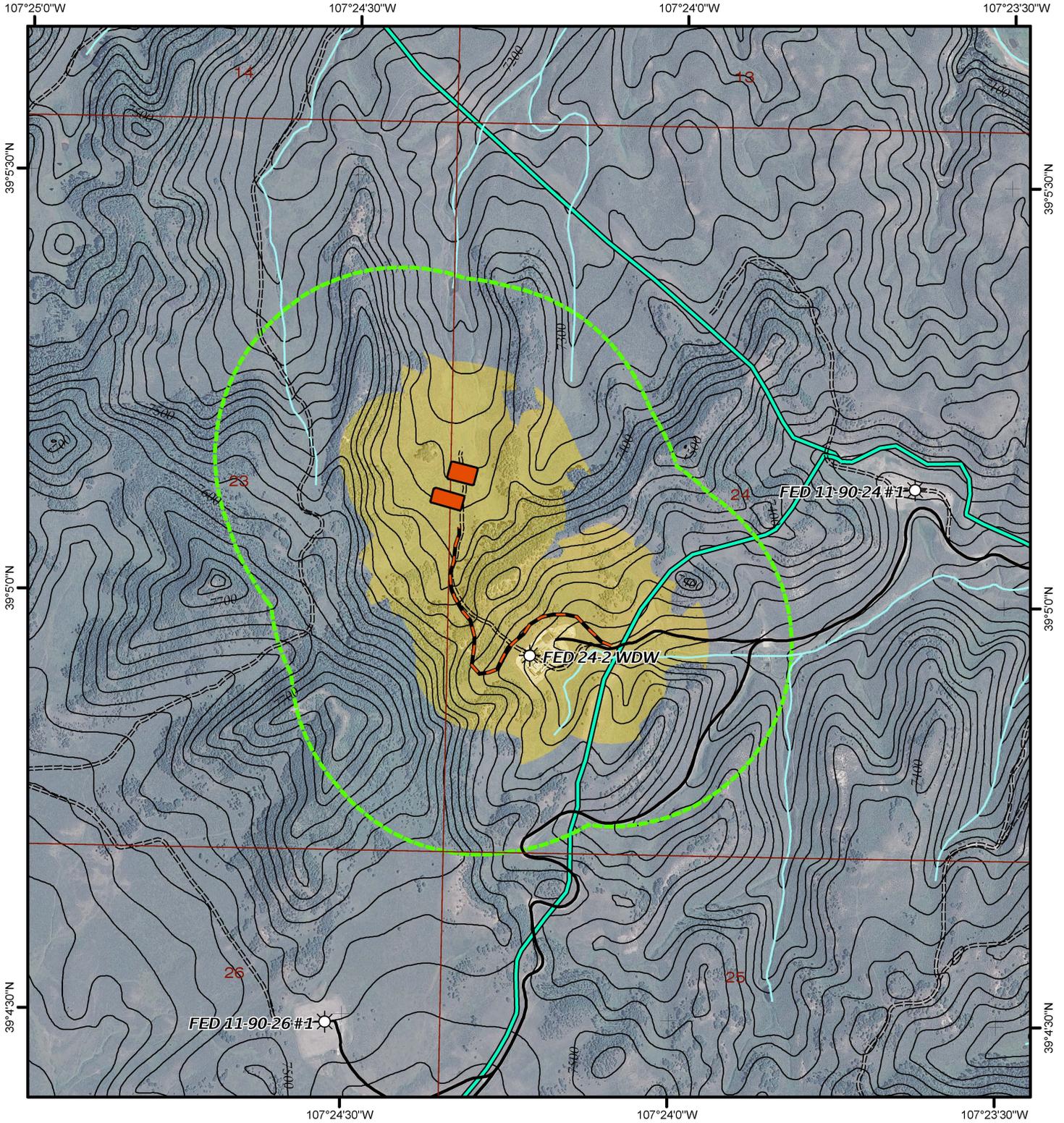
The development of the McIntyre flowback pits will create a direct loss of approximately 4 acres of sagebrush meadows. Although some reclaiming of the roadsides and topsoil stockpiles will occur, full mule deer use of these area is unlikely for the next 15 years, but reclamation is still very important as it would help reduce indirect impacts through buffering and production of available forage. Traffic and human activities in the vicinity of the flowback pits would have an indirect impact reducing the ability for mule deer to utilize habitats around the site, especially during the construction phase and periods of high activities around the pits.

Mule deer will continue to use, migrate through, and may even been seen very close to the pits and access roads, but existing literature indicates that mule deer utilization of habitats near pad sites and roads decreases after development, and although this area is much different than Wyoming sagebrush steppe, one can use professional judgment to assume that a behavioral response would still occur. As this site is not in mule deer winter range, there should be no impact to wintering deer. Given the size of the project, its location, and surrounding habitats, this project would have minor impacts on mule deer and their summer-range habitat availability. Cumulatively, foreseeable development of the Bull Mountain Unit and gas fields in the Muddy Creek basin would have significantly more extensive direct and indirect impacts to mule deer and their use of otherwise available habitat in the area, especially during the construction and drilling phases.



There are recommendations to minimize other stresses or negative impacts to deer moving through and using the area. These recommendations are listed further below in this document, but the most important mitigation would be the use of water disposal pipelines and other methods to reduce traffic and human activities on the access roads and around the pits. The use of mufflers on pumps would also allow for more deer use of adjacent habitats. The proposal includes a perimeter livestock fence, and a year-round interior wildlife fence and bird-netting around all flowback pits to prevent terrestrial wildlife entry into a full or drawn-down flowback pit. As a result, no direct impacts to mule deer are anticipated from the pits themselves. Closing and reclamation of pits in a timely manner would also help reduce long-term cumulative impacts to deer.





**LEGEND**

-  Proposed Flowback Pit
-  Existing Well
-  Existing Gathering System
-  Noise/Visual Impact
-  1/4 Mile Disturbance Buffer
-  Township Boundary
-  Section Boundary
-  Stream
-  Proposed Access Road
-  State Highway
-  Improved Road
-  Unimproved Road

**Note:**

**Disclaimer:**  
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

**FIGURE 4**  
 McIntyre Flowback Pits 1 & 2  
 Indirect Impacts

0      750      1,500      3,000

Scale: 1" = 1,500'



Prepared By: PENDO solutions  
 Prepared For: SG Interests, Ltd.  
 Contour Interval: 25 ft.

## 4.2 Elk

### Species Ecology Synopsis

In the southern Rocky Mountains, as elsewhere in North America, elk (*Cervus elaphus*) are often associated with edge (ecotone) habitats where forested and meadow/shrubland systems are intermingled. During much of the year, elk are typically found near edges where forests grow adjacent to parks, meadows, or alpine tundra (Skovlin 1982, Fitzgerald et al. 1994). During the summer months, elk may spend significant amounts of time feeding in open alpine environments above treeline. Use of alpine habitats is thought to be associated with the cooler temperatures, persistent snowbanks, and breezy conditions which keep bothersome flying insects to a minimum (Adams 1982, Lyon and Ward 1982, authors pers. obs.). Similarly, during the winter months elk may congregate in sagebrush expanses, pinyon and juniper woodlands, irrigated meadows, and other open habitats which are significant distances from forested cover (Lyon and Ward 1982). While habitats used by elk vary considerably over the course of a year, elk tend to inhabit higher elevations during the summer months and migrate to lower elevations and/or south facing slopes during the winter months. On winter ranges elk form mixed herds of bulls, cows and calves (Fitzgerald et al. 1994), but in the more developed areas in Colorado bulls may avoid traditional winter ranges which are near high-use roads, homes, and other human developments (B. Andree, CDOW pers. comm. 2006, Dodd et al. 2007).

Generally, elk feed at twilight and at night, but they readily forage and disperse through the daylight hours (Fitzgerald et al. 1994). Most elk mortality is due to predation on calves, hunting and winter starvation (Fitzgerald et al. 1994). Localized mortality from vehicle strikes may also produce noticeable impacts on herds where traffic exceeds 1,000 vehicles per day, and traffic travels at high speeds (Gagnon et al. 2007).

Elk are generalist feeders, but usually prefer to graze on grasses, grass-like plants, and forbs during the non-winter months (Nelson and Leege 1982, Fitzgerald et al. 1984). The specific diet for elk in a particular locality is largely determined by the season and palatability of available forage plants (Nelson and Leege 1982). In Colorado, elk show a clear preference for grasses and grass-like plants (Hoover and Wills 1984). Browse species can also vary by site and palatability of available plants. Shrubs, deciduous trees, and sometimes conifers compose much of the winter diet when snow depth limits access to grasses, sedges, and forbs (Nelson and Leege 1982).

On Colorado winter ranges, Gambel oak, aspen, serviceberry, sagebrush (*Artemisia* spp.), and snowberry (*Symphoricarpos* spp.) are the major browse species used by elk (Hoover and Wills 1984). Locally heavy elk feeding on aspen bark during the winter and spring can be very significant, and can leave long-lasting impacts on aspens stands. In heavily used aspen stands, "barking" may scar the trunks of nearly all aspens to a height of 6-feet or more (Fitzgerald et al 1984). The scarred trunks can be invaded by aspen pathogens which may stunt tree growth, cause dieback, or hasten the decline of aspens from pathological stressors (Hart and Hart 2001). Elk can also browse young aspen shoots to a degree that the aspen stand fails to successfully regenerate (Suzuki 1997).

In Colorado, the breeding season for elk begins in early September, peaks during the last week of September and the first week of October, and is over by late October (Boyd and Ryland 1971, Fitzgerald et al. 1994). Mature bulls compete for females and father harems of adult cows and calves. Most of the breeding is done by bulls three years of age or older (Freddy et al. 1986). Other bulls continually attempt to usurp cows in the harem, and as a result of this constant activity of protecting the harem, herd bulls lose considerable weight during this time of the year. Harem size typically ranges between 15 and 20 cows (Boyd 1978, Thomas and Towell 1982). Elk have a 240-255 day



gestation period and most calves are born in late May or early June, with the peak of calving from June 4-6 (Freddy 1987). Yearling cows can breed in Colorado, but less than 1/3 of them are successful at producing offspring that survive into the fall, compared to about 3/4 of adult cows (Freddy 1987).

Calving grounds are carefully selected by the cows and are generally in locations where cover, forage, and water are in close proximity (Seidel 1977). Calving sites occur in the middle to upper portions of summer range and often occur in the same general area each year. Although selected sites are used for a brief period in the spring there are some key characteristics required for optimum reproductive success. Sites must provide security from harassment and be within or adjacent to high-quality summer range. They can occur in any forest type on gentle slopes, given that cover, food and water are nearby. The aspen habitat association is often regarded as the most productive type for elk reproduction in Colorado; however, in areas with a paucity of widespread aspen stands the use of Krummholz stand types can be significantly utilized. Cows with calves isolate themselves from the herd for two to three weeks or until the calves are large enough to travel. Cows and calves then begin to gather into larger nursery groups. By mid-July, herds of several hundred animals are common on some summer ranges.

A concern for both state (CDOW) and federal (US Forest Service) biologists is the lack of elk security habitat in summer ranges, primarily where high road densities have led to changes in elk distribution and/or herd composition (Andree pers. comm. 2006-2007, Giezentanner 2004). Elk commonly retreat to secure areas, defined as areas of cover away from roads, during periods of stress (Hillis et al, 1991). Stress on elk often begins prior to summer archery hunting seasons and continues through fall hunting seasons, though general dispersed recreation may also cause stress (DeVergie 1989, Morrison 1992, Phillips 1998, Phillips and Alldredge 2000, D. Freddy, as cited in Giezentanner 2004). This can cause a shift in elk use away from the Forest and other public lands, where high road densities may occur, to private lands where access is controlled. Elk studies have consistently demonstrated that they avoid roads (Lyon 1979, 1983, Thomas et al. 1979, Lyon and Jensen 1980, Christensen et al. 1993, and Rowland et al. 2000). The amount of vehicular travel on roads appears to be the key factor that causes avoidance. A study by Lyon (1983) demonstrated that elk habitat effectiveness decreases by approximately 25% with a density of one mile of road per square mile of land, and by at least 50% with a density of 2 miles of road per square mile. The same research concluded that the best method of maximizing elk habitat effectiveness is by closing and obliterating roads. Recent research by Gagnon (et al. 2007) has indicated that consistent road traffic in repeatable patterns throughout the day allow some herds to become accustomed to higher levels of traffic. They further conclude that low-level use of roads, as is common on USFS system and unpaved dirt roads, is too erratic and unpredictable to allow for elk habituation and accustomization.

Near the Towns of Silt, Rifle and Parachute, development comes in the form of natural gas exploration and extraction, which includes new roads, pipelines, well pads and other infrastructure (laydown yards, compressor stations, etc.). The oil and gas boom increased the demand for housing in these areas, but the recent slowdown in gas development has tempered the demand for housing. Some development of commercial space and for golf courses also occurs in these areas. The increase of residential traffic around subdivisions and county roads further fragments and reduces the viability of remaining winter ranges. Human activity patterns around homes and pet dogs commonly reduce availability of remaining habitats around homesites and within subdivisions. The result of this development is that winter range is a significant limitation to long-term herd health, and elk are being forced onto smaller areas of winter range, where overgrazing or damage to agricultural fields can occur.

The CDOW manages elk to provide healthy populations capable of supporting both significant harvests and opportunities for nonconsumptive uses (Freddy 1993). Elk license sales account for a large percentage of all license revenue, indicating the importance of elk herd management and



population viability in the state. Indeed, unique to CDOW is the fact that their budget does not come from any type of significant State tax revenues, but is supported primarily through license fees.

The shift of elk use from public to private lands during and following hunting seasons constrains efforts to achieve desired hunter harvest. Constraints on harvests limit CDOW's abilities to meet harvest objectives.

Although Colorado elk populations may be near all time high levels, elk habitat is diminishing as a result of increasing land development (Freddy et al. 1993). Even non-consumptive recreational activities may be detrimental to elk, causing animals to alter behavior patterns, expend energy to avoid humans, and possibly abandoning preferred habitats (Knight and Cole 1995, Morrison 1992, Phillips and Alldredge 2000).

### **Population Trend and Abundance for Elk**

Elk were nearly exterminated in Colorado in the late 1800's due to market hunting pressures and subsistence hunting from Colorado's mining communities (Fitzgerald et al. 1994). Overexploitation reduced the native population in the State to as few as 500 individuals. The re-establishment of elk, where current herd numbers are believed to be larger in Colorado than any other state, is one of the noteworthy wildlife conservation achievements.

Regarding elk abundance, the NDIS website (Species Occurrence and Abundance- 2008), identifies Rocky Mountain elk as "abundant" in areas around the Bull Mountain Unit. A classification of "abundant" for mammals denotes "observed daily; >100/day in appropriate season and habitat, OR the dominant species (in terms of number) collected by standard techniques in appropriate season and habitat."

Elk are habitat generalists and their populations respond to climate-induced factors (e.g. forage availability and quality). Hunter harvest also has a strong influence on populations. Where elk populations remain high or exceed objectives, this can often be attributed to a failure in providing secure habitat on public lands where hunter harvest can be used to maintain populations within objectives. Hunter harvest on private lands is typically more limited, as either access fees or landowner preferences restrict the number of hunters and the gender of elk harvested. Region-wide, most elk populations are at or above herd management objectives, which are established within an estimated carrying capacity and balanced with hunter demand and other resource objectives, though data in this objective-setting process is typically limited and many assumptions are made. Over much of the southern Rockies, elk populations may be controlled more by severe winter conditions than any other factor, including hunting harvest (DeVergie 1989, Giezentanner 2004, 2008).

A guiding assumption of elk management on public lands in western Colorado is that as security habitat increases, hunter success and harvest will increase allowing improved maintenance of population objectives (Lyon and Christensen 2002) and bull:cow ratios (Leptich and Zager 1991) resulting in improved hunter opportunity (Giezentanner 2004, 2008). This assumption is based on the premise that secure habitat on public lands will facilitate harvest by keeping elk off private lands for a greater portion of the hunting season. Additionally, tracking the calf:cow ratio will provide information about the overall health of the elk population. Overall body condition for cow elk relates directly to the reproductive potential of the population (D. Freddy, as cited in Giezentanner 2004). As stress increases, overall health and resulting body condition decreases for cows resulting in a lowering of calf production and/or survival. As security habitat conditions increase (or are maintained), cow body condition will also increase resulting in increased calf survival and a higher calf:cow ratio for the



population. Conversely, when habitat security conditions decrease, cow body condition decreases with a resultant reduction in calf production and survival.

Past management emphasis frequently focused on increasing elk populations, but current emphasis is how to maintain their habitats and populations with regard to ecosystem processes (e.g. habitat diversity) and human uses of the summer, transition, and winter ranges (Skovlin et al 2002).

Additionally, current emphasis on some National Forest lands is to extend the season of use (later in the fall and earlier in the spring) on National Forest lands to reduce conflicts with elk use on private lands.

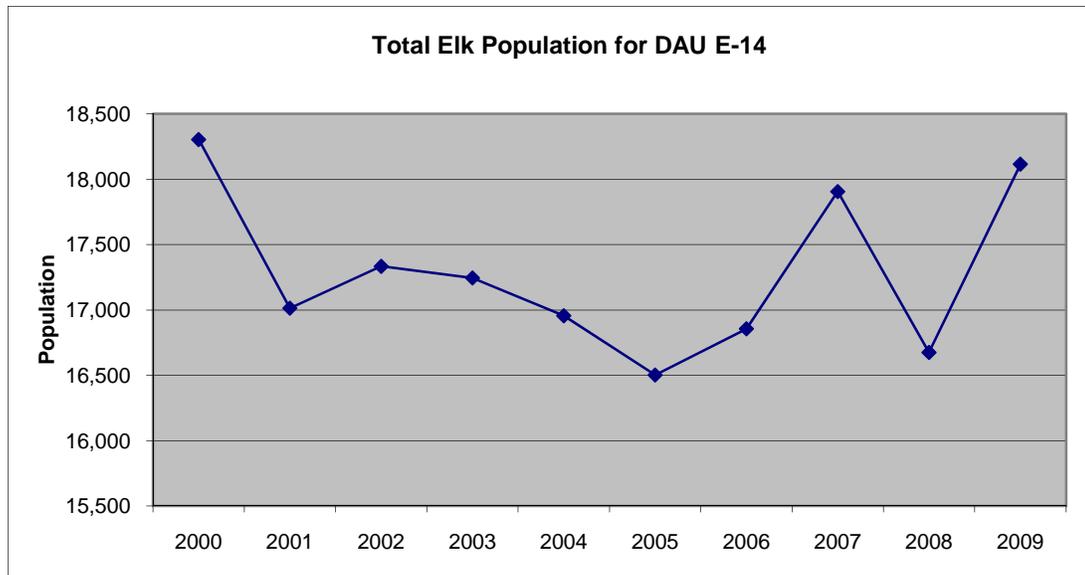
The CDOW estimates elk herd numbers annually by monitoring hunter kill success and by conducting winter aerial counts. From the monitoring conducted by CDOW, and the herd size estimates subsequently derived, it is clear that elk populations are at high numbers locally and throughout Colorado. Data Analysis Units (DAUs) are used to manage herds of big game animals, are generally geographically discrete, and, for the most part, contain discrete big game populations. DAUs are designed to support and accomplish the objective of the CDOW's Long Range Plan and meet the public's objectives for big game management.

### **Current Elk Use of Area**

The McIntyre Pits 3 & 4 area is mapped as elk Winter Range, Severe Winter Range and a Winter Concentration Area by CDOW, and is located in DAU E-14. This is a large DAU of 2,477 square miles. The majority of the DAU is located on private lands, BLM lands, and the Grand Mesa, Uncompahgre & Gunnison National Forest (GMUG). Only 20% of the winter range for this herd is found on NFS lands (both White River NF and GMUG). The majority of that is on the GMUG. The remainder is on BLM (25%) and private (54%).

Computer modeling data as well as other information, including harvest and aerial surveys, show that the elk herd has increased significantly since the 1950's (CDOW 2009, Giezentanner 2008). The overall population of this herd increased from approximately 2,500 animals in the early 1950s to an estimated high of over 21,000 in 1990 and 1991. The 10 year average from 2000 to 2009 is approximately 17,291. The post-hunt estimate for 2009 was 18,116. As with many of the other elk herds in western Colorado, the CDOW initiated intensive management in the mid-1990s according to the approved DAU plan to reduce herds that were over the population objectives.



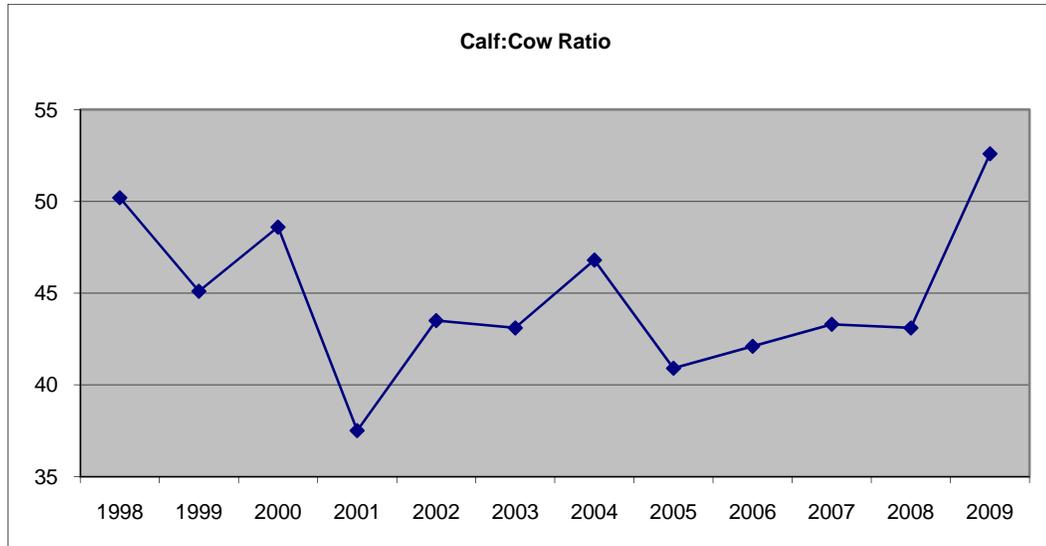


### **Calf:Cow Ratio**

Starting in 1998 the 3-year running average for the number of calves for every 100 cows decreased until 2005, when they stabilized at slightly below 45 calves to 100 cows. This may have indicated some type of stress in the reproductive capabilities of the herd. It is possible that at least some of this decline is a result of stress response of the population being over the DAU population objective for the herd. The long-term drought affecting western Colorado from 2000-2003 likely played an important role in the observed reduced calf recruitment and survival. Increasing recreational use of NFS and BLM lands may also have affected elk populations. Another factor likely affecting this herd is the rapid increase in the natural gas exploration and development in the northern half of this DAU. A large portion of the winter range on private land and BLM managed lands in the area south of I-70 between DeBeque and Newcastle has been heavily impacted by dramatic gas field development activities. This activity is also affecting NFS lands at lower elevations that are adjacent to the current development concentrated on private and BLM lands. Although public lands often have timing restrictions on the development of well sites, early phase maintenance activities and well stimulation activities have continued to produce elevated activity periods into the winter season. The development on private lands often does not have timing restrictions on initial activities or the follow-up maintenance/stimulation activities which has even greater potential for affecting elk use of these areas.

In 2006, the calf:cow ratio began to show recovery from the downward trend. This may be attributable to higher precipitation levels of the past few years, and the slow-down in natural gas development projects. As the total herd size is also decreasing, there may be less intraspecific competition and less stress on calves, resulting in higher fitness. In 2009 the calf:cow ratio showed a significant increase to a ratio of 52.6.





**Summary and Conclusions of DAU Status-** While the overall herd size had been decreasing these past few years, this was in accordance to CDOW's DAU plan to reduce the population to within the population objective between 9,000 and 11,000 animals. With new population modeling being employed for 2009 statistics, the current population is assumed to be approximately 18,116 animals. CDOW's desired herd size was not available at the time of writing this report.

The bull elk harvest has remained relatively stable for the past 10 years, but recently the warm, dry falls have made fall hunting challenging. Bull:cow ratios have remained fairly stable over the past 10 years, and are now at 21.5 bulls per 100 cows. Neither of these data points are cause for concern at this time.

The calf:cow ratio is low and was in decline over the past 5 years, but this decline seems to have stabilized, possibly due to more precipitation (and available forage) and a slowdown in the natural gas exploration and development at the northern end of the DAU. It is possible that at least some of the decline is a result of stress response of the population being over the DAU population objective for the herd. This decline may be reflective of the drought conditions during the early 2000s coupled with the gas field development of BLM and private lands on winter ranges in the DAU. It may also be a response to the increasingly heavy recreation use of public lands in the DAU. There have been no significant increases in the number of open roads or trails on NFS lands over this time period, but all open roads and trails continue to experience increasing use by recreationists year-round. There has been a marked increase in new roads and road improvements on BLM and private lands associated with natural gas development. The private lands surrounding this DAU continue to be developed into private home sites and other developments. The continued development of large portions of the winter ranges on private lands and BLM lands at the north end of this DAU by the gas industry is likely causing increased stress on the population and may contribute to reduced calf production and survival. All of these factors likely play a part in the downward trend in reproduction of this herd.

### **Elk Activities in the Muddy Creek Area**

Elk use of the area is generally during the spring, fall and winter months, with some low-intensity summertime use. Elk move down from higher summer and fall ranges in the Grand Mesa, Huntsman Ridge and Ragged Mountain areas during the late fall months, pushed to lower elevations by snowfall but also from hunting pressure. Elk generally do not winter around the McIntyre pits, as the snow depths are often in excess of 2-feet. Elk use of the area is more common during the spring months, as



elk follow the melting snow out of winter ranges, and into summer ranges. The area around the McIntyre pits may more appropriately be termed “transitional range”. Although some guided and permitted hunting occurs within private lands in the area, hunting pressure is significantly less than on adjacent public lands. Therefore elk utilize much of the lower elevation private lands as a “hunting refuge”.

No elk calving would likely occur in the vicinity of the pits as in general elk calve in higher elevation areas on USFS lands to the east.

#### **4.2.1 Impacts to Elk and Habitat**

The pits will reduce the availability of foraging and security habitat along the access road and around the pit site directly by approximately 4 acres. Please see the mule deer discussion above for an assessment of indirect impacts given the similarities. After construction, there should be no loss in habitat connectivity, as elk can easily cross the road given the size, location and relatively low levels of traffic. Pits will only be utilized during freeze-free times of the year (spring, summer and fall), which coincides with elk's lowest use of the area. During the winter months, when elk are more likely to be in the area, the pits will be drawn-down for the winter (fencing will still remain up to keep wildlife out of the pit areas, and daily checking of the pits will occur to ensure bird-netting is functional).

If elk do occur in the area during the operational seasons for the pits, elk would likely leave the area rapidly at the approach of a vehicle, and would avoid the area during human activities and loud noises. This would mean that there would be a decrease in otherwise available range in the area around the pit site and around access roads, especially during the daylight hours. During the nighttime hours, elk use of the area around the pits and access road may be near normal levels, and elk will indeed likely continue to pass through the area. However, it is well documented that elk use of habitats near roads, and likely well pads (and pits), decreases during construction and operation, but also in areas with consistent road use. This is especially true for bull elk (Gagnon et al. 2005).

#### **Summary of Impacts to Elk**

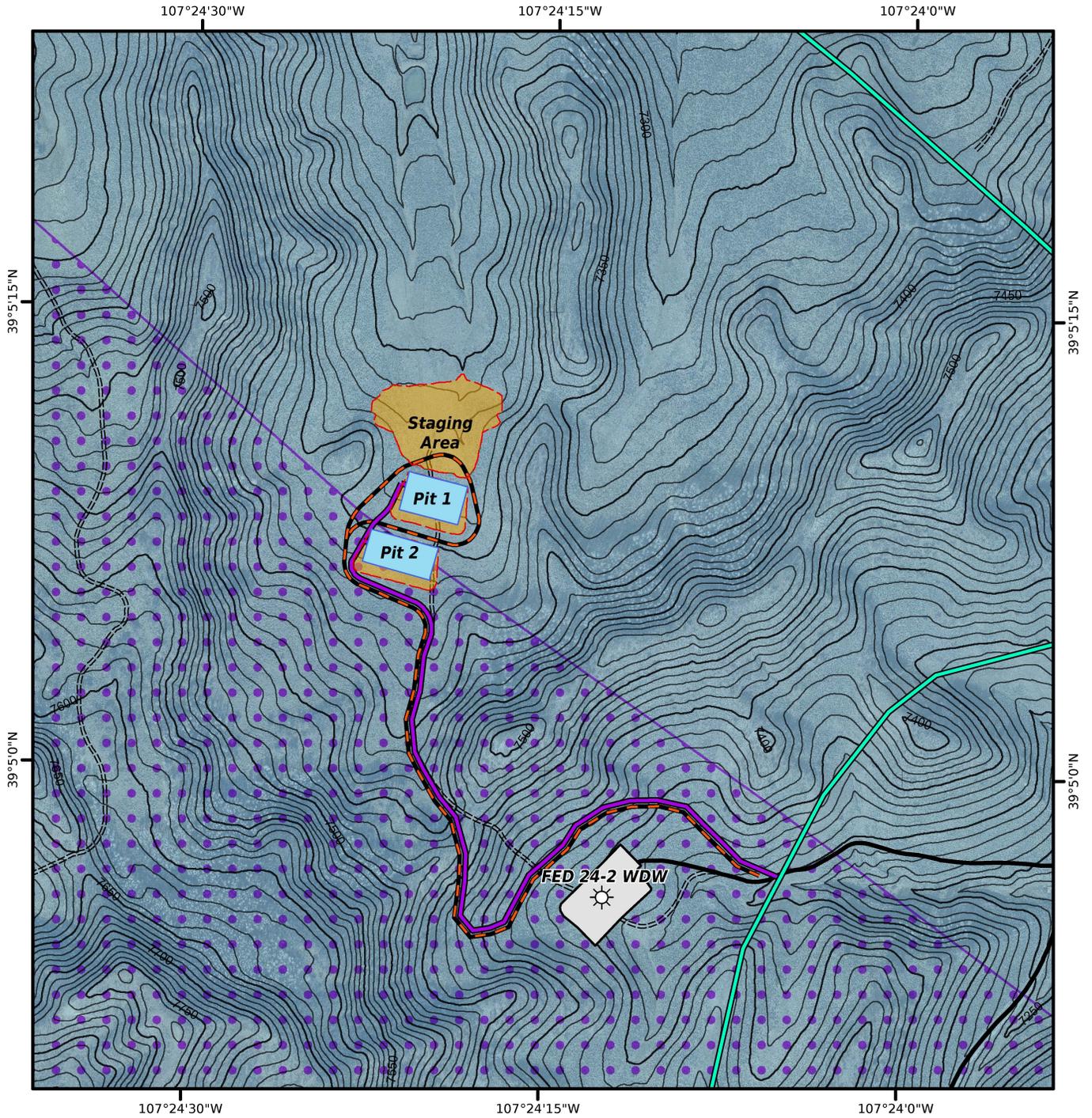
Elk may occur in the general project area during any time of the year; however the area would be more likely used as transitional range outside of the operational periods of the pits. Impacts to elk during the spring would be the most hard on elk due to their poor condition following long winters. Elk that do happen to be in the area during the summer seasons would likely avoid the area around the pits due to high levels of activity and noise. This would result in approximately 105.4 acres of indirect impact through diminished habitat availability around the pit site. A 295 acre area around the pits (i.e., ¼ mile buffer area) may see modified elk use when pits are being heavily used and human traffic and activities are at their highest.

As a stand-alone project, the flowback pits will have minor impacts to elk behavior and use of the area, and insignificant impacts to available habitats in the greater Muddy Creek basin area. Cumulatively, this and other related projects will begin to have indirect impacts likely manifested by changes in elk movement patterns, habitat utilization, and stress levels. There is an abundance of summer and transitional ranges in the greater area, so projects in those habitats will have less of an impact compared to projects in more limited winter ranges. However there is likely to be some threshold at which road development and use, drilling and construction, and associated human activities could rise to a level where changes in elk migration and habitat use patterns would occur, and at that time the literature suggests that these stresses would begin to have impacts to elk fitness. A comprehensive wildlife report of cumulative impacts to wildlife from the development of the Bull Mountain Unit is in the process of being developed, per NEPA requirements.



There are recommendations to minimize other stresses or negative impacts to elk moving through and using the area. These recommendations are listed further below in this document, but the most important mitigation would be the use of water disposal pipelines and other methods to reduce traffic and human activities on the access roads and pits. After construction, minimizing human visits and activities at the pits is probably the most important step in minimizing indirect disturbances to elk wintering and passing through the area (H. Sawyer pers. comm. 12/31/2009). The use of mufflers on pumps would also allow for more elk use of adjacent habitats. The proposal includes year-round wildlife fencing and silt fencing around all flowback pits to prevent terrestrial wildlife entry into a full or empty flowback pit. Additionally, flowback pit sites would have fencing around the entire perimeter and be gated to prevent livestock entry onto the flowback pit site itself. As a result, no direct impacts to elk are anticipated from the pits themselves. Closing and reclamation of pits in a timely manner would also help reduce long-term cumulative impacts to elk.



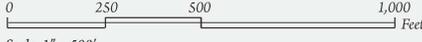


-  Proposed Pit
-  Proposed Pit Disturbance
-  Existing Well
-  Existing Pad
-  Proposed Access Road
-  Improved Dirt Road
-  Two-Track Road
-  Proposed Pipeline
-  Existing Gathering System
-  Elk Winter Concentration
-  Elk Winter Range

### FIGURE 5

#### Bull Mountain Unit McIntyre Flowback Pits 1 & 2

#### Elk Winter Ranges



Scale: 1" = 500'

Prepared By: PENDO solutions  
Prepared For: SG Interests I, Ltd.  
Date: February 2011

**Disclaimer:**  
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

### 4.3 Moose

Moose (*Alces alces*) was introduced by CDOW onto the Grand Mesa approximately 17 years ago. Since that time, moose have expanded their range down towards areas around the Bull Mountain Unit. Moose in general utilize coniferous habitats and wetland complexes, but have been observed in sagebrush and oakbrush habitats in the area. CDOW has mapped the area around the pits as moose Overall Range, and this designation covers most of the Grand Mesa and Muddy Creek basin, therefore a map was not deemed necessary to show potential moose habitat.

The excavation and operation of the McIntyre Pits 1 and 2 would likely preclude moose lingering or utilizing habitats within the area around the access road and pits during the construction phase. After construction, human activity levels around the pits would likely cause moose to leave the area if humans entered the area during the freeze-free operation season of the pits, but depending on the distance a moose is to the roads and pits when humans entered the area, moose's response will vary. Suffice it to say that moose would likely leave the area once humans entered the area.

Increased traffic on local roads would also reduce moose use of habitats near roads. Increased mortality from vehicle strikes is not likely near the project area, as road speeds are fairly low, but moose vehicle strikes have been documented on Highway 133 near McClure Pass. This area is not optimal moose habitat and use of this area is likely infrequent; therefore, this project should have no significant impact on moose or moose habitat.

### 4.4 Black Bear

Black bear (*Ursus americanus*) has become a significant wildlife management issue in the State of Colorado. Bears are commonly supplementing their diets by raiding garbage cans and breaking into homes; they are becoming a hazard and a nuisance. The project area is dominated by sagebrush, which is not optimal habitat for bears. Gambel oak stands and dense shrubby habitats in the greater area do provide higher quality habitats for bears. The excavation and operation of these two pits would have no impacts on bear populations due to abundant available habitats in the area, however cumulative impacts from development of the Bull Mountain Unit in combination with this project will begin to have impacts on bear foraging habitats and bear behavior. More recommendations to minimize human/bear conflicts are presented in section **5: Recommended Impact Minimization and Mitigations**.

### 4.5 Brewer's Sparrow

Brewer's sparrow (*Spizella breweri*) is by far the most abundant bird there during spring and summer. Typically, pairs form shortly after arrival on the breeding grounds in the spring, building a small open-cup nest in sagebrush and laying 3 eggs. If not discovered by a predator during the 20–22 days it takes from egg-laying to fledging, 3 chicks are produced. Time permitting the pair attempts a second brood. By late summer, territories have broken down and birds begin moving about in family groups and small flocks; by early fall, southward migration has begun. Throughout the year, Brewer's sparrows remain in shrublands, migrating through the southern Great Basin and foothills of the Rockies and the Sierra Nevada, and wintering in the desert scrub of the southwestern United States and northern Mexico, often in the company of other sparrow species. Although its bill morphology is typical for seed-eating sparrows, much of this species' diet consists of arthropods. As befits an arid land species, its water economy is excellent, and it can exist for long periods without drinking (Rotenberry et al. 1999).

Recent (1980s and 1990s) surveys have shown breeding numbers of Brewer's Sparrows to be in significant decline throughout the species' range (Rotenberry et al. 1999a). Causes are related to



fundamental changes in shrubland ecosystems being brought about by agriculture, grazing, and the invasion of exotic plant species. And although the species can be abundant over large landscapes, it inhabits an area relatively sparsely populated by humans; as a result, comparatively little is known about major aspects of its biology (Rotenberry et al. 1999a).

Brewer's sparrows are a nearctic-neotropical migrant. Most individuals breed in and around the Great Basin and winter in Sonoran and Chihuahuan deserts of the southwestern U.S., west Mexico (including Baja California peninsula), and the Mexican Plateau (Rappole et al. 1993). As with almost all other oscines, migration is nocturnal. Data on orientation, altitude, and flight formation is not available. There are no formal studies of flocking behavior, but sparrows appear often to migrate in small flocks, especially in spring (Rotenberry et al. 1999a).

Documented predators of eggs and nestlings include gopher snake (*Pituophis melanoleucus*) and ground squirrel (*Spermophilus spp.*). Intense, episodic predation of Brewer's sparrow nests by ground squirrels probably results from combination of ground squirrel demography and extreme annual variation in precipitation (Rotenberry and Wiens 1989). Reynolds (1979) strongly suspected loggerhead shrikes (*Lanius ludovicianus*) of preying on Brewer's sparrow nestlings after observing shrikes killing adult sparrows and unidentified nestlings. Other potential nest predators include other species of snakes, such as western rattlesnake (*Crotalus viridis*), and common raven (*Corvus corax*), black-billed magpie (*Pica pica*), long-tailed weasel (*Mustela frenata*), and least chipmunk (*Tamias minimus*; Reynolds 1979, Petersen and Best 1987, Rotenberry and Wiens 1989).

Nest predation is the primary cause of nest failure; likely to be an important factor in Brewer's sparrow life history traits and habitat use (Rotenberry and Wiens 1989). Levels of nest predation vary significantly both geographically and temporally. In 1976–1977, nest predation ranged from 11% of 80 nests in Oregon (Rotenberry and Wiens 1989) to 86% of 7 nests in Idaho (Reynolds 1981) to 100% of 5 nests in Nevada (Rotenberry and Wiens 1989). From 1976 to 1980, annual nest predation ranged from 0 to 37% in Oregon (Rotenberry and Wiens 1989).

Brewer's sparrows prefer nest shrubs entirely alive or mostly alive (Petersen and Best 1985, Rotenberry et al. 1999b). The foliage of live shrubs provides concealment from predators and protection from elements. Although nests are typically placed in live shrubs with foliage, no preference among live shrubs for denser-than-average foliage was apparent. No preference for shrubs with discontinuous (gaps) versus continuous canopies existed either (Rotenberry et al. 1999b).

### Population Trends

Local sparrow population numbers are negatively influenced by increasing landscape-level fragmentation of shrublands, and those numbers appear to be more sensitive to variation in landscape-level attributes than in local-scale attributes (Knick and Rotenberry 1995).

Breeding Bird Survey (BBS) shows highest abundance for Brewer's sparrows in central Nevada northward to southeast Oregon, with other centers of abundance in southeast Idaho and southwest Wyoming (Sauer et al. 1997). The bulk of the breeding population appears mostly contiguously distributed; centers of abundance in eastern Washington and northwestern New Mexico (10–20 individuals/route) tend to be slightly disjunct. Winter counts show highest U.S. abundance in southern Arizona and New Mexico, and west Texas (Sauer et al. 1997). There is no information about distribution of abundance in Mexico.

This species appears to have undergone statistically significant declines (from about 3 to 6%/yr) throughout BBS survey area during 1966–1996 (Sauer et al. 1997). Declines have been more pronounced in 1980–1996 than in 1966–1979. No state or physiographic region shows significant



increasing trends. In contrast, survey-wide trend in winter abundances is positive (but insignificant; 0.2%/yr); significant increases during 1959–1988 were noted for Texas (6.7%/yr; Sauer et al. 1997).

The most critical conservation measure for breeding birds is protection and restoration of native shrublands and shrub-steppe habitats (Rotenberry 1998). Successful long-term preservation of shrublands will require removal of exotic annual plants that have become self-perpetuating, and in doing so have shortened fire cycles to the point that many shrub species cannot persist.

#### 4.5.1 Impacts to Sparrow and Habitats

The development of the pits would convert approximately 4 acres of sagebrush habitats to non-habitat for the next 15+ years, until the pits are closed and the site is reclaimed, and sagebrush is allowed to recolonize the area. Due to the spring construction schedule, some nesting sparrows may be directly impacted as the site is suitable and occupied nesting habitat.

Indirectly, Brewer's sparrow would avoid sagebrush habitats near the pit and access road during the construction process. During summertime operation of the pits, some sagebrush habitats nearest the pits may be avoided by sparrows, but given the width of layback slopes and stockpile yarding, there may be sufficient buffering from areas of high human activity and un-impacted sagebrush habitats that sparrows may continue to use habitats very near the edge of disturbance. Sagebrush habitats near the access road would likely be avoided by nesting sparrows in the future, but sparrows may forage near roads. While habitat fragmentation is cited as a cause for population declines, Brewer's sparrows have been observed nesting in sagebrush plants near or adjacent to sagebrush canopy openings (author pers. obs.). This project is relatively small in scale and complexity, and therefore this project should have no detectable impacts to Brewer's sparrow population numbers, but it is likely that some sparrows would be directly and indirectly impacted.

In summary, while the construction of the pits is a relatively small-scale project, there may be direct impacts to nesting birds, and the project would decrease suitable nesting and foraging habitats temporarily by 15-20 years. This project would incrementally add to other impacts to habitat which are having negative effects to Brewer's sparrow populations in the west.

#### 4.6 Summary of Impacts to Wildlife

Project implementation would result in the direct loss in 4 acres of sagebrush and mixed shrubland habitats. The pits would be in operation for approximately 15 years, at which time they would be permanently closed and the site recontoured and reclaimed.

This habitat loss would reduce the availability of habitats for foraging, reproduction, and sheltering of species which utilize sagebrush dominated habitats. Dispersal activities would still likely occur on or adjacent to the pit area. All of the species occurring within the areas to be directly affected by this project have widespread habitats in the area; this project would not affect any critical or constrained habitat types. Therefore, most species directly affected by this habitat loss would have other habitats in the greater area still available to them for foraging, reproduction, dispersal, and shelter. This project would likely impact individuals of various species, but would not significantly impact populations. During the construction period (lasting around 2 months), the elevated levels of human activity would preclude most species from using otherwise available habitats around the pit area, at least during the daytime hours (some nocturnal use of habitats near the ROW would be expected). As a result of these potential impacts to wildlife and their habitats, recommendations for impact minimization and mitigation are included in section **5 Recommended Impact Minimization and Mitigations**.



## 5 Recommended Impact Minimization and Mitigations

The following sections present recommendations for consideration to minimize the potential impacts to wildlife from the proposed development. Many of these recommendations are considered to be “best management practices” for wildlife, which would allow for continued wildlife use of the area.

### 5.1 Roads

Along the existing roads that occur in this area, the following recommendations are presented:

- Fences along the roads should not be allowed or should be wildlife friendly.
- Cut and/or fill slopes along the roads should be designed to facilitate wildlife movement; this includes using native plant materials that mimic local native vegetation species and distribution.
- Large or extensive retaining walls (defined as slopes greater than 70°) should be minimized, or if needed, retaining walls greater than 40 feet in length should have “steps,” “ramps,” small dirt piles or other features to allow wildlife to cross retaining walls if engineering allows such features.

### 5.2 Revegetation

As the area is sometimes used as winter range by elk, reclamation should use native plant species and vegetation profiles. Revegetation should also occur as soon as possible, however, seeding in the fall is recommended for native grasses for better seed germination. If needed, spring or summer seeding of temporary grass mixes is also a good idea to reduce sediment movement.

Noxious weeds should be treated annually in order to minimize their spread and impact on winter range and increase the success of revegetation activities.

The following is SG Interests upland native seed mix, and what would also allow long-term revegetation by native forbs and shrubs. Use of agricultural cultivars such as smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*) or yellow sweetclover (*Melilotus officinalis*) is strongly discouraged in order to provide high quality wildlife forage. CDOW (K. Madariaga & J. Holst) also discouraged the use of aggressive agricultural cultivars in reclamation. The use of temporary “cover crops” using sterile or short-lived grasses is acceptable.

Common name	Scientific name	Variety	lbs	# seeds/ lb	% of mix
<b>Grasses</b>					
Western wheatgrass	<i>Pascopyrum smithii</i>	Arriba	4	120,000	15.2
Prairie junegrass	<i>Koeleria macrantha</i>		0.2	2,315,400	14.7
Mtn brome	<i>Bromus marginatus</i>	Garnet	7	90,000	20
Canby bluegrass	<i>Poa canbyi</i>		0.3	925,000	9
Slender wheatgrass	<i>Elymus trachycaulus</i>	Pryor	5	155,000	25
Quickguard			14	14,000	6
		<b>Total PLS lbs</b>	<b>31</b>		
		<b>Seeds/sq ft.</b>	<b>72</b>		



### **5.3 Domestic Dogs**

SG Interests has a no dog policy, which avoids and reduces indirect impacts to wildlife.

### **5.4 Bears**

There should be no dumps that have edible materials associated with the construction and post-construction activities. Construction workers and contractors should be notified and educated about the importance of keeping trash, food and drink items properly disposed of to discourage bear activities in the area.

Garbage should be placed in bear-proof dumpsters, individual bear-proof trash containers, or kept in trash cans inside closed buildings.

### **5.5 Other Recommendations**

Automization, even semi-automatization, of the pit site would help reduce daily vehicle traffic to the site. This would be important to reduce indirect impacts to big game species, and during breeding bird seasons.

Housing of generators or other loud equipment would help reduce noise levels in the area, and would help reduce indirect impacts to wildlife.



## 6 CDOW Standard Operating Procedures

The following recommended standards are provided by CDOW for consideration in oil and gas development activities. CDOW has requested that applicants consider the following, even though they are still in review by the COGCC and are not binding at this time. The SG Interests responses to these SOPs follow in *blue, italicized* font.

### PRE-DEVELOPMENT PLANNING AND FACILITY LOCATION:

#### A. General

- When planning minor and major facilities, Operators shall reference CDOW wildlife occurrence data (NDIS) and identify species that occur in the vicinity of the proposed development.
  - *NDIS was used in the generation of this report*
- Operators shall survey, map, and report the occurrence of a defined list of species for which limited data exists and/or where occurrences may move from one year to the next. Surveys shall use CDOW protocols and existing CDOW occurrence data (NDIS). At a minimum, depending on geographic location and season of development, surveys for the following species shall be performed. All data from wildlife surveys performed will be forwarded to CDOW on completion. When expressly requested by the surface owner, data provided to CDOW will only be used for oil and gas permitting activities.
  - *SG agrees to comply with this; however CDOW has not provided a species list.*
  - Surveys for the following species will be conducted within 1/2 mile of proposed facilities on lands legally accessible to the operator.
    - Raptor nests, including owls
      - *SG agrees to comply with this.*
    - Amphibians including boreal toads
      - *Western chorus frogs and northern leopard frogs are assumed to occur in irrigated meadows and wetlands in surrounding areas; SG agrees to comply with this. No impacts to wetlands would occur.*
  - Surveys for the following species or habitats will be conducted within 1/4 mile of proposed facilities on lands legally accessible to the operator
    - Active Gunnison's prairie dog colonies
      - *No prairie dog colonies occur within the Muddy Creek basin.*
    - Wetlands
      - *Wetlands were mapped using aerial interpretation and brief on-site reviews, see **Figure 5** (following).*
- Transportation networks shall be planned to the extent possible so as to minimize the number and length of oil and gas accesses consistent with Federal and state



land management agencies and local government plans, including utilization of common roads/accesses and centralized collection facilities and pipelines for produced water.

- *Road planning was considered in the development of this project.*
- Destruction of active migratory bird nests is a violation of the Migratory Bird Treaty Act (16 U.S.C §§ 703-712). Vegetation removal and ground disturbing activities shall, to the maximum extent practical, take place outside the nesting season for migratory birds (April 1 to August 15). If vegetation removal and ground disturbing activities must take place during the nesting season, operators shall contact the United States Fish and Wildlife Service (USFWS) for information regarding appropriate measures to implement to avoid unauthorized take of nesting migratory birds.
  - *Construction activities will occur during the breeding bird season, and it is possible that nests will be impacted.*

## B. Timing Limitation Areas:

Timing Limitation Areas shall be applied to oil and gas operations in Colorado to the extent technically and economically feasible using the best available development technology to minimize adverse impacts to wildlife resources. In this context, No Development Activity means the seasonal deferral of ground disturbance, construction, drilling and completion, non-emergency workovers and pipeline installation activity, except in the event of situations posing a risk to human health or safety. It does not include production, maintenance, emergency operations, reclamation activities or habitat improvements. Where a Federal or local agency has implemented its own Timing Limitation Area that is clearly more protective of wildlife resources than those suggested here, the more restrictive Timing Limitation Area shall apply, provided it is consistent with the intent of this regulation.

- Mule Deer Critical Winter Range (Severe Winter Range and Winter Concentration Areas)--no development activity between 1 December and 15 April. In areas where a late big game hunting season extends to 31 December, this timing limitation runs between 1 January and 15 April.
  - *There will be no construction until after May 15<sup>th</sup>.*
  - *The McIntyre Flowback pits 1 & 2 are not in any mapped mule deer winter ranges.*
- Elk Winter Concentration Areas--no development activity between 1 December and 15 April. In areas where a late big game hunting season extends to 31 December, this timing limitation runs between 1 January and 15 April.
  - *The pit site is located within elk Winter Range, and Winter Concentration Area, but no activities would occur within the timing limitation periods.*
- Elk Production Areas--no development activity between 15 May and 15 June.
  - *The pit site does not occur within a Production Area*



- Prairie Dog (Gunnison's)--no development activity in active colonies between 1 March and 14 June, except those colonies within 1 mile of urban development areas.
  - *There are no prairie dog colonies within the Muddy Creek basin.*
- Raptors (variable by species--defined in Craig 2002, revised 2008)--no development activity within nest buffers or roost sites during the defined nesting or roosting dates for each species.
  - Bald Eagle Nest Sites--no development activity within 1/2 mile of active Bald Eagle Nest Sites between 15 October and 31 July
  - Bald Eagle Winter Night Roost Sites--no development activity within 1/2 mile of Bald Eagle Winter Night Roost Sites where there is a direct line of sight to the roost or within 1/4 mile where there is no direct line of sight to the roost between 15 November and 15 March except for periodic visits such as oil maintenance and monitoring work within the buffer zone after development which should be restricted to the period between 10:00 am and 2:00 pm.
  - Bald Eagle Winter Concentration Areas--no development activity within any mapped winter concentration areas between November 15 and March 15
  - Burrowing Owl Nest Sites--no development activity within 150 feet of active Burrowing Owl Nest Sites between 15 March and 31 October
  - Golden Eagle Nest Sites--no development activity within 1/2 mile of active Golden Eagle Nest Sites between 15 December and 15 July
    - *None of these areas/sites occur within miles of the pit site*

### C. Restricted Surface Occupancy (RSO) Areas:

Restricted Surface Occupancy Areas shall be applied to oil and gas operations in Colorado to the extent technically and economically feasible using the best available development technology to minimize adverse impacts to wildlife resources. The RSO areas listed here shall be avoided to the maximum extent possible when planning and conducting oil and gas development operations, except when specifically exempted by CDOW or in the event of situations posing a risk to human health or safety. Where a Federal or local agency has implemented its own Restricted Surface Occupancy Area that is clearly more protective of wildlife resources than those suggested here, the more restrictive Restricted Surface Occupancy Area shall apply, provided it is consistent with the intent of this regulation.

- Lynx breeding habitat--areas of spruce/fir forest south of Interstate 70, above 9500 feet elevation and with slope >25% in spruce/fir habitat.
  - *The pit site does not occur within suitable lynx habitat*
- Areas within 1/4 mile of active Bald Eagle nest sites.
- Areas within 1/4 mile of active Golden Eagle nest sites
- Areas within 1/2 mile of active Northern Goshawk nest sites
- Areas within 1/2 mile of active Peregrine Falcon nest sites
- Areas within 1/4 mile of Townsend's Big Eared Bat, Fringed Myotis, and Mexican Free-Tailed Bat roost sites



- *No bat roost sites were located in this area*
- Areas within 1/2 mile of identified Boreal Toad breeding sites
  - *The pit site does not occur within miles of any of these sites.*
- Areas within 300 feet of the ordinary high water mark of any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.
  - *The edge of disturbance is over 900-feet away from aerially interpreted wetland areas (see Figure 5)*

#### **D. Off-Site Mitigation**

In areas designated critical winter range for mule deer, Operators shall minimize the effects of disturbance by reducing the number of well pads to a maximum of two per section, and by limiting the number of pipeline and access road ROW's to the minimum required to service two well pads per section. If the number of wells cannot be limited to a maximum of two per section, Operators shall develop and submit plans for off-site mitigation to compensate for the loss of critical winter range for mule deer.

- *There is no critical winter range for mule deer within the project area.*

### **FACILITY DESIGN, CONSTRUCTION, AND OPERATION:**

#### **A. General**

- Bear-resistant dumpsters and trash receptacles are required at all minor and major oil and gas facilities.
- All food items at minor and major oil and gas facilities must be centrally stored or individually stored in bear-resistant food boxes with no food items stored in sleeping quarters unless hard-sided and secured.
- Food items shall not be stored in the passenger compartments of vehicles.
- Feeding of any wildlife is strictly prohibited.
- Operators are prohibited from carrying firearms or other weapons onto minor and major oil and gas facility locations.
- Operators are prohibited from bringing dogs or other domestic animals onto minor and major oil and gas facility locations, and shall report feral animals to County Animal Control Officers.
- Operators shall install screens on all heater-treaters and other exhaust systems to prevent nesting bird activity and bird mortality.
- Operators shall develop and implement aggressive weed management plans per the requirements of the Colorado Noxious Weed Act, C.R.S. § 35-5.5-101, et seq. and Gunnison County.
- Operators shall disinfect heavy equipment, hand tools, boots and any other equipment used previously in a river, lake, pond, or wetland, with one of the following practices:
  - Remove mud and debris from equipment and the equipment kept dry for 10 days, or



- Remove mud and debris from equipment and spray/soak equipment with a 1:1 solution of Formula 409 Household Cleaner (or equivalent) and water or a 1:15 solution of Sparquat 256 Institutional Cleaner (or equivalent) and water, keeping the equipment moist for at least 10 minutes and discard rinse water in an approved manner, or
- Remove mud and debris from equipment and spray/soak equipment with water greater than 130 degrees F for at least 10 minutes.
- Using the methods described above, sanitize water suction hoses and water transportation tanks withdrawing from or discharging into surface waters (other than contained pits) and discard rinse water in an approved disposal facility.
- The disinfection practice shall be repeated after completing work or before moving to the next water body.
- Operators shall report spills that might affect wildlife (in particular spills that impact water) to the local CDOW District Wildlife Manager within 24 hours of detection.
- Operators shall utilize screen water suction hoses to exclude fish when drawing water from streams, ponds, and lakes.
  - *SG agrees to the above items which pertain to pit construction and use. SG's contractors routinely cleans equipment using available high pressure sprayers to remove dirt, mud and foreign debris. SG treats noxious weeds on all their facilities.*

## B. Pipelines

During pipeline construction, Operators shall install wildlife crossovers (trench plugs) with ramps on each side at maximum ¼ mile intervals and at well defined game trails to facilitate passage of big game across the open trench and to allow trapped wildlife to escape the trench.

- *SG agrees to comply with this.*

## C. Pits

- Operators shall protect wildlife from becoming trapped in reserve pits and other fluid pits by installing and maintaining chain link or 6-inch woven wire 8-foot high fences to exclude big game. The bottom 2-feet of fluid pit fences shall be wrapped with silt fence to exclude smaller wildlife species, and netting or other appropriate measures should be installed to exclude birds and bats. Operators shall skim and eliminate oil from unfenced produced water ponds and reserve pits daily until fences are installed.
  - *SG agrees to comply with this.*
- Operators shall report all wildlife mortalities found in produced water ponds, reserve pits, and other production facilities to the local CDOW District Wildlife Manager within 24 hours of discovery.
  - *SG agrees to comply with this.*
- Operators shall reclaim reserve pits within 14 days after drilling and completion operations cease.



- *No reserve pits are part of the construction or use of the flowback pits.*
- Operators shall treat waste water pits and/or any associated pit containing water with BTI (*Bacillus thuringiensis v. israelensis*), commonly known as Mosquito Dunks, or take other effective action to control mosquito larvae that may spread West Nile Virus to wildlife, especially grouse.
  - *Waters in the flowback pits are treated with bactericides to reduce odors and keep waters clean. Bactericides may be toxic to BTI. However, if mosquito larvae become an issue in the flowback pits, SG agrees to try BTI or work with CDOW to develop an alternative solution to keeping mosquito larvae from becoming viable at the pit sites.*

#### D. Roads

- Operators shall install gates and locks and close all single purpose roads (well, compressor, and other production facility access roads) to unauthorized traffic, and restrict access to oil and gas and other administrative traffic only. Operators shall keep gates closed and locked at all times except when entering or exiting the property;
  - *SG agrees to comply with this.*
- Operators shall post appropriate speed limits (not to exceed 35 mph) on non-public primary and secondary oil and gas facility access roads;
  - *SG agrees to comply with this.*
- Operators shall confine traffic to established travel ways, and prevent unauthorized travel on seismic, powerline, and pipeline corridors by posting signs that prohibit off road travel;
  - *SG agrees to comply with this.*
- Operators shall limit off roadway parking designated sites and avoid parking in undisturbed areas;
  - *SG agrees to comply with this.*
- Individual well access roads and single purpose production facility access roads shall be a maximum 8-foot surface width unless otherwise approved by CDOW and Gunnison County;
  - *The access road to the pit site will is existing- no new road construction is needed.*
- Structures for perennial or intermittent stream channel crossings shall be made using bridges, culverts, or other structures designed, constructed, and maintained using current, prudent engineering practices; no part of any road shall be located in the channel of an intermittent or perennial stream (i.e. no low water crossings);
  - *No stream crossings for roads occur.*
- Operators shall maintain the normal flow of water in streambeds and seasonal drainage channels crossed by roadways; protect stream and drainage channel crossing inlets from erosion and sedimentation using stormwater control devices



and install energy dissipation structures at outfalls; pre-existing fish passage shall be maintained at stream channel/roadway crossings;

- *No wetlands would be crossed as part of this project.*

## INTERIM RECLAMATION AND POST-DEVELOPMENT

### A. General Reclamation

- Site-specific reclamation plans shall be developed in consultation with CDOW, Gunnison County, NRCS, and the land owner or land management agency.
  - *SG has provided their reclamation plan and preferred seed mix to COGCC as part of their application.*
- Operators shall group disturbance locations into reclamation units with consistent vegetation type, elevation, precipitation, and aspect, and determine appropriate reclamation goals for each reclamation unit.
  - *SG agrees to comply with this.*

### B. Roads

- A road not to be retained for use under an approved post-oil/gas production land use shall be reclaimed within 30 days after it is no longer needed for operations. Reclamation includes:
  - closing the road to traffic;
  - removing all bridges and culverts;
  - restoring the natural drainage patterns;
  - reshaping all cut and fill slopes to be compatible with the post-oil and gas land use;
  - scarifying or ripping the roadbed; replacing topsoil or substitute material; and revegetation disturbed surfaces;
  - removing and properly disposing of road surfacing materials off site that are incompatible with the post-oil/gas production land use.
    - *SG agrees to comply with this, when the pits are no longer needed in approximately 15 years.*

### C. Vegetation

- Operators shall reduce long-term footprint of facilities to the smallest practical space and use interim reclamation to speed return of disturbed areas for use by wildlife; Operators shall down-size well pad size and reclaim with vegetation once drilling is complete and the well is in operation.
  - *SG agrees to comply with this.*
- Operators shall use only certified weed free erosion control materials.
  - *SG agrees to comply with this.*



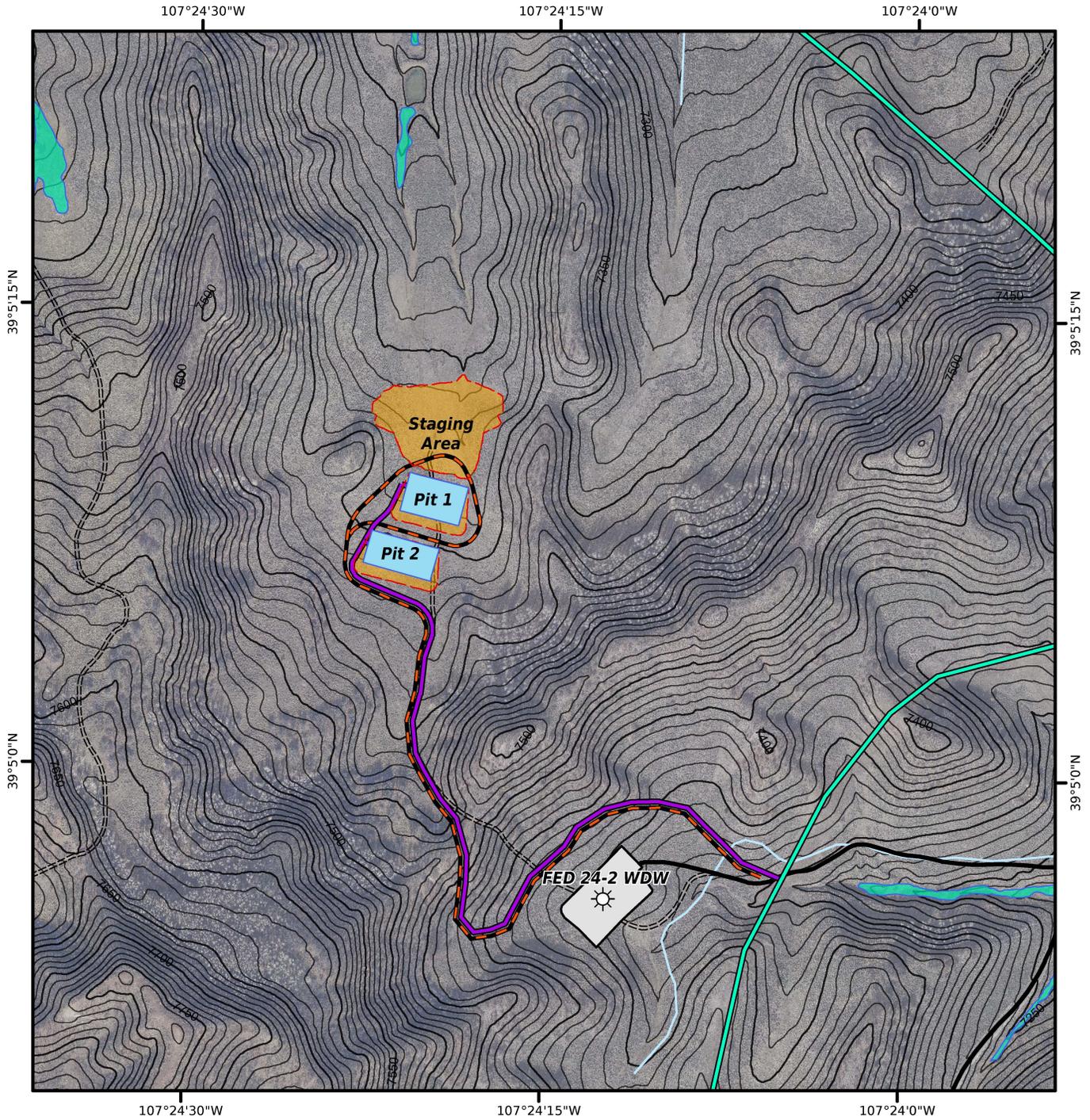
- Operators shall utilize staked soil retention blankets for erosion control and reclamation of surface areas with slopes of 3:1 or greater. Retention blankets should be a straw/coconut blend and should be covered on the top and bottom with 100% biodegradable organic jute fiber netting to minimize entanglement of small mammals, reptiles, and amphibians especially in or near riparian and wetland areas. The erosion control blanket can be used in combination with native seed to maximize potential germination on steep slopes.
  - *SG will apply this standard based on on-site needs and soil characteristics*
- Operators shall fence livestock out of newly reclaimed areas until proper vegetative cover is achieved, provided that fencing does not provide a barrier to wildlife migratory movements (i.e. fencing may be impractical for linear pipelines).
  - *SG agrees to comply with this.*
- Non-native grasses, forbs, or shrubs (e.g. intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, smooth brome, etc.) shall not be used in reclamation seed mixes. Native seed sources shall be from identified (not VNS) native seed stocks whose derivation is as close as possible to the site being rehabilitated.
  - *Proposed seed mixes are consistent with this guidance, but final seed mix constituents are determined by the land owners.*

#### **D. Monitoring**

Operators shall monitor interim and final reclamation progress through the establishment of pre- and post construction photo-point monitoring or measurement of vegetation plots at one, three, and five year intervals. Final reclamation is achieved when 70% of pre-existing vegetation is re-established (both cover and diversity of species) as evidenced by pre-and post construction photo-point monitoring and/or vegetation plots. Re-seeding is required if satisfactory reclamation progress is not being made at year one or year three monitoring intervals, or if final reclamation is not achieved by year five.

- *SG inspects for compliance with stormwater regulations, but does not inspect activities within the Unit for reclamation progression.*





- |  |                          |  |                           |  |         |
|--|--------------------------|--|---------------------------|--|---------|
|  | Proposed Pit             |  | Proposed Access Road      |  | Wetland |
|  | Proposed Pit Disturbance |  | Improved Dirt Road        |  | Stream  |
|  | Existing Well            |  | Two-Track Road            |  |         |
|  | Existing Pad             |  | Proposed Pipeline         |  |         |
|  |                          |  | Existing Gathering System |  |         |

**FIGURE 6**  
**Bull Mountain Unit**  
**McIntyre Flowback Pits 1 & 2**  
**Wetlands**

0      250      500      1,000  
 Feet

Scale: 1" = 500'

Prepared By: PENDO solutions  
 Prepared For: SG Interests I, Ltd.  
 Date: February 2011

**Disclaimer:**  
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

## 7 Appendix I: Qualifications of Report Author

The primary author for this report was Eric Petterson, Principal Ecologist at Rocky Mountain Ecological Services, Inc (RMES). Mr. Petterson holds a Master of Science Degree in Rangeland Ecosystem Science and a Bachelors of Science Degree in Wildlife Biology from Colorado State University. Mr. Petterson has 20 years of natural resource planning and management experience. As a professional wildlife biologist for the past 14 years working in the private sector and for the USDA Forest Service, he has authored numerous Biological Evaluations and Biological Assessments for NEPA and Endangered Species Act compliance for wildlife (and plant) species in Colorado, Utah, Wyoming, and Nebraska. He has produced management plans and impact analyses for federal, state, and private natural resource projects, and conducted many surveys for Threatened, Endangered and Sensitive species in Colorado, Utah, Wyoming and Nebraska.

He has implemented a variety of wildlife impact assessments, vegetation monitoring and vegetation management projects, wetland delineations, and research-based projects for clients including the USDA Forest Service, Bureau of Land Management, Colorado State Forest Service, Colorado State Parks, Summit County, Pitkin County Open Space & Trails, City of Aspen, Gunnison County, Town of Breckenridge, Town of New Castle and various private entities within Pitkin, Eagle, Grand, Garfield, Gunnison, Mesa, Rio Blanco, Routt, Larimer and Boulder Counties, and areas in northern New Mexico and Utah.

Wildlife and vegetation assessment reports and compliance documentation have been provided for entities such as Aspen Skiing Company, Vail Resorts, Sunlight Mountain Resort, Loveland Ski Area, ETC Canyon Pipeline, Noble Energy, SG Interests, Rio Tinto Kennecott Utah Copper LLC, Climax Molybdenum, Los Alamos National Laboratory, Western Area Power Administration, Holy Cross Electric, and Mountain Parks Electric Association. Many other individual entities and corporations have also been clients for RMES.

Mr. Petterson has also been a consultant/contractor on post-fire vegetation management on the 135,000 acre Hayman Fire, Missionary Ridge, Burn Canyon, and Eldorado Canyon fires in Colorado, and the Cerro Grande fire in Los Alamos, New Mexico. RMES has also provided wetland delineation and 404 permitting for compliance with the Clean Water Act for clients including natural gas development companies, Rio Tinto Kennecott Utah Copper, developers, pipeline companies, and for wetland reclamation and habitat improvement projects.

Mr. Petterson has managed Rocky Mountain Ecological Services since 2000, and previous to working with RMES he was the District Wildlife Biologist and Fuels Planner for the Canyon Lakes Ranger District on the Arapaho & Roosevelt National Forest. Mr. Petterson was with the USDA Forest Service for 10 years.



## 8 Literature Cited & General References

- Adams, A.W. 1982. Migration (Chapter 7), in Thomas, J.W. and D.E. Towell, eds. Elk of North America: ecology and conservation. Stackpole Books. Harrisburg, PA.
- Alcorn, J. R. 1988. The birds of Nevada. Fairview West Publ., Fallon, NV.
- Allredge, A.W., J.F. Lipscomb, and F.W. Whicker. 1974. Forage intake rates of mule deer estimated with fallout cesium-137. *J. Wildl. Mgmt.*, 38:508-516.
- Anderson, A.E. and D.C. Bowden. 1977. Mule deer-coyote interactions. Pp. 15-16 in Colorado Game Res. Review, 1975-1976 (O.B. Cope, ed.). Colorado Div. Wildl., Ft. Collins, CO. 73pp.
- Andree, W. M. 2006. Personal communication. Vail District Wildlife Manager, Colorado Division of Wildlife. Glenwood Springs, Colorado.
- Andree, W. M. 2007. Personal communication, July 5, 2007. Vail District Wildlife Manager, Colorado Division of Wildlife. Glenwood Springs, Colorado.
- Andrews, R. and R. Righter. 1994. Colorado birds, a reference to their distribution and habitat. Denver Museum of Natural History. 442 pp.
- Bailey, A. M., R. J. Niedrach. 1965. Birds of Colorado. Denver Mus. of Nat. Hist., Denver, CO.
- Bailey, F. M. 1928. Birds of New Mexico. New Mexico Dept. of Game and Fish, printed by Judd and Detweiler, Inc., Washington, D.C.
- Barneby, R.C. 1989. Fabales, Vol. 3, Part B. Fables. In: A. Cronquist, A.H. Holmgren, N.H. Holmgren, J.L. Reveal and P.K. Holmgren. Vascular Plants of the Intermountain West, U.S.A. New York Botanical Garden, Bronx, NY.
- Baxter, G.T. and M.D. Stone. 1985. Amphibians and Reptiles of Wyoming. Second edition. Wyoming Game and Fish Department. 137 pp.
- Behle, W. H., J. Ghiselin. 1958. Additional data on the birds of the Uinta Mountains and Basin of northwestern Utah. *Great Basin Nat.* 18: 1-22.
- Best, L. B. 1972. First year effects of sagebrush control on two sparrows. *J. Wildl. Manage.* 36: 534-544.
- Boyd, R.J. 1978. American elk, pp. 11-29 in J.W. Schmidt and D.L. Gilbert, Big Game of North America, Stackpole Books, Harrisburg PA.
- Boyd, R.J. and E.E. Rayland. 1971. Breeding dates of Colorado elk as estimated by fetal growth curves. Colorado Division of Wildlife Information Leaflet No. 88.
- Broderick, J. Personal Communications, Wildlife Biologist, Colorado Division of Wildlife, Glenwood Springs, CO.
- Burke, J. 2007. Personal Communication. Forest Silviculturalist, White River National Forest, Glenwood Springs, CO.
- Burleigh, T. D. 1972. Birds of Idaho. Caxton Printers, Caldwell, ID.
- Carey, C. 1993. Hypothesis concerning the causes of the disappearance of boreal toads from the mountains of Colorado. *Conservation Biology* 7:355-362.
- Carey, C., N. Cohen, and L. Rollins-Smith. 1999. Amphibian declines: An immunological perspective. *Developmental and Comparative Immunology* 23:459-472.
- Carpenter, L.H. 1976. Nitrogen-herbicide effects on sagebrush deer range. Unpubl. Ph.D. dissertation, Colorado State University, Ft. Collins, C). 159pp.



- Christensen, A.G. L.J. Lyon and J. Unsworth. 1993. Elk management in the Northern Region: considerations in forest plan updates or revisions, USDA Forest Service, GTR INT-303. Missoula, MT.
- Clevanger, A. P., B. Chruszcz, and K. Gunson. 2001 Highway mitigation fencing reduces wildlife-vehicle collisions. *Wildlife Society Bulletin* 29:646-653.
- Colorado Division of Wildlife. 2010. Natural Diversity Information System.  
<http://ndis.nrel.colostate.edu/ftp/index.html>
- Colorado Natural Heritage Program. 2006. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, CO.
- Corn, P.S. and J.C. Fogleman. 1984. Extinction of montane populations of the northern leopard frog (*Rana pipiens*) in Colorado. *Journal of Herpetology* 18:147-152.
- Corn, P.S. and L.J. Livo. 1989. Leopard frog and wood frog reproduction in Colorado and Wyoming. *Northwestern Naturalist* 70:1-9.
- Cousineau, M. and K. Rogers. 1991. Observations on sympatric *Rana pipiens*, *R. blairi*, and their hybrids in eastern Colorado. *Journal of Herpetology* 25:114-116.
- Daszak, P., L. Berger, A.A. Cunningham, A.D. Hyatt, D.E. Green, and R. Speare. 1999. Emerging infectious diseases and amphibian population declines. *Emerging Infectious Diseases* 5:735-748.
- Dawson, W. L. 1923. The birds of California. Vol. 1. South Moulton Co. Los Angeles, CA.
- Dawson, W. R., C. Carey, C. S. Adkisson, R. D. Ohmart. 1979. Responses of Brewer's and Chipping sparrows to water restriction. *Physiol. Zool.* 52: 529–541.
- DeVergie, W.J. 1989. Thesis: Elk movements, dispersal, and winter range carrying capacity in the upper Eagle River Valley, Colorado. Dept. of Fishery & Wildlife Biology, Colorado State University, Ft. Collins, CO.
- Dobler, F. C. 1994. Washington State shrubsteppe ecosystem studies with emphasis on the relationship between non-game birds and shrub and grass cover densities. Pp. 149–161 in *Proceedings—Ecology and management of annual rangelands* (S. B. Monsen and S. G. Kitchen, compilers). USDA Forest Serv. Gen. Tech. Rep. INT-GTR 313.
- Dodd, N.L., J.W. Gagnon, S. Boe, and R.E. Schweinsburg. 2006. Characteristics of elk-vehicle collisions and comparison to GPS-determined highway crossing patterns. Pages 461-477 in C.L. Irwin, P. Garrett, and K.P. McDermott, eds. 2005 proceedings of the International Conference on Ecology and Transportation. Center for Transportation and the Environment, North Carolina State University, Raleigh NC.
- Dodd, N.L., J.W. Gagnon, S. Boe, and R.E. Schweinsburg. 2007. Assessment of Elk Highway Permeability by Using Global Positioning System Telemetry. *The Journal of Wildlife Management*, 71(4):1107-1117; 2007).
- Dorn, J. L., R. D. Dorn. 1990. Wyoming birds. Mountain West Publ., Cheyenne, WY.
- Dunning, J. B., J. H. Brown. 1982. Summer rainfall and winter sparrow densities: a test of the food limitation hypothesis. *Auk* 99: 123–129.
- Emery, A.R., A.H. Berst, and K. Kodaira. 1972. Under-ice observations of wintering sites of leopard frogs. *Copeia* 1972:123-126.
- Faeh, S.A., D.K. Nichols, and V.R. Beasley. 1998. Infectious diseases of amphibians. Pages 259-265 in M.J. Lannoo, editor. *Status and Conservation of Midwestern Amphibians*. University of Iowa Press, Iowa City, IA. 507 pp.
- Farrell, J.E., L.R. Irby, and P.T. McGowan. 2002. Strategies for ungulate-vehicle collision mitigation. *Intermountain Journal of Sciences* 8:18.
- Fitzgerald, J.P., C.A. Meaney and D.M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History. University Press of Colorado. P.O. Box 849, Niwot, CO 80544.



- Franz, R. 1971. Notes on the distribution and ecology of the herpetofauna of northwestern Montana. Bulletin of the Maryland Herpetological Society 7:1-10.
- Freddy, D. J. 2003. Personal communication with Keith Giezentanner regarding proposed parameters of elk populations. Biologist with CDOW.
- Freddy, D. J., W.M. Bronaugh and M.C. Fowler. 1986. Response of mule deer to disturbance by persons afoot and snowmobiles. Wildlife Society Bulletin. 14:63-68. In Joslin, G., and H. Youmans, coordinators. 1999.
- Freddy, D.J. 1987. The White River elk herd: a perspective, 1960-1985. Tech. Publication, Colorado Division of Wildlife, Denver, CO. 37:1-64.
- Freddy, D.J., L.Baker, R.M. Bartmann, and R.C. Kufeld. 1993. Deer and elk management analysis guide, 1992-1994. Colorado Division of Wildlife.
- Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Island Press, Washington, D.C.
- Gagnon, J.W., T.C. Theimer, N.L. Dodd, S. Boe, and R.E. Schweinsburg. 2007. Traffic Volume Alters Elk Distribution and Highway Crossings in Arizona. Journal of Wildlife Management. 71(7): 2318-2323; 2007.
- Giezentanner, K.I. 2004. Management indicator species monitoring protocol, White River National Forest, Rocky Mountain elk. USDA Forest Service, White River National Forest unpublished report. Glenwood Springs, CO. 10p.
- Giezentanner, K.I. 2007. Personal Communications. Forest Ecologist, White River National Forest, Glenwood Springs, CO.
- Hammerson, G.A. 1982. Bullfrog eliminating leopard frogs in Colorado? Herpetological Review 13:115-116.
- Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado. Second edition. University Press of Colorado and Colorado Division of Wildlife, Niwot, CO. 484 pp.
- Hart, J.H. and D.L. Hart. 2001. Interaction among cervids, fungi, and aspen in northwest Wyoming. Pages 197-205 In: Sheppard, W.D., D. Binkley, D.L. Bartos, T.J. Stohlgren, and L.G. Lane (compilers), sustaining aspen in western landscapes: symposium proceedings; June 13-15, 2000, Grand Junction, CO. proceedings RMRS-P-18. USDA Forest Service, Rocky Mountain Research Station, Ft. Collins, CO.
- Hendricks, F.S. 1973. Intestinal contents of *Rana pipiens* Schreber (Ranidae) larvae. Southwestern Naturalist 18:99-101.
- Hillis, J.M., M. J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-43 in Proceedings of Elk Vulnerability Symposium. Montana State University, Bozeman, MT.
- Hoover, R. L. and D. L. Wills, eds. 1984. Managing forested lands for wildlife. Published by Colorado Division of Wildlife, Denver, CO. 459pp.
- Knick, S. T., J. T. Rotenberry. 1995. Landscape characteristics of shrubsteppe habitats and breeding passerine birds. Conserv. Biol. 9: 1059-1071.
- Knight, R.L. and D.N. Cole. 1995. Wildlife responses to recreationists. Pages 51-69 in R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Island Press, Washington D.C.
- Knight, R.L. and K.J. Gutzwiller. 1995. Wildlife and recreation: coexistence through management and research. Island, Washington, D.C.
- Knopf, F. L., J. A. Sedgwick, D. B. Inkley. 1990. Regional correspondence among shrubsteppe bird habitats. Condor 92: 45-53.



- Leptich, D.J. and P. Zager 1991. Road access management effects on elk mortality and population dynamics. From proceedings of a symposium on elk vulnerability; Montana State University, Bozeman, MT. April 2-1991. (In USDA Forest Service, 2000).
- Linzey, D.W. 1967. Food of the leopard frog, *Rana pipiens pipiens*, in central New York. Herpetologica 23:11-17.
- Loveless, C.M. 1967. Ecological characteristics of a mule deer winter range. Tech. Bull., Colorado Div. Game, Fish and Parks, 20:1-124.
- Loye, J. E., M. Zuk. 1991. Bird-parasite interactions: ecology, evolution, and behavior. Oxford Univ. Press, Oxford, UK.
- Lyon, L.J. 1979. Habitat effectiveness for elk as influenced by roads and cover. J. Forestry. 77:658-660.
- Lyon, L.J. 1983. Road density models describing habitat effectiveness for elk. J. Forestry. 81:592-595.
- Lyon, L.J. and A.G. Christensen. 2002. Elk and land management. Pages 557-582 in D.E. Toweill and J.W. Thomas, Elk of North America: Ecology and Management. Smithsonian Institution Press. Washington, D.C.
- Lyon, L.J. and A.L. Ward. 1982. Elk and land management. Pages 443-477 in J.W. Thomas and D.E. Toweill, eds. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PE.
- Lyon, L.J. and C.E. Jensen. 1980. Management implications of elk and deer use of clear-cuts in Montana. J. Wildlife Management, 44:352-361.
- Mackie, R.J., K.L. Hamlin, and D.F. Pac. 1982. Mule deer. Pp. 862-877, in wild mammals of North America: biology, management, and economics (J.A. Chapman and G.A. Feldhamer, eds.) Johns Hopkins Univ. Press. Baltimore, 1147pp.
- Merrell, D.J. 1970. Migration and gene dispersal in *Rana pipiens*. American Zoologist 10:47-52.
- Merrell, D.J. 1977. Life history of the leopard frog, *Rana pipiens*, in Minnesota. Bell Museum of Natural History Occasional Papers No. 15:1-23.
- Morin, P.J. 1983. Predation, competition, and the composition of larval anuran guilds. Ecological Monographs 53:119-138.
- Morrison, J.R. 1992. Thesis: The effects of ski area expansion on elk, and accuracy of 2 telemetry systems in mountainous terrain. Department of Fishery and Wildlife Biology, Colorado State University, Ft. Collins, CO.
- Nagy, J.G. and R.P. Tengerdy. 1967. Antibacterial action of essential oils of *Artemisia* as an ecological factor II. Antibacterial action of the volatile oils of *Artemisia tridentata* (big sagebrush) on bacteria from the rumen of mule deer. Appl. Microbiology. 16:441-444.
- NatureServe: An online encyclopedia of life [web application]. 2009. Version 1.4 . Arlington, Virginia, USA: Association for Biodiversity Information. Available: <http://www.natureserve.org/>.
- Nelson, J.R. and T.A. Leege. 1982. Nutritional requirements and food habits. Pages 323-367 in J.W. Thomas and D.E. Toweill, eds. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.
- Petersen, K. L., L. B. Best. 1987. Brewer's Sparrow nest-site characteristics in a sagebrush community. J. Field Ornithol. 56: 23-27.
- Petterson, E.S. 2006a. Ecological Assessment for the Los Amigos project, Garfield County, Colorado. Rocky Mountain Ecological Services, Redstone, CO.
- Petterson, E.S. 2006b. Wildlife Assessment for the Hunt Ranch project, Garfield County, Colorado. Rocky Mountain Ecological Services, Redstone, CO.
- Petterson, E.S. 2007a. Biological Evaluation for the Jones Gulch Hut and Associated Trails Project. Rocky Mountain Ecological Services, Redstone, CO.



- Petterson, E.S. 2007b. Wildlife Assessment for the Ginn Battle Mountain Resort. Rocky Mountain Ecological Services, Redstone, CO.
- Petterson, E.S. 2007c. Ecological Assessment for the Spring Valley Ranch project, Garfield County, Colorado. Rocky Mountain Ecological Services, Redstone, CO.
- Petterson, E.S. 2010. Stream Health Monitoring Summary- 2008/2009. Bull Mountain Natural Gas Pipeline, Gunnison County, CO. Rocky Mountain Ecological Services, Inc. Glenwood Springs, CO. 140pp.
- Phillips, G.E. 1998. Effects of human-induced disturbance during calving season on reproductive success of elk in the upper Eagle River Valley, Colorado. Dissertation, Department of Fishery and Wildlife Biology, Colorado State University, Ft. Collins, CO.
- Phillips, G.E. and A.W. Alldredge. 2000. Reproductive success of elk following disturbance by humans during calving season. *J. Wildlife Management*, 64:521-530.
- Rappole, J. H., E. S. Morton, T. E. Lovejoy, III, J. L. Ruos. 1993. *Aves migratorias Nearcticas en los Neotropicos*. Smithsonian Inst., Washington, D.C.
- Rorabaugh, J.C. 2005. *Rana pipiens*. Pages 570-580 in M. Lannoo, editor. *Amphibian Declines: The Conservation Status of North American Species*. University of California Press, Berkeley, CA.
- Rotenberry, J. T., J. A. Wiens. 1989. Reproductive biology of shrubsteppe passerine birds: geographical and temporal variation in clutch size, brood size, and fledging success. *Condor* 91: 1-14.
- Rotenberry, J. T., M. A. Patten, and K. L. Preston. 1999a. Brewer's Sparrow (*Spizella breweri*). In *The Birds of North America*, No. 390 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA
- Rotenberry, J. T., S. T. Knick. 1999b. From the individual to the landscape: multiscale habitat associations of a shrubsteppe passerine and their implications for conservation biology. In *Ecology and conservation of grassland birds of the Western Hemisphere* (P. Vickery and J. Herkert, eds.). *Stud. Avian Biol.*
- Rowland, M.M., M.J. Wisdom, B.K. Johnson and J.G. Kie. Elk distribution and modeling in relation to roads. *J. of Wildlife Management*, 64:672-684.
- Sawyer, H. 2009. Personal Communications. Wildlife Biologist, Western EcoSystems Technology, Inc. 12/31/2009. WEST, Inc. Laramie, WY.
- Seburn, C.N.L., D.C. Seburn, and C.A. Paszkowski. 1997. Northern leopard frog (*Rana pipiens*) dispersal in relation to habitat. Pages 64-72 in D.M. Green, editor. *Amphibians in Decline: Canadian Studies of a Global Problem*. Society for the Study of Amphibians and Reptiles, Herpetological Conservation Number One. St. Louis, MO. 338 pp.
- Seidel, J.W. 1977. Elk calving behavior in west central Colorado, in *Proceedings Western States Elk Workshop*, Colorado Division of Wildlife. Denver, CO.
- Semenchuk, G. P. 1992. *The atlas of breeding birds of Alberta*. Fed. of Alberta Nat., Edmonton.
- Skovlin, J.M., P. Zager, and B.K. Johnson. 2002. Elk habitat selection and evaluation. Pages 531-556 in D.E. Toweill and J.W. Thomas, *Elk of North America: Ecology and Management*. Smithsonian Institution Press. Washington, D.C.
- Smith, B.E. and D.A. Keinath. (2007, January 16). Northern Leopard Frog (*Rana pipiens*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/northernleopardfrog.pdf> [1/20/2009].
- Spellerberg, L.F. 1998. Ecological effects of roads and traffic: a literature review. *Global Ecology and Biogeography Letters*. 7, 317-333.
- Stewart, R. E. 1975. *Breeding birds of North Dakota*. U.S. Fish Wildl. Serv., Northern Prairie Wildl. Res. Cent., Jamestown, ND.



- Suzuki, K. 1997. Aspen regeneration in elk winter range of Rocky Mountain National Park and Roosevelt National Forest. Masters Thesis, Colorado State University, Graduate Degree Program in Ecology, Ft. Collins, CO.
- Thomas, J.W. and D.E. Toweill. 1982. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.
- Thomas, J.W., H. Black, Jr., R.J. Scherzinger and R.J. Pedersen. 1979. Deer and elk, pp. 104-127 in J.W. Thomas, ed., Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington, USDA Forest Service, Agricultural Handbook No. 553. Pacific Northwest Forest and Range Experiment Station, Portland, OR.
- Thomas, J.W., H. Black, Jr., R.J. Scherzinger and R.J. Pedersen. 1979. Deer and elk, pp. 104-127 in J.W. Thomas, ed., Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington, USDA Forest Service, Agricultural Handbook No. 553. Pacific Northwest Forest and Range Experiment Station, Portland, OR.
- Towry, R.K., Jr. 1984. Wildlife habitat requirements. Pages 72-209 in R.L. Hoover and D.L. Wills eds. Managing forested lands for wildlife. Colorado Division of Wildlife, Denver, CO.
- U.S. Fish and Wildlife Service (USFWS). 2008a. Birds of conservation concern 2008. Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Available online at <<http://www.fws.gov/migratorybirds/>>
- U.S. Fish and Wildlife Service. 1995. Migratory nongame birds of management concern in the United States: The 1995 List. USFWS, Office of Migratory Bird Manage. 149.2: M 58/4.
- Weber, W.A. and R.C. Wittmann. 2001. Colorado Flora: Eastern Slope and Western Slope. University Press of Colorado, Niwot, CO.
- Werner, E.E. and K.S. Glennemeier. 1999. Influence of forest canopy cover on breeding pond distributions of several amphibian species. *Copeia* 1999:1-12.
- Woodward, B.D. 1983. Predator-prey interactions and breeding-pond use of temporary-pond species in a desert anuran community. *Ecology* 64:1549-1555.





**Gunnison County, CO**  
**Community Development Department**

221 N. Wisconsin St. Ste. D, Gunnison, CO 81230

Phone: (970) 641-0360 FAX: (970) 641-8585

Website: [www.gunnisoncounty.org/planning.html](http://www.gunnisoncounty.org/planning.html)

Email: [planning@gunnisoncounty.org](mailto:planning@gunnisoncounty.org)

March 9, 2011

Catherine Dickert  
SG Interests I, Ltd.  
P.O. Box 26  
Montrose, CO 81402

Re: McIntyre Flowback Pits #1 and #2 application  
McIntyre Flowback Pits #3 and #4 application  
Determination of Application Completeness

Catherine,

I have completed the review of the McIntyre Flowback Pits Oil and Gas Operation applications, pursuant to *Section 1-106: Permit Review Procedures for Oil and Gas Operations, Gunnison County Temporary Regulations for Oil and Gas Operations*.

Please be advised that the applications have been determined to be incomplete, based upon deficiencies in the permit submittal requirements of the applications.

The following items have been identified as deficiencies in the applications, pursuant to *Section 1-104: Application Submittal Requirements For Oil And Gas Permits, B. Permit Submittal Requirements For Oil And Gas Operations, Gunnison County Temporary Regulations for Oil and Gas Operations*. An applicant for a permit to conduct Oil and Gas Operations shall submit the following information:

**9. Site Plan Map.**

- c. Proposed Facilities. Proposed facilities such as structures, pipelines, tanks, wells, pits, flow lines, impoundment facilities, staging and storage areas and equipment.**
- No site plan identifying the location of wells to be drilled in conjunction with the operation of the flowback pits.
  - No site plan identifying the location of surface and/or subsurface pipelines, used in conjunction with the operation of the flowback pits.
  - No site plan identifying the location of pumps/pumping stations used in the operation of the flowback pits.

- No site plan identifying the roads associated with the construction of the proposed wells or pipeline network, used in conjunction with the operation of the flowback pits.
- 11. Operation Plan. A plan including the method and schedule for drilling, completion, transporting, production and post-operation.**
- No plan submitted, including the method and schedule for drilling, completion, transporting, anticipated production and post-operation, for wells to be drilled and used in conjunction with the operation of the flowback pits.
  - No plan submitted for construction of the surface and/or subsurface pipelines, used in conjunction with the operation of the flowback pits.
  - No plan submitted for the construction of roads, associated with the wells to be drilled and pipelines to be constructed, used in conjunction with the operation of the flowback pits.
  - No identification of the type, sizing or materials used for the flowback surface "poly" pipelines.
  - No identification of the type, size, or number of pumps/pumping stations, intermediate or at the pits, used in the operation of the flowback pits.
- 18. Emergency Response Plan. An emergency response plan that addresses fire protection and hazardous spills, including the name and contact information for the applicant's incident commander, proposed signage, access/evacuation routes, and health care facilities anticipated to be used.**
- No identification of the fracture stimulation fluids; including the types, volumes, or chemical constituency of the materials stored or used, as a component of the flowback water.
- 19. Water Quality Non-Point Source Impacts.**
- c. Non-Point Source Impacts to Water Quality. A description of potential non-point source pollution associated with the proposed Oil and Gas Operation and proposed mitigation.**
- No identification of the fracture stimulation fluids; including the types, volumes, or chemical constituency of the materials stored or used, as a component of the flowback water.

If you have any questions, please let me know. You will have 60 days in which to resubmit the items identified, or the application will be considered withdrawn.

Sincerely,



Neal Starkebaum, AICP  
Assistant Director

cc: Joanne Williams, Gunnison County Community Development Director  
David Baumgarten, Gunnison County Attorney

Attachment 2

Stormwater Discharge Permit

# STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION  
TELEPHONE: (303) 692-3500



**CERTIFICATION TO DISCHARGE  
UNDER  
CDPS GENERAL PERMIT COR-030000  
STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION**

Certification Number **COR039711**

This Certification to Discharge specifically authorizes:

***S.G. Interests I, Ltd.***

LEGAL CONTACT:

*Lynn Garner, Oper. Mgr.  
S.G. Interests I, Ltd.  
P.O. Box 26  
Montrose, CO 81401  
Phone # 970/252-0696  
lgarner@sginterests.com*

LOCAL CONTACT:

*Lynn Garner, Oper. Mgr./Agent,  
Phone # 970/252-0696  
lgarner@sginterests.com*

During the Construction Activity: **Oil & Gas Field Development**  
to discharge stormwater from the facility identified as **S.G. Interests I Oil field**  
**Common Plan of Development**  
which is located at:

**Map In File  
, Co**

**Latitude 39/07/03, Longitude 107/28/11  
In Gunnison/Delta County**

**to: -- E. Muddy Creek**

Anticipated Activity begins **05/01/2006** continuing through **12/31/2015**  
On **30 acres (30 acres disturbed)**

Certification is effective: **07/01/2007** Certification Expires: **06/30/2012**

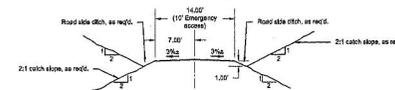
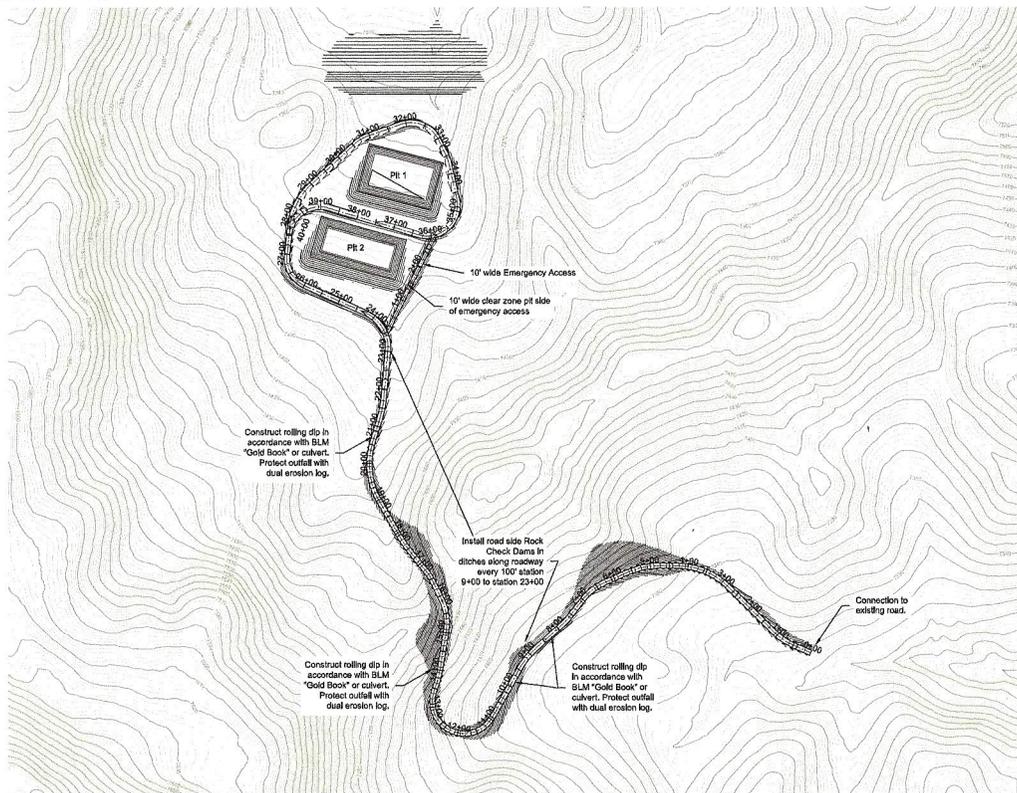
Annual Fee: \$245.00 (**DO NOT PAY NOW** – A prorated bill will be sent shortly.)

Attachment 3

Road Map with Profile

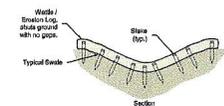
SG Interests, I.  
 Pit Roads 1 & 2  
 Road Map with Profile.  
 Surface Data Provided by SG Interests.

BELL CONSULTING, LLC  
 P.O. Box 8  
 Rifle, Colorado 81650  
 Voice: 970/625-9313 Fax: 970/625-9315

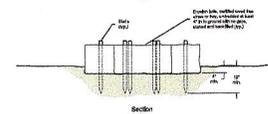
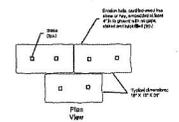


Temporary Rock Check Dam Notes:  
 1. Maximum height of dam at center should not exceed 2' or one-half of the depth of the ditch.  
 2. Check dam should be wide enough to reach from bank to bank of the inside of ditch.

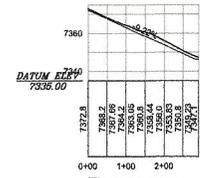
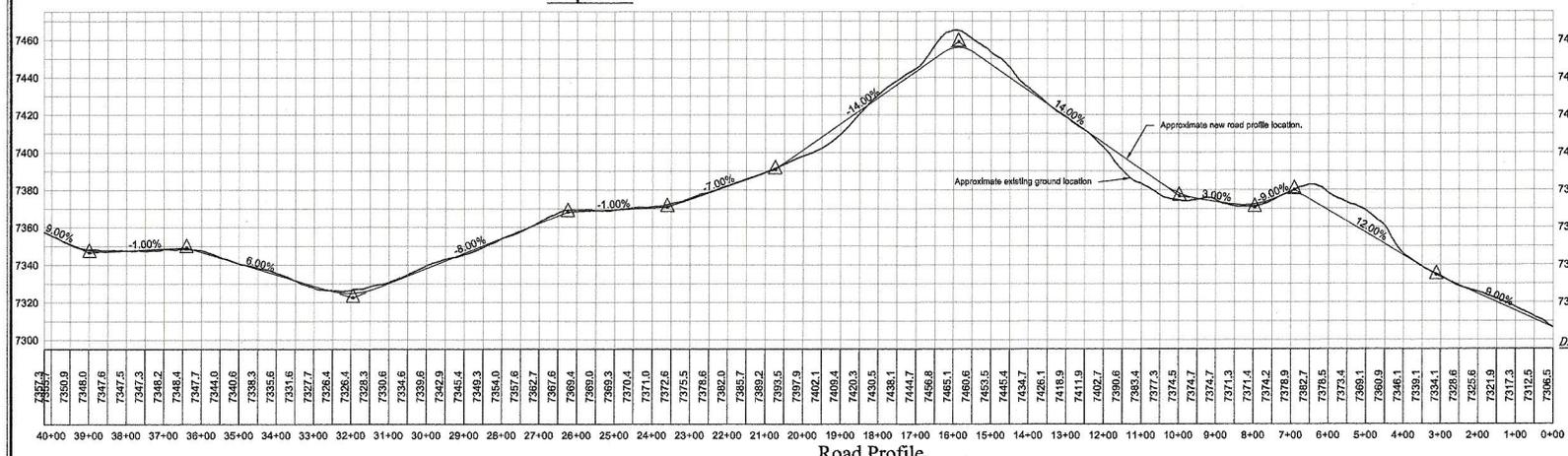
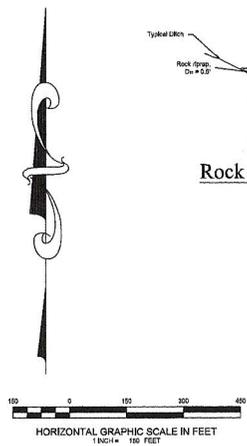
Rock Check Dam  
 Do not scale.



Wattle / Erosion Log.  
 Do not scale.



Straw / Hay Check Dam.  
 Do not scale.



Emergency Access Profile.  
 Do not scale.

Attachment 4

Revised Stormwater Management Plan

THE STORMWATER MANAGEMENT PLAN INCLUDED WITH THIS SUBMITTAL HAS BEEN REMOVED. IT WAS REPLACED BY A SWMP COVERING PITS #1, 2, 3, AND 4 SUBMITTED TO COGCC 5/25/2011. (SCANNED SEPARATELY). GD

Attachment 5

Letter from Rock Creek Ranch I Ltd

February 17, 2011

Department of Natural Resources  
Colorado Oil and Gas Conservation Commission  
Alex Fischer, P.G.  
Environmental Supervisor- Western Colorado  
1120 Lincoln St., Suite 801  
Denver, CO 80203

Mr. Fischer,

Rock Creek Ranch I, Ltd. is the owner of lands in Gunnison County, Colorado, located Sections 23, 24 and 26 of Township 11 South, Range 90 West, 6<sup>th</sup> P.M., among other lands.

SG Interests I, Ltd. has submitted Permit Applications to construct and operate the "McIntyre Flowback Pits 1-4" on these lands. Please accept this letter as documentation authorizing SG Interests I, Ltd. to construct and operate these facilities on the abovereferenced lands owned by Rock Creek Ranch I, Ltd.

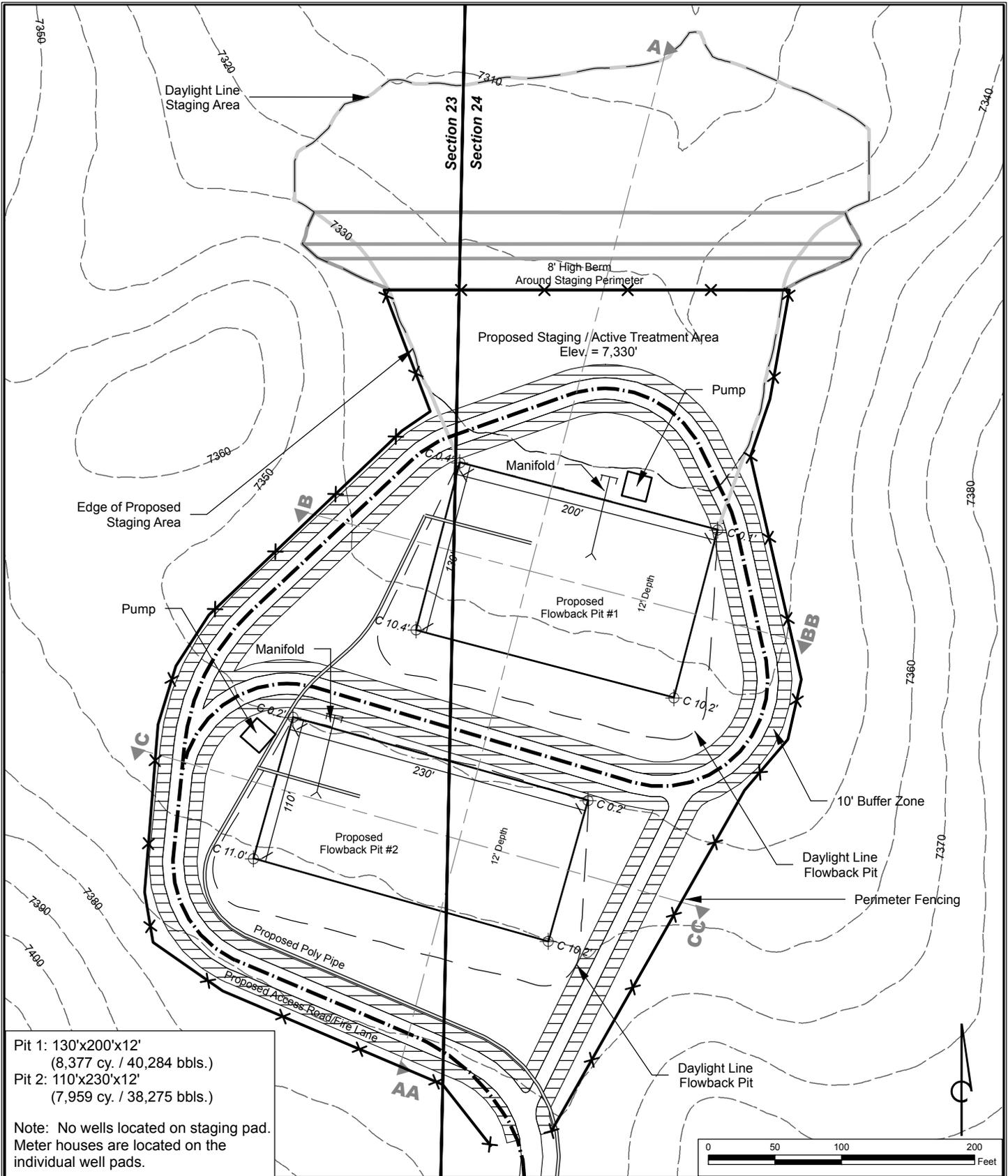
Sincerely,



Robert H. Guinn, II

Attachment 6

Revised Construction Layout Drawing



Pit 1: 130'x200'x12'  
 (8,377 cy. / 40,284 bbls.)  
 Pit 2: 110'x230'x12'  
 (7,959 cy. / 38,275 bbls.)

Note: No wells located on staging pad.  
 Meter houses are located on the individual well pads.

ITEM	Estimated Dirt Quantities (cy)		
	CUT	FILL	EXCESS
	<i>SUBSOIL</i>	<i>TOPSOIL</i>	
Pit 1	14,169	1,041	15,210 (C)
Pit 2	13,860	1,057	14,917 (C)
Staging		2,687	25,342 (F)
<b>TOTAL</b>	<b>28,029</b>	<b>4,785</b>	<b>28,029</b> <b>4,785 (C)</b>

Notes:

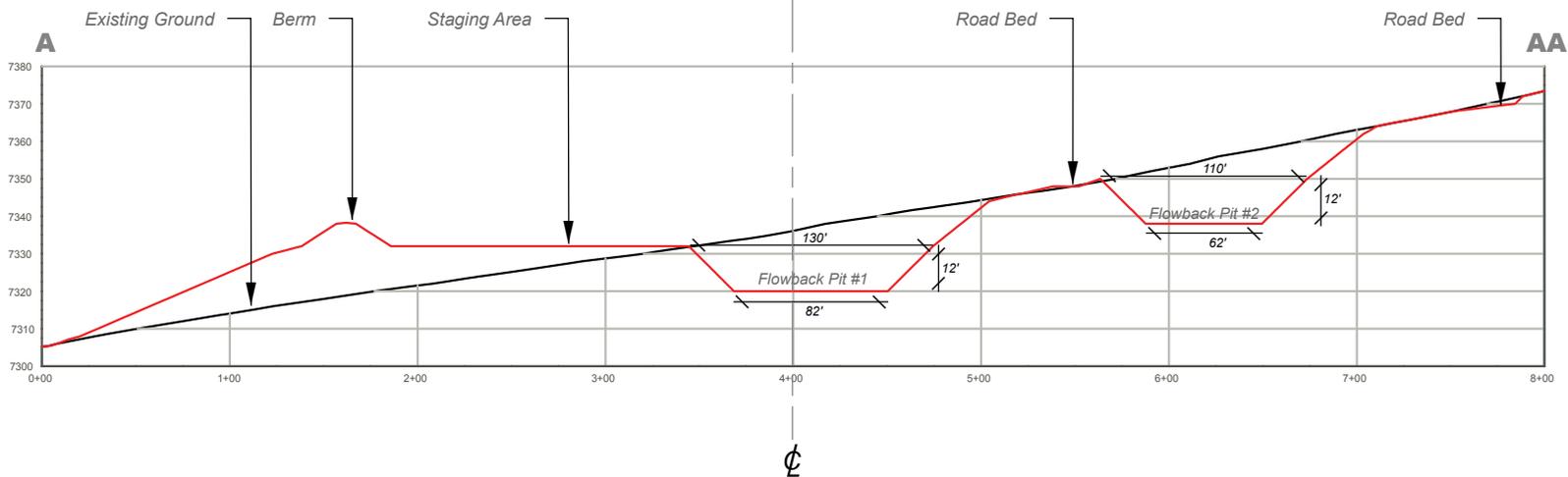
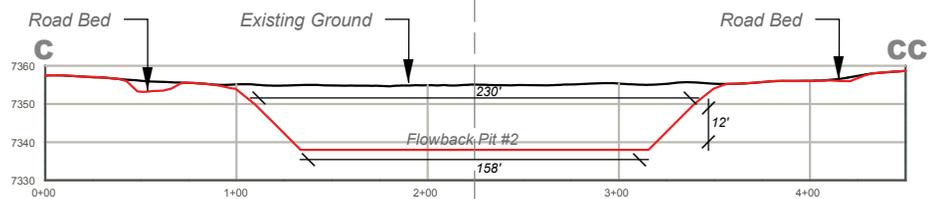
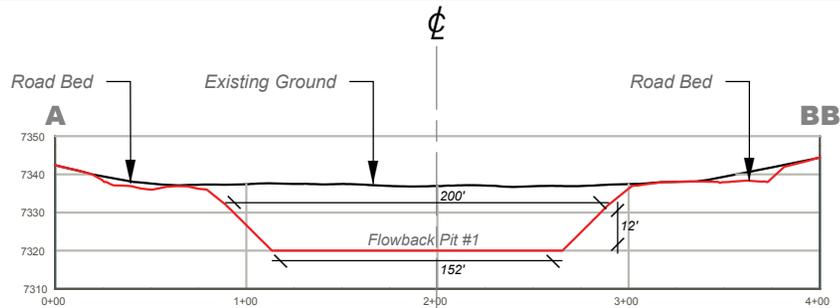
1. Subsoil from pits cuts (28,029 cy.) used to create staging area.
2. Topsoil (4,785 cy.) stored in separate pile from staging area.
3. Topsoil volumes based on 8" soil depth.
4. Total Disturbed Area = +/- 4.0 Ac.

SCALE: 1" = 100'  
 DATE: 03.10.2011

 **SG Interests**  
 PO Box 26  
 Montrose, CO 81402  
 970-252-0696

**Bull Mountain Unit**  
 T. 11 S, R. 90 W, Sections 23 & 24

**McIntyre Flowback Pits 1 & 2**  
**CONSTRUCTION LAYOUT**



**Notes:**

1. Inner perimeter cut slopes = 2:1.
2. Outer perimeter cut slopes = 2.5:1.



**SG Interests**  
PO Box 26  
Montrose, CO 81402  
970-252-0696

**Bull Mountain Unit**

T. 11 S, R. 90 W, Section 23 & 24

**McIntyre Flowback Pits 1 & 2**

**CONSTRUCTION CROSS SECTION**

SCALE: Horiz.: 1" = 100'  
Vert.: 1" = 50'  
DATE: 03.10.2011

Attachment 7

Revised Operating Plan

## Operating Plan for McIntyre Flowback Pits #1 and #2 (908.B.8)

### Project Introduction

SG Interests has planned two facilities at which they will store water, including flowback water, for use in frac'ing wells in their Bull Mountain Unit and at nearby wells outside the unit. McIntyre Flowback Pits 1 and 2 are located at one of these facilities and are the subject of this Operating Plan. Both facilities will be located on Rock Creek Ranch, a property owned by an affiliate of SG Interests, Rock Creek Ranch I Ltd. The Construction Layout drawings included in this application depict the general arrangement of the facility. The purpose of this Operating Plan is to provide a basis for developing and implementing the processes and procedures that will be used at the facility. This plan will be updated at regular intervals beginning prior to project construction and annually after that. This facility will have a Spill Prevention, Containment and Countermeasure Plan prepared within six months of project construction. The SPCC plan will include a Facility Response Plan due to the volume of water stored at the facility.

The basic plan for use of the facilities is to transport water to be stored in the pits via poly pipeline on the ground surface. These pipelines can be laid on the ground without creating ground disturbance (see example photo below from <http://www.wpandd.com/photoGallery.html>). Wherever possible, these pipelines will be laid alongside or over existing disturbance such as along an access road. Before the pipelines are moved to a new location, they will be dried using a foam pig pushed by compressed air. The pig will be pushed back toward the pits allowing the fluid to drain into the pits. The pipeline can then either be dragged with a rubber tired vehicle to the new location or rolled back onto the coil for relocation.



Photo 1. Example of surface poly pipeline in use.

Most produced water that will be stored in the pits will be piped through SG Interests' existing buried water pipeline gathering system to the Federal #24-2 WDW (05-051-06084, water disposal well) and from there via surface poly pipelines to the pits. Surface poly pipelines that cross sensitive areas will have secondary containment to prevent a leak in a poly line from contaminating surface waters. These temporary surface poly water pipes can be moved as needed to connect the pits with gas well sites or injection well sites for disposal.

Trailer-mounted pumps will be located near the edge of each pit to pump water into and out of the pits (see photo 2). Water pumps will have built-in secondary containment systems known as ecology rails (see photo 3). Ecology rails are built-in sump systems that are part of the skids of these pumps.



Photo 2. Example of water pumps with stinger pipes reaching down into a pit.



Photo 3. Ecology rails are secondary containment systems that surround the pumps and prevent pump fuel and fluids from reaching the ground.

Booster pumps will be needed at certain points along some of the poly pipeline routes to keep the water flowing at the desired pressure. These points will be determined by field conditions such as topography between the facility and the well location. Although none of these locations have yet been identified, a map with their locations will be provided to COGCC with a Form 4, Sundry Notice whenever a booster pump is needed.

It will not be possible to connect all wells supplying produced water for storage in the pits via pipe. Some wells will have water trucked from tanks on these locations. Operators will use the permanent manifold structures located next to each pit, to deliver or remove water from pits by truck. This will prevent water hoses from being dropped into the pits and dragged over the liner, which could lead to liner damage. The manifold structure uses a hose that is left in place in each pit throughout the season to reach water stored in the pits. This hose will lay on an additional piece of 60 mil liner from its first contact with the pit liner to the bottom of the pit. Operators will only use the manifold structure to access the pit from the staging area. No operators will be allowed to approach the pit any closer than the manifold structure. Prior to disconnecting the hose from the manifold, equipment operators will reverse pump to clear fluid from the hose. Each manifold will have a galvanized or graded catch basin in case a leak does occur while operators are connecting or disconnecting hoses. The standard basin for this type of containment is 8'x6'x2'. Fluid will not be allowed to build up within any secondary containment system.

**Photo 4.** Hose manifold with containment system beneath connections.



The pits will not be used during the winter season. Winterization of the pits will consist of removal of stationary equipment from the staging area and removal of poly pipelines from unit. Equipment that would be removed from the staging area includes the pumps, poly pipes, and hose manifold. The stationary hose that extends from the manifold structure into the pit will also be removed for winter shut down. The volume of water stored in the pits over winter will be reduced to accommodate snow fall. The highest recorded annual total snowfall measured in Meredith, Colorado (similar in elevation to this site) was 192" in 1964 ( $\approx 16'$ ) (Western Regional Climate Center data). In order to accommodate this snow if it were all to melt in one event, the pit water would be drawn down 16" in both pits 1 and 2. This draw down would accommodate all of the snow melt resulting from 16' of snow, which would approximately equal 16" of water. Pit 1 would be drawn down by 5,237 bbl and Pit 2 by 5,049 bbl each year if the pits were filled to capacity prior to draw down (capacity calculated with two feet of freeboard). This water would be disposed of either at a commercial facility or at SG's

water disposal well each year. The volume in the pits would be monitored daily during the winter. The facility access road will be kept plowed and accessible during the winter. In the event that plowing does not occur in time for daily facility monitoring, the location is accessible with a snowmobile. If problems are noted during a snowmobile site visit, the road will be plowed immediately and the problem addressed. Bird netting would also be monitored daily over the winter shut down period. Any necessary maintenance for this netting would be performed as needed (damage from snow load etc.).

This operating plan will be updated prior to start-up of the facility, whenever a significant change in operations occurs, and annually thereafter. See Appendix A to this plan for the Facility Modification Checklist (FMC) to be used when updating this plan. Changes that should be recorded on the FMC include facility modifications, updates to the Operating Plan, permit reporting information. Whenever the FMC is filled out, it will be forwarded to COGCC with a Form 4, Sundry Notice, for approval.

An Annual Review of operations will be provided to COGCC by December 31<sup>st</sup> each year that the facility is in operation. This review will summarize operations for the year and will include the volume of produced water handled at the facility, volume of produced water disposed of, and any results from surface and groundwater monitoring.

#### A. Method of Treatment and Loading Rates

The water to be stored in the McIntyre Pits will initially be comprised of a mixture of fresh water from the Bainard Reservoir No. 1 Augmentation Plan and produced water from several of SG Interests' wells in the area. A list of these wells and water analysis reports for the listed wells is attached to this application. Fresh water will be added as necessary utilizing the Bainard Reservoir No. 1 Augmentation Plan. SG re-built the existing Bainard Reservoir No. 1 and obtained an Augmentation Plan through State Water Court to use this water for commercial/industrial purposes. When water will be drawn from a pit to be used for frac'ing a well, it is filtered (filter model # SWD10R29.50P) before use in frac'ing the well and the resulting flowback water will be filtered as well. These filters are designed to remove solids, coal, hydrocarbons, and sediments. The filters have a polypropylene core and yarn. The filter sock measures 7.5"W X 32"L and the cartridge measures 2.0"W X 29"L. The MSDS sheets for these filters are attached to this plan. Water is then piped back into the pits for storage until it is reused. Filter systems may be located on individual well locations or at the pit facility. When the pits are being filled, water will flow into them at the rate of about 3,000 barrels per day. Water in the pits will be treated as necessary to prevent bacteria buildup using biocide developed for that purpose. Dead bacteria are filtered out of the water when the water is drawn from the pits for reuse. Bacteria treatment will prevent odor from emanating from the pits.

#### B. Dust and Moisture Control

The facility is not required to obtain a land disturbance permit from CDPHE since it is below the acreage threshold of 25 acres and construction will not last six months or more. Dust on the staging area adjacent to the pits and pit access roads will be controlled by application of fresh water as needed to keep dust down. SG expects dust treatment to be needed infrequently because trucks will not ordinarily be used to transport this water. There will be no dust or moisture control needed for the pits themselves.

### C. Sampling

As new wells begin producing and are included in the list of wells contributing produced water to the pits, they will be added to the list of wells by Sundry Notice. Water analyses for this produced water will be included with this form. As new wells are frac'ed and contribute flowback water to the pits, these new wells will also be added to the list of wells through a Sundry Notice. Once flowback water has been added to the pits, analytical water testing will be conducted of the pit water (as per Linda Spry-O'Rourke's email dated October 7, 2010 and attached to this plan). Analytical testing will be conducted four times per year of the pit water. The results of this testing will be included with the Sundry Notice within three months of testing. The current list of wells and analytical test results for this produced water are in Attachment H.

There are no water wells used by members of the public for drinking water within one mile of the flowback pits. The State Engineer's Office shows one water well about one mile to the northeast of Flowback Pit #1 (Permit #263115). This well was not located in the field when water well sampling was conducted in 2010. Instead the landowners allowed access to the spigot from which they draw water. The source of this water is a spring box located off their property. This water (from spigot, not from water well) was sampled and tested (WQ 11-90-13 #2, in Attachment H). The second spring box that was tested is WQ 11-90-27 #1 as depicted on the map of shallow groundwater test locations in Attachment H. Surface water in the vicinity of the pits has also been collected and tested (see attached map and test results in Attachment H). Shallow groundwater and surface water has been tested and analyzed according to the parameters listed in Table 910-1. Shallow groundwater and surface water test points are indicated on the maps attached to this application (Attachment H). This water testing provides a baseline of water quality in the area prior to construction and filling of the pits. Once the pits are operational, testing of the shallow groundwater and surface water will be conducted during the season following initial filling of the pits, on the third year of use, and on the sixth year of use. Sampling of surface water and shallow groundwater sites for TDS will be conducted twice per operating season annually while the pits are in use. If the leak detection system shows there has been a leak in the primary liner or if TDS levels in the water test locations are elevated, additional analytical testing of the surface and shallow groundwater sites will be conducted as per COGCC requirements. All test results will be provided to the COGCC within three months of sampling. SG Interests will report confirmed leaks in pit liners to COGCC immediately.

SG Interests has designed the flowback pit facilities to protect water resources. This project includes a liner system that consists of two synthetic liners separated by geonet, which are set on a protective geomat set over a smooth ground surface. This liner system has a leak detection system, which SG will use to discover any leak that has occurred in the primary liner before it can reach the ground surface below the pit. This liner and leak detection system will be installed in pits that will be constructed entirely in cut soils, therefore the risk of pit failure is minimized. The facility includes appropriately designed drainage features to prevent water from overflowing the pits due to a precipitation event or snow build up (see Attachment D, Drainage Plan and Item 12, Drainage Calculations for details). The drainage plan for the facility includes all relevant details, but some of these features are a 12" liner lip around each pit, an 8' high berm or cut soil face surrounding the facility to prevent water flow onto or off from the facility, and secondary containment for the water pumps and hose manifold structures. These features are designed to prevent leaks from the facility, but shallow groundwater and surface water monitoring sites have been identified in this permit application to verify that these waters are not being contaminated by any fluids stored at the facility.

The water collected at these sites has been analytically tested. Over the life of the pits, the monitoring test results can be compared to their baseline test results as well as to analytical test results for the flowback pit water in order to verify that contamination of ground and surface waters has not occurred.

#### D. Inspection and Maintenance

Daily inspection at the facility will include visual inspection of the entire facility for any readily apparent problems. This will include watching for leaks in any equipment, damage to any fencing or netting, and checking the integrity and capacity of secondary containment systems. All equipment will be inspected weekly in greater detail. This weekly inspection will include checking fluid levels, safety features, etc. for all motorized equipment on site. Filters for water entering and exiting the pits will be checked before each use and will be replaced as needed.

Inspection of the pit liners will occur on a quarterly basis and after any object has contacted the liner.

The pits have been designed with leak detection systems between the primary and secondary liners. The leak detection system will be monitored regularly for water accumulation between these two liners. The leak detection system will be inspected in the spring prior to refilling of the pits, weekly through the active use season, and monthly during the winter shut down period. If water appears between the liners, it will be tested to determine if this water has leaked through the primary liner from the pit or if it is from another source. If a leak is confirmed between the primary and secondary liners, SG Interests will draw down the fluid in that pit. The water in the subject pit will be removed to a non-leaking pit through steel or poly pipe, a commercial disposal well or facility by truck, or a deep water disposal well through steel or poly pipe. SG Interests will refrain from using that pit until the liner has been repaired by a certified liner technician. The pit will be refilled and tested for leaks before using.

Water level in the pits will be monitored daily. At least two feet of freeboard will be maintained in the pits at all times. The pit liner will be marked at the two foot depth line so that the inspector can easily verify that the water is being maintained at the correct depth. The pits will be covered with bird netting. This netting will be monitored daily and maintained in proper working condition at all times. This netting will also be monitored throughout the winter months when the pits are not operational. The fence surrounding the pits will be inspected visually daily and repaired as needed to keep livestock, wildlife, and unauthorized persons from entering the pit site.

Any abnormalities that are noticed during any inspection will be reported to the Field Superintendent immediately so that any necessary follow-up can be scheduled.

#### E. Emergency Response (908.b.11)

SG Interests has a 24-hour emergency answering service that will allow the Field Superintendent to be notified of any emergency situation related to the McIntyre Flowback Pits. Table 1 below lists the personnel, positions, duties, and contact information for all relevant personnel associated with the flowback pits.

Table 1: Contact Information for key personnel

<b>Name</b>	<b>Contact</b>	<b>Position</b>	<b>General Duties</b>	<b>Specific Duties Related to Flowback Pits</b>
24-Hour Answering Service	866-261-9766			Will immediately notify the field superintendent or his replacement in the event of an emergency situation related to the flowback pits
Shaun Gordy	Office: 713-333-6522	Vice President, Operations	Manager of company operations	Can commit resources to pit activities and can appoint new personnel duties under this emergency response plan
Dennis Beasley	Office: 970-929-5313 Mobile: 505-947-3564	Field Superintendent	Manager of field operations.	Authority to initiate emergency response actions, oversees all work done on the pits including maintenance, monitoring, and pit closure
Eric Sanford	Mobile: 970-259-2759	Operations and Land Manager	Oversees operations from SG Interests' Montrose office	Coordinate and communicate activities with agencies and landowners
Brian Kimball	Mobile: 505-801-0006	Lease Operator	Responsible for daily operations of wells, water transportation, and water disposal facilities.	Will conduct the daily monitoring of the pits and associated facilities
Brent Bizer	Mobile: 970-260-9039	Lease Operator	Responsible for daily operations of wells, water transportation, and water disposal facilities.	Will conduct the daily monitoring of the pits and associated facilities
Dusty Carson	970-234-8330	Construction Superintendent	Earthwork, construction planning	construction of facilities, reclamation of sites, spill cleanup, plowing snow
Catherine Dickert	970-209-6464	Environmental and Permitting Manager	Oversee environmental permitting and reporting requirements	Coordinate with agencies, environmental subcontractors for monitoring and compliance.
Eric Petterson, Rocky Mtn. Ecological Services	Office: 970-945-9558 Mobile: 970-309-4454	Consulting environmental scientist	Performs water and soil testing and reporting.	Will conduct testing of surface and ground water in vicinity of pits. Will conduct stormwater compliance inspections.

Table 2: Emergency Personnel

<b>Responder</b>	<b>Contact</b>
Gunnison County Emergency Dispatch	970-641-8000
Air Life @ St. Mary's Hospital	970-244-2551 800-332-4923
Colorado State Patrol	970-249-4392
Gunnison County Sheriff	970-641-1113

The produced water that will be pumped into the pits from producing wells in the gas field is low in hydrocarbon content. The filter system that will be used to treat water before it is put into the pits will remove most of the hydrocarbons that are present. The low hydrocarbon content of the pit water reduces the risk of fire in the pits.

Every effort will be made to minimize the threat of a fuel spill during refueling and servicing. Fuel and service vehicles will carry a minimum of 20 pounds of suitable absorbent material to handle potential spills.

Prior to moving equipment to the project site, all equipment will be checked for leaks and drips, and any necessary repairs will be completed prior to removal from the contractor yard. In addition, all vehicles will be inspected for leaks regularly throughout their use. In the event that a leak is found, equipment will not be allowed to operate until all leaks have been repaired. Construction equipment requiring maintenance that might result in the draining or leaking of fluids will be serviced only after a 12 mil plastic liner has been installed between the equipment and the soil. This liner must be placed in such a manner that all fluid is contained.

SG will provide spill prevention and response training to appropriate construction personnel. Persons accountable for carrying out the procedures specified herein will be designated prior to construction beginning and will be informed of their specific duties and responsibilities with respect to environmental compliance and hazardous materials. At a minimum, this training will include the following:

- a review of all relevant spill prevention and safety plans for this project and discussion of individual responsibilities
- an overview of all regulatory requirements
- methods for the safe handling/storage of hazardous materials and petroleum products
- spill prevention procedures
- function and location of spill control materials
- inspection procedures for spill containment equipment and materials
- emergency response procedures
- use of personal protective equipment (PPE)
- procedures for coordinating with emergency response teams
- standard information regarding a spill to be provided to SG for agency notification

Physical response actions are intended to ensure that all spills are promptly and thoroughly cleaned up. However, the first priority in responding to any spill is personnel and public safety. Construction personnel will be notified of evacuation procedures to be used in event of a spill emergency.

In the event a spill is detected the following steps may be taken in response:

- the first person on the scene will notify the designated spill coordinator who will select personnel to respond to the spill
- attempt to identify the source, composition, and hazard of the spill or stain;
- isolate and stop the spill, i.e. shut off valves, turn off pump, etc.
- contain the spill using dry absorbents, booms, berms or other as appropriate
- collect and containerize spill-affected material in properly labeled appropriate containers
- obtain a sample of the unknown substance for laboratory analysis if necessary
- dispose of waste containers at approved disposal facilities according to all regulations
- restore all supplies
- evaluate the situation leading up to the spill and consider ways to improve operations such that probability of recurrence is reduced

Persons should only attempt to clean up or control a spill if they have received proper training. Untrained individuals will immediately notify the SG's primary or alternate emergency coordinators.

In general, expert advice will be sought to properly clean up major spills. For spills on land, berms will be constructed to contain the spilled material and prevent migration of hazardous materials or petroleum products toward waterways. Dry materials will not be cleaned up with water or buried. Contaminated soils will be collected using appropriate machinery, stored in suitable containers, and properly disposed of in appropriately designated areas off-site. After contaminated soil is recovered, all machinery utilized will be decontaminated, and recovered soil will be treated as used oil if contaminated with petroleum products or hazardous waste if contaminated with hazardous waste. Contaminated cleanup materials (absorbent pads, etc.) and vegetation will be disposed of in a similar manner. For major spills, cleanup will be verified by sampling and laboratory analysis.

If spilled materials reach water, booms and skimmers will be used to contain and remove contaminants. Other actions will be taken as necessary to clean up contaminated waters.

The following equipment will be maintained on-site with each crew using heavy equipment for use in cleanup situations.

- shovels
- absorbent pads/materials
- personal protective gear
- fire fighting equipment
- medical first-aid supplies
- phone list with emergency contact numbers
- storage containers
- personal decontamination equipment

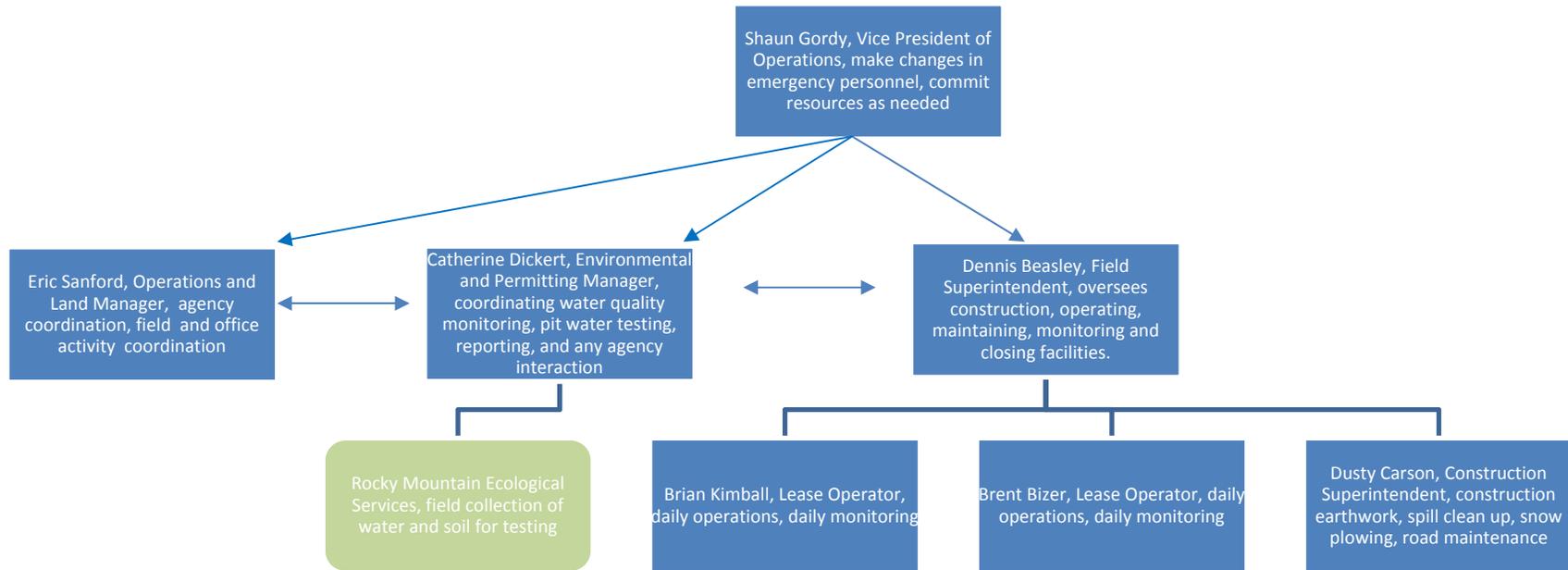
In the case of a spill, the following agencies may need to be notified:

Table 2: Pertinent Agencies

<b>Agency</b>	<b>Contact Information</b>	<b>When to call</b>
CDPHE Colorado Environmental Release and Incident Reporting Line	877-518-5608 (24-hour)	Any spill that has the potential to impact waters of the State of Colorado.
Colorado Oil and Gas Conservation Commission	303-894-2100 (business hours)	Spills of E&P waste (produced water and flowback fluid) on state or private lands in excess of 20 barrels, and spills of any size that impact or threaten to impact waters of the state, an occupied structure, or public byway must be reported to the COGCC as soon as practicable, but not more than 24 hours after discovery.
Bureau of Land Management	970-240-5300 (business hours)	Spills of waste materials must be reported to the BLM.

## Responsibilities Flow Chart

The following flow chart illustrates the responsibilities of the various personnel associated with this facility. These activities include operating, maintaining, monitoring, and closing the facility.



### Chemicals Stored and/or Used on Site

In the case of a spill of any chemical at the McIntyre Pit site, the Spill Prevention, Containment, and Countermeasure Plan should be consulted. There are two chemicals that SG expects to use on site; a biocide (EC6106A) and an anticorrosive agent (Enercept EC1317A). The Material Safety Data Sheets (MSDS) for these two chemicals are attached to this plan. The Emergency Overview sections of these two sheets should be reviewed prior to facility start up by all employees who will work on site. As new employees begin work at the site, they too should familiarize themselves with the safety information in these data sheets.

The two chemicals that may be used in the pits will not be stored at the facility. If small quantities of chemical are required for treatment, they will be brought to the facility in approved containers that are properly placarded and marked with MSDS. Larger quantities of these chemicals will be delivered to the facility by truck. These trucks will be permitted and placarded for hazardous materials as necessary.

If it is necessary to store fuel on site, it will be contained in an approved container and will have secondary containment in the event of a spill or leak. Fuel for the equipment at the facility will be transported to the location by fuel truck. The connection between the equipment fuel tank and the fuel truck hose will be within the area covered by the secondary containment system for that equipment.

Water that cannot be used for frac'ing wells and cannot be stored at the pits, will be transferred to the water disposal well via pipeline or truck for disposal.

In the event that evacuation of the site is required, all personnel should immediately leave the pit site and report to the Federal 24-2 well pad. At this point, a head count of all personnel will be conducted to make sure everyone has left the facility. Under normal circumstances, only one or two truck drivers or personnel monitoring the pits will be on site at the same time.

#### F. Record-keeping

Record-keeping will be composed of the following elements: date water was transported, method of transportation (truck or pipeline), approximate volume of water, source of water, and number of the pit to which the water was transported. If the water is transported by truck, the name of the trucking company will be included in the records. SG will also maintain records to support the FMC and Annual Reports described at the beginning of this plan. These records will be kept by SG Interests for five years following final closure of the facility. All records will be made available to COGCC upon request.

#### G. Site security

The site will be secured with an 8' high field style fence. The fence is designed to keep livestock and wildlife out of the facility. It is made of woven wire with a t-post every 10 feet and a wooden post ever 40'. A string of barbed wire along the top of the fence will deter humans from climbing over the fence. The fence will completely surround the pits. The gate at the access road/staging area entrance will also be 8' high. This gate will be kept closed when not in

use. There is currently a gate on the access road to the Narrows Road (a private gas well access and ranch road) where it intersects County Road 265. Two additional gates will be added to the route to the pits; one at the entrance to the Federal 11-90-26 #1 well pad and the other on the pit access road at the Aspen Leaf Ranch/Rock Creek Ranch property line. These gates will be locked with combination locks. The gates are steel. There are no cattle guards planned for this project. The gate to the facility will be kept closed to prevent livestock access.

The facility will be manned during all pumping operations.

#### H. Hours of Operation

The pits could be in use 24-hours per day during the warm weather months in which they are operational. Normal operating hours will be approximately 0630 to 1730 each day. During the winter season, the pits will not be used, but will be inspected daily for any problems with bird netting, liner integrity, fluid level, etc. Winter daily visits will be made in all weather. Snow mobiles are available for access in the event the road has not been plowed. SG Interests plans to keep the road plowed to the facility throughout the winter.

#### I. Noise and Odor Mitigation

Most of the water stored in the pits will be delivered and removed for reuse via pipeline. Transportation of water to and from the pits by pipeline will be significantly quieter than transportation by truck. The facility will meet COGCC's Light Industrial noise standard (Rule 802.c) 350' from the property line. This standard is applicable to remote locations such as this where the operator owns the surface property (Rock Creek Ranch I Ltd. is an entity associated with SG Interests I Ltd). Odor will be mitigated by use of biocide to keep the water clean and reduce populations of bacteria in the pits that would otherwise produce odors.

#### J. Final Disposition of Waste

When the water level is drawn down at the end of the operational season and when the pits are no longer needed, the water will be disposed of at one of SG Interests' water disposal wells. Currently, there is one disposal well permitted near the pit locations; Federal #24-2 WDW (05-051-06084). SG Interests plans to permit and construct additional water disposal wells in the Bull Mountain Unit. These wells will be submitted for pre-approved use by this facility on a Form 4, Sundry Notice. This change will also be noted on a FMC (FMC change provided to COGCC by Form 4, Sundry Notice).

When bottom sediment must be removed from the liner in the pits, it will be suctioned off using a SuperVac or similar vacuum hose system to remove the sediment without damaging the liner. Sediment is not expected to build up to the point where removal is necessary often during the lifetime of the pits, because most solids will be removed from the fluid by filtering the water as it is added to the pits. Sediment removed from the pit bottom will be taken to a certified disposal site. A contracted company will come to the facility and remove and bale the liner for transport. Liners will either be taken to a cogeneration plant for incineration (as would be the case with the geoliner) or transported to a recycling company that uses the recycled liner material to make

pallets and other objects. The liner removal company will keep transport and disposal records for COGCC.

## Appendix A

### Facility Modification Checklist

This checklist must be filled out and submitted to COGCC whenever a change to the facility, operating plan, or permit compliance has occurred. An example of such a change is provided in the checklist below.

#### Facility Modifications

Facility Modification	Modification Description or Justification	Date of Modification	Comments	Permit Changes Triggered by Modification?
Example = modification to design of hose manifold	Use of existing manifold led to idea for better design	11/22/2010	None	No

#### Operating Plan Updates

Reason for Update	Date changed	Pages changed	Is revised plan attached?
Example = Contingency Plan updated to include new personnel	11/22/2010	6, Table of contact information 8, responsibilities flowchart	yes

Permit Compliance

Permit	Agency	Change/Amendment/Report
Example = stormwater management inspection reports for active construction period	CDPHE	Reports attached.

Additional Comments:

## Appendix B

### Annual Review Template

Write a narrative report to be submitted to COGCC that contains at least the following elements:

- a summary of the operations conducted at the facility in the past year
- a list of any FMOCs that were submitted to the COGCC that year
- revised list of wells that contribute water to the pits
- pit water monitoring results for that year
- the volume of water that was recycled into the pits
- the volume and source of fresh water added to the pits
- the volume of produced water injected that year and the disposal well(s) API
- the total volume of water injected that year and disposal well(s) API
- any other waste associated with the pits that was disposed of that year (description of waste, reason it was generated, method of disposal)
- monitoring results from surface water testing from that year
- monitoring results from shallow groundwater testing from that year

This narrative will be submitted to COGCC by December 31<sup>st</sup> for each year the facility is in operation.

Appendix C

Daily Surface Poly Inspection Form



Attachment 8

Revised Preliminary Closure Plan

## McIntyre Flowback Pits #1 and #2 - Preliminary Closure Plan (908.g)

When the pits are no longer needed by SG Interests (project lifespan estimated at 25 years), the water that is being stored in these pits will be disposed of at either one of SG Interests' permitted water disposal wells within the Bull Mountain Unit or at a commercial water disposal well or facility. The liner system that was used at each pit will be dried, removed, cut into manageable sizes, bundled, and disposed of at a solid waste disposal site or recycling facility. The soil beneath each pit will be sampled and tested to verify that there has been no leakage. Table 910-1 will provide the soil test parameters. If a spill is discovered, it will be reported on Form 19. Soil will be remediated as required if any spill is discovered. Next, the pits will be backfilled using the spoil that was stored on site and served as the staging area for each pit. The ground will be returned to near-original contour and topsoil that has been stored will be replaced over the land surface. The disturbed area will be seeded with the seed mix recommended by CDOW for use in this project. More detail on the closure of the pits will be included in the Final Closure Plan (Form 27), which will be submitted to the state at least 60 days prior to final pit closure.

### Reclamation of Pits 1 and 2 – Activities and Estimated Costs

The methods of reclamation described below come from interviews with field experienced staff currently employed by SG Interests. These cost estimates are based on labor and equipment rental costs as of February 2011.

#### Mobilization and Demobilization of Construction Equip:

We will haul 1 trackhoe and 1 dozer in to site.

- ✓ 20 hrs for a transport truck x \$100.00 per hr= \$2,000.

#### Remove and Dispose of Pond Fluids:

- ✓ pump and dispose of pit fluid = \$2,000 (estimated cost for fuel to pump to WDW)
- ✓ suction off sediment for disposal = \$2,500/day for 5 days to remove all sediment = \$12,500
- ✓ Sample and test sediment according to COGCC Table 910-1.
- ✓ collect sediment samples and prepare for sending to lab= 1 technician x \$65 per hour for 8 hours = \$520.00
- ✓ lab testing of sediment = \$5,600 (4 samples at each pit consists of 2 along side walls, 1 along long wall and 1 from sediment at bottom center of pit)

#### Remove and Dispose of Operating Equipment:

Dismantle and haul away all equipment staged on facility = \$14,000

#### Remove and Dispose of Pit Liners:

These numbers were provided by InterTech Environmental & Engineering, LLC and are rough estimates based on current costs and rates.

Contract with liner disposal company to remove, transport, and dispose of liner system.

- ✓ 2.5 days to remove and process Pit 1 at \$31/hr labor rate = \$620
- ✓ 2 days to remove and process Pit 2 at \$31/hr labor rate - \$496
- ✓ 4 days to bale and load liner material from Pit 1 for transport at \$2000/day=\$8,000
- ✓ 4 days to bale and load liner material from Pit 2 for transport at \$2000/day=\$8,000

#### Soil Sampling:

Sample soils collected from under the pits (2 samples at pit low points), from the former truck loading/unloading area on the staging area, and from under each pump site on the staging area. A background soil sample is collected from an undisturbed area approximately 50' from edge of facility disturbance. Send samples to be tested at the laboratory. Parameters tested will be according to COGCC Table 910-1.

- ✓ Collect samples = 15 samples collected from staging area and pit area = 2 techs at \$65/hour = \$1,040
- ✓ Lab testing = 15 samples = \$10,500
- ✓ Collect any contaminated soil and transport to landfarm = \$10,000
- ✓ Retest to confirm soils meet background levels = \$1,640

#### Road Reclamation:

Reclaim 2,000' of road to site:

Take gravel off and haul off to desired site for reuse. We will use a front end loader and belly dump trailers to haul gravel off. Push any cuts back to near original contour. We will use 1 trackhoe and 1 Dozer to put all cuts back to original contour. Put topsoil back on any disturbed areas.

- ✓ Haul 1,500 tons of gravel off =60 loads x \$125.00 per load=\$7,500.
- ✓ 30 hrs x \$185.00 per hr for trackhoe = \$5,550.
- ✓ 30 hrs x \$185.00 per hr for dozer = \$5,550.

#### Removal of fence:

5 laborers x 12 hrs per day = 60 hrs per day for taking fences down. Approximately 4 days to remove and haul off fencing materials.

- ✓ Labor rate of \$28.00 per hour and 240 labor hours to take fencing down= \$6,720.
- ✓ 1 skidsteer to pull posts and wrap up wire 41 hrs @ \$85.00 per hr=\$3500.

### Reclamation of Pits:

Backfill and compact pits after liner has been removed:

We will use two 627 Caterpillar scrapers, one D-8 dozer, one farm tractor with grain drill, and one water truck. Our plan would be to haul subsoil material from temporary stockpile back to pits with the scrapers and water it down to meet compaction needs. We will use the scrapers to achieve our compaction rates. We will use the D-8 to contour disturbed areas back to original shape. We will use the water truck to water subsoil down to meet compaction needs. Our goal would be to have the bulk of the dirt moved in 10 days. These numbers will be to put subsoil and topsoil back.

We will move 28,029 yds subsoil back to pits. We will move 4,785 yds topsoil back to pit areas.

- ✓ 200 hrs for scrapers x \$240.00 per hr = \$48,000.
- ✓ 100 hrs for D-8 contouring slopes x \$200.00 per hr = \$20,000.

Other reclamation activities:

- ✓ 20 hrs for farm tractor, grain drill, and mulch crimper for reseeded, total of 4.0 acres to re-seed x \$100.00 per hr = \$2,000.
- ✓ 200 bales of straw for temporary stabilization = \$5.00 per bale = \$1,000.
- ✓ Labor for taking down temporary BMPs and installing permanent BMPs = 5 guys for 100 hrs x \$28.00 per hr = \$2,800.
- ✓ Equipment for labor crew = 1 skidsteer for 50 hrs x \$85.00 per hr = \$4,250.

### Post Closure Groundwater Monitoring:

Collect samples from groundwater monitoring wells and test for elevated TDS at 1, 3, and 6 year post closure intervals = \$1,560

Additional monitoring and possible remediation of any impacts discovered during or following closure of the facility would add cost to the closure of the site. This cost would vary depending on the type and magnitude of the impact. It is not possible to accurately estimate this cost at this time.

### Post Closure Weed Management:

After soil disturbing reclamation activities are completed, weed control will be performed on the area of the reclaimed pits, staging area, and road. Weed management will be performed for two years following the facility closure.

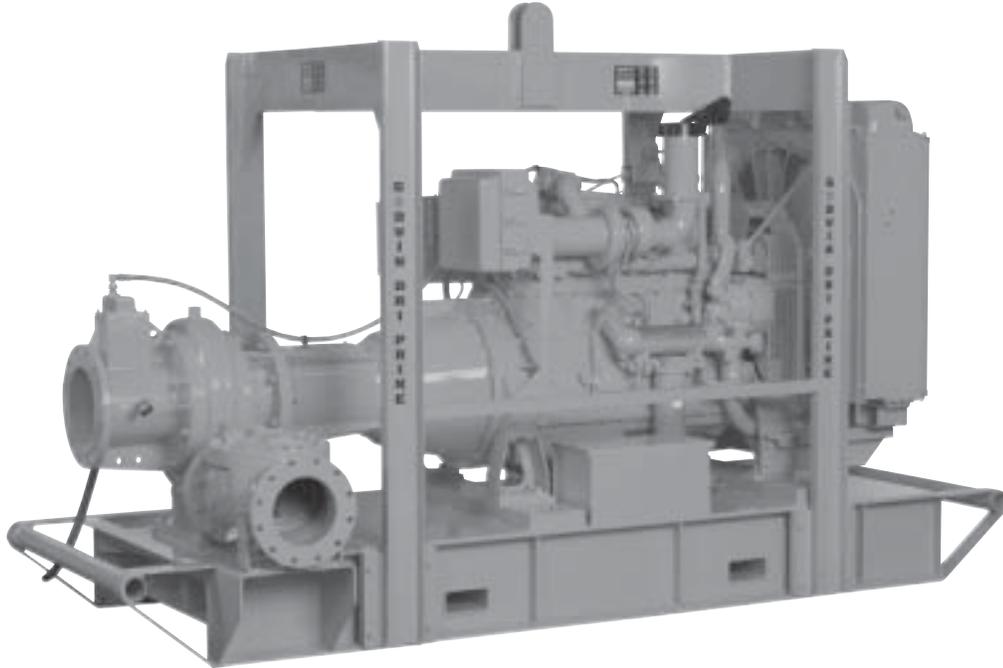
2 days of spraying per year X \$2,000/ day = \$4,000 each of two years= total of \$8,000

**Total Cost to Close Facility Estimated at: \$193,346.**

Attachment 9

Pump Specifications

# HL250M Dri-Prime® Pumps

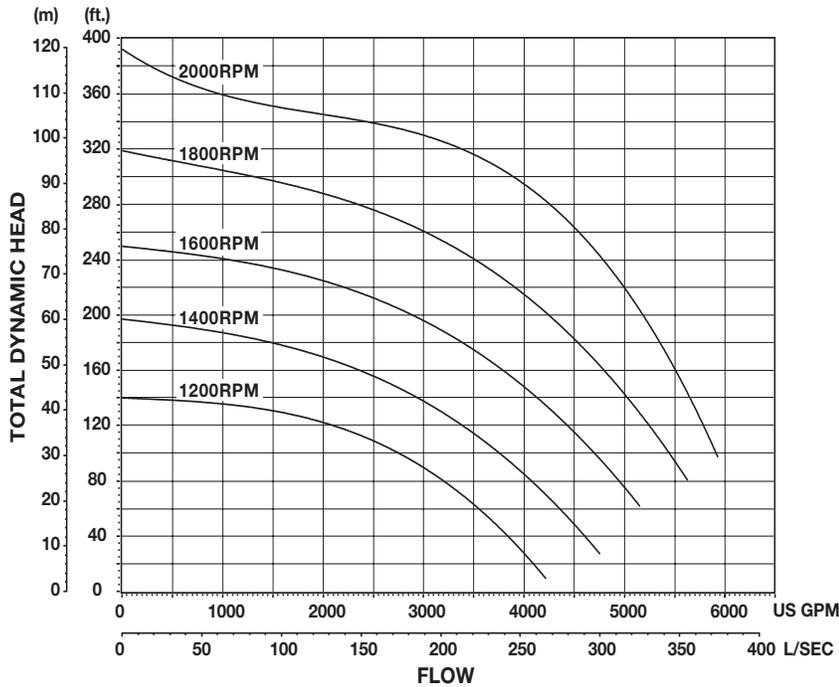


The Godwin Dri-Prime 12" x 10" (300mm x 250mm) HL250M is a heavy duty, fully automatic self-priming pump specifically offered for pumping under discharge pressure conditions or high discharge lift applications. The HL250M offers flowrates up to 5,700 gpm (360 l/sec.), total dynamic heads up to 390 feet (118.9M), and solids handling up to 3" (75mm) in diameter. Like all Godwin pumps, the HL250M includes the Dri-Prime air ejector priming system for fully automatic priming up to 28 feet (8.5M) of static suction lift.

## Features

- Fully automatic priming from dry to 28 feet (8.5M) of suction lift. Maximum heads to 390 feet (118.9M). Maximum flows to 5,700 gpm (360 l/sec.).
- Handles sludges and solids-laden liquids with solids up to 2-9/16" (65mm) in diameter.
- Continuously operated venturi air ejector priming system operated by an air compressor requiring no form of periodic adjustment or operator intervention.
- Double, high pressure mechanical seal with high abrasion resistant silicon carbide interfaces. Oil bath immersion for dry running.
- Mounted to a structural steel skid with integral 250 gal. (946 liter) fuel tank and lifting bail.
- Standard engine — Caterpillar 3406C diesel. Other engines available. Electric drive version also available.

# HL250M Performance Curve



## HL250M Performance Table

**Diesel Set** — Caterpillar 3406C, 440 hp (328 kw) @ 2000 rpm  
**Impeller Diameter:** 17.3" (440 mm)

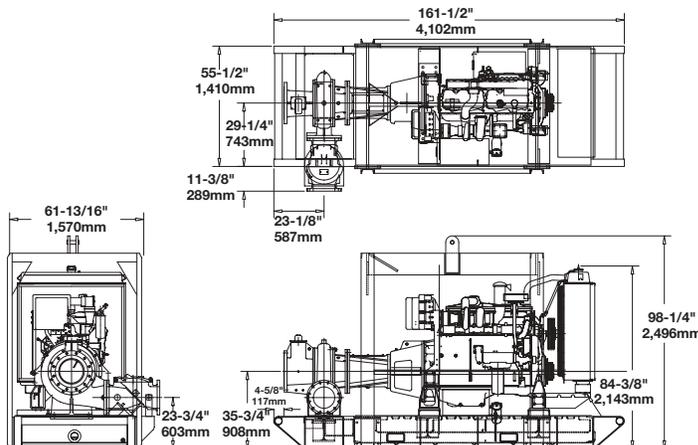
Total Delivery Head — Feet

Total Suction Head — Feet	150	200	250	275
	Output — GPM			
15	4700	4500	4300	3800
20	4200	4000	3600	3500
25	3900	3700	3300	2900

Performance data listed in table and curves based on water test at sea level and 68° F (20° C). Maximum flows may require larger diameter pipes.

## Dimensions

HL250M — Caterpillar 3406C, Skid Base  
 Weight: 13,500 lbs. (6,109 kg.)



## Specifications

- Maximum Operating Speed:** 2000 rpm
- Maximum Operating Temperature:** 194° F (90° C)
- Maximum Working Pressure:** 155 psi (10.7 BAR)
- Maximum Suction Pressure:** 90 psi (6.2 BAR)
- Maximum Casing Pressure:** 240 psi (16.6 BAR)
- Fuel Tank Capacity:** 250 gal. (946 liters)
- Fuel Consumption:** 19.7 gph (74.6 lph)
- Pipe Connections:** Suction: 12" (300mm) ASA 150; Discharge: 10" (250mm) ASA 150
- Solids Handling:** 3" (75mm) dia.

## Materials

- Pump Casing, Bearing Casing, & Non Return Valve:** Close grained cast iron
- Impeller:** Cast chromium steel
- Shaft:** Nickel chrome steel
- Wearplates:** Nickel-Chrome cast iron, replaceable
- Mechanical Seal:** Solid silicon carbide faced, oil bath lubricated



One Floodgate Road, Bridgeport, NJ 08014, USA  
 (856) 467-3636 • Fax: (856) 467-4841  
 Quenington, Cirencester, Glos., GL7 5BX, UK  
 +44 (0)1285 750271 • Fax: +44 (0)1285 750352

E-mail: sales@godwinpumps.com  
 www.godwinpumps.com

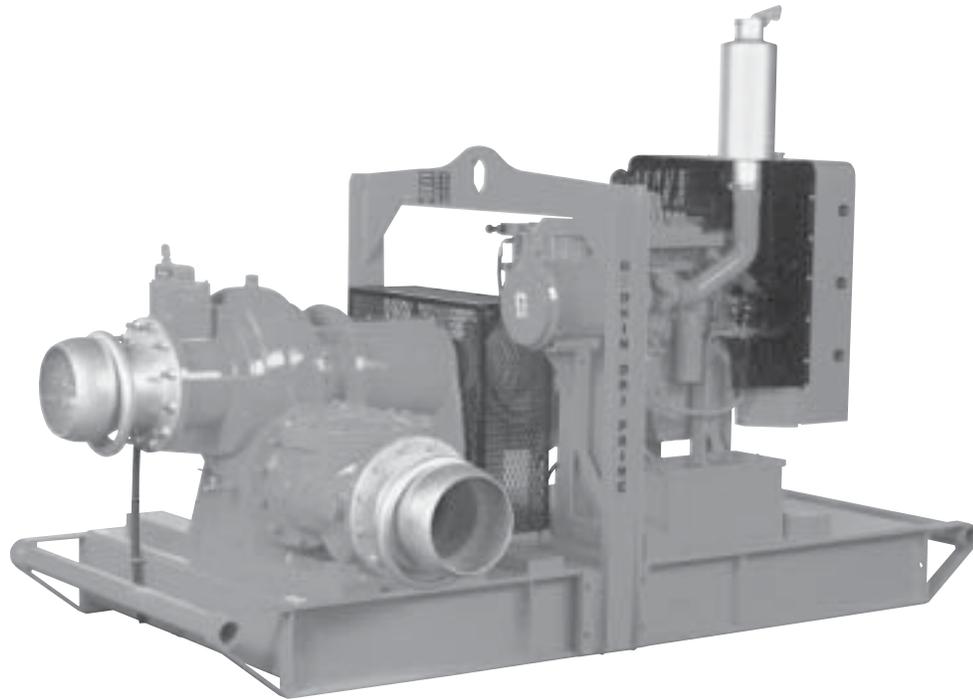
### BRANCH LOCATIONS:

- Connecticut • Pennsylvania • New York • Ohio
- Illinois • Maryland • Virginia • West Virginia
- Georgia • South Carolina • North Carolina
- Florida • Texas • Montana • California • Washington

Dri-Prime® and the color orange for pumps are registered trademarks of Godwin Pumps of America, Inc. Specifications and illustrations are subject to revision without notice.

© Copyright 2003-2006 Godwin Pumps of America, Inc.  
 GPASL.093.206

# CD300M Dri-Prime® Pumps



The Godwin CD300M Dri-Prime pump is a 12 inch (300mm) centrifugal trash pump perfect for your biggest jobs. Offering flows to 6,000 gallons per minute (380 liters per second), discharge heads to 200 feet (60M), and solids handling to 3-3/4" (95mm) in diameter, the CD300M moves large volumes of water and provides automatic self-priming to 28 feet (8.5M). For intermittent flows, the double high pressure mechanical seal means the CD300M can run dry indefinitely without damage. And the underslung discharge flange makes pump connections easy and efficient. When your job calls for both high volume and high head, the Godwin CD300M is the pump that does it all.

## Features

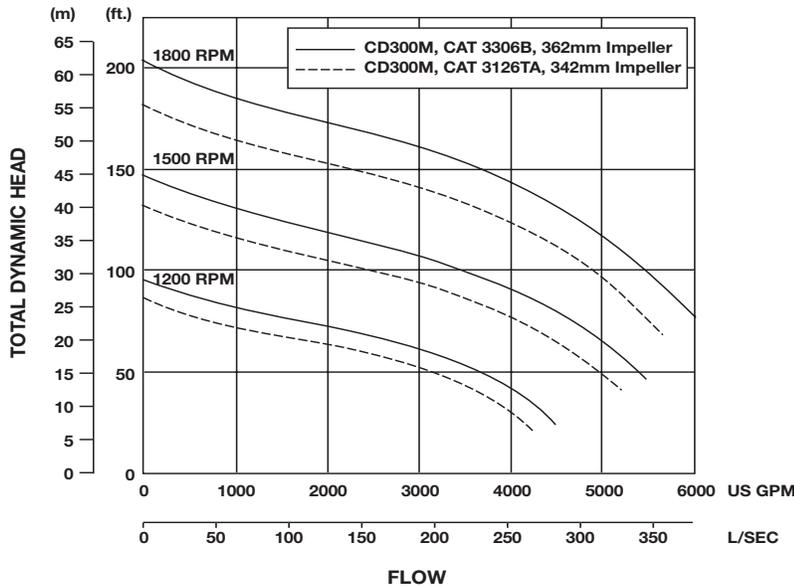
- Direct drive automatic priming 12" (300mm) high volume centrifugal pump with vacuum priming compressor mounted to a diesel engine. Also available in electric drive or as bare shaft pumpend.
- Extensive application flexibility — handles raw sewage, sludges and liquids with solids up to 3-3/4" (95mm) in diameter.
- Continuously operated "Godwin" air ejector priming device requiring no form of periodic adjustment or control.
- Compact design — Pump is direct coupled to engine flywheel for increased reliability.
- Underslung side discharge for easy pipe connection.
- Double, high pressure mechanical seal with high abrasion resistant silicon carbide interfaces. Oil bath immersion for dry running.
- Skid base incorporating integral overnight running fuel tank.
- Simple maintenance — normally limited to checking engine oil, compressor oil and seal lubrication.
- Standard Caterpillar C-9, Caterpillar 3126B or John Deere 6081AF engine. Also available with a variety of other engines including Cummins and Deutz.
- Balanced unit with centralized lifting bracket for easy handling.

godwin  
pumps



# CD300M Dri-Prime® Performance Curve

# Specifications



## Maximum Operating Speed:

1800 rpm

## Maximum Operating Temperature:

+212° F (100° C)

## Maximum Working Pressure:

87 psi (6.0 BAR)

## Maximum Suction Pressure:

88 psi (6.1 BAR)

## Maximum Casing Pressure:

130 psi (9.0 BAR)

## Fuel Tank Capacity:

250 gallons (946 litres)

## Fuel Consumption (full load & max. speed):

CAT C-9: 13.4 gph (50.7 lph) @ 1800 rpm

CAT 3126B: 10.1 gph (38.1 lph) @ 1800 rpm

JD 6081AF: 10.6 gph (40.1 lph) @ 1800 rpm

## Pipe Connections:

12 inch (300mm) ASA 150#

## Solids Handling:

3-3/4" (95mm) diameter

## Performance Tables

**CD300M with Caterpillar C-9 Diesel Engine, 275 hp (205 kw) @ 1800 rpm**  
**Impeller Diameter: 14-1/4 inches (362 mm)**

Total Suction Head — Feet	Total Delivery Head — Feet			
	40	80	120	160
10	6000	5810	4870	3010
15	5480	5250	4700	3000
20	4850	4780	4500	2900
25	4300	4100	3800	2800

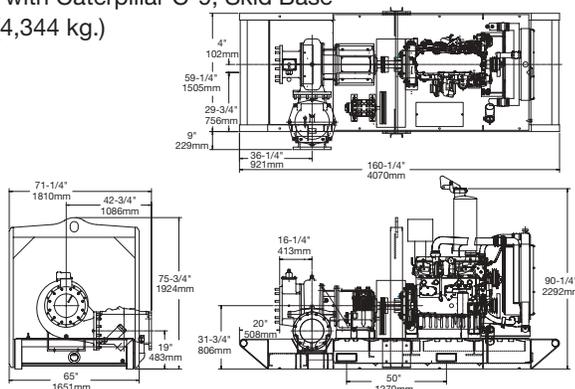
**CD300M with Caterpillar 3126B Diesel Engine, 205 hp (153 kw) @ 1800 rpm**  
**Impeller Diameter: 13-1/2 inches (342 mm)**

Total Suction Head — Feet	Total Delivery Head — Feet			
	40	80	120	150
10	6000	5400	4180	2390
15	5180	4850	4050	2380
20	4550	4450	3950	2370
25	4050	3800	3400	2360

Performance data listed in table and curves are based on water tests at sea level and 68° F (20° C). Larger diameter pipes may be required for maximum flows.

## Dimensions

CD300M — shown with Caterpillar C-9, Skid Base  
 Weight: 9,600 lbs. (4,344 kg.)



## Materials

### Pump Casing, Suction Cover, and Separation Tank:

Close Grained Cast Iron

### Impeller:

Nitride Hardened Cast Chromium Steel

### Front Wearplate:

25% Chromium Iron

### Rear Wearplate:

Nitride Hardened Cast Iron

### Pump Shaft:

1-1/2% Nickel/Chromium Steel

### Non Return Valve Body Ejector Housing:

Close Grained Cast Iron

### Non Return Valve Flapper:

High Nitrile Rubber

### Mechanical Seal Faces:

Solid Silicon Carbide



One Floodgate Road, Bridgeport, NJ 08014, USA  
 (856) 467-3636 • Fax: (856) 467-4841

Quenington, Cirencester, Glos., GL7 5BX, UK  
 +44 (0)1285 750271 • Fax: +44 (0)1285 750352

E-mail: sales@godwinpumps.com

www.godwinpumps.com

### BRANCH LOCATIONS:

Connecticut • Pennsylvania • New York • Ohio  
 Illinois • Maryland • Virginia • West Virginia  
 Georgia • South Carolina • North Carolina  
 Florida • Texas • Montana • California • Washington

Dri-Prime® and the color orange for pumps are registered trademarks of Godwin Pumps of America, Inc.

Specifications and illustrations are subject to revision without notice.

© Copyright 2003-2005 Godwin Pumps of America, Inc.

All rights reserved.

Attachment 10

Revised Drainage Plan and Calculations

Sedimentation Basin - 16,560 ft<sup>3</sup> with two 18" CMPs; one low CMP with slide gate & one high CMP for overflow.  
Daylight to natural channel.

Daylight Line Staging Area

24" CMP Culvert @ 10% grade.  
Install adjustable closure slide gates on CMP at inlet. Riprap discharge outlet area. Flow capacity = 29 cfs each.

Tributary Drainage Area = 10.72 acres  
Pit 1 & 2 Surface Area = 1.79 acres  
Net Drainage Area = 8.98 Acres

V-shaped borrowditch (typ.) diversion channel 18" deep with 2H:1V side slopes. Flow capacity = 27 cfs.

Edge of Proposed Staging Area

Extend synthetic liner 12" above finished pad grade around perimeter of all pits. (typ.).

Pump

Manifold

Proposed Flowback Pit #1  
12' Depth

Proposed Flowback Pit #2  
12' Depth

Proposed Poly Pipe

Proposed Access Road/Fire Lane

Trapezoid shaped diversion channel 2 ft deep with 2 ft wide bottom and 2H:1V side slopes

Pit 1: 130'x200'x12'  
(8,377 cy. / 40,284 bbls.)  
Pit 2: 110'x230'x12'  
(7,959 cy. / 38,275 bbls.)

Note: No wells located on staging pad. Meter houses are located on the individual well pads.

Hay bales and/or wattles at runoff ditch terminus.

Proposed Staging / Active Treatment Area  
Elev = 7,330'

8' High Berm Around Staging Perimeter

Manifold

Pump

24" CMP Culverts @ 2% minimum grade

10' Buffer Zone

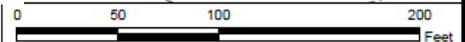
Daylight Line Flowback Pit

Perimeter Fencing

Trapezoid shaped diversion channel 2 ft deep with 2 ft wide bottom and 2H:1V side slopes.

Daylight Line Flowback Pit

24" CMP Culvert @ 2% minimum grade



Estimated Dirt Quantities (cy)

ITEM	CUT		FILL	EXCESS
	SUBSOIL	TOPSOIL		
Pit 1	14,169	1,041		15,210 (C)
Pit 2	13,860	1,057		14,917 (C)
Staging		2,687	28,029	25,342 (F)
<b>TOTAL</b>	<b>28,029</b>	<b>4,785</b>	<b>28,029</b>	<b>4,785 (C)</b>

Notes:

- Subsoil from pits cuts (28,029 cy.) used to create staging area.
- Topsoil (4,785 cy.) stored in separate pile from staging area.
- Topsoil volumes based on 8" soil depth.
- Total Disturbed Area = +/- 4.0 Ac.

SCALE: 1" = 100'  
DATE: 03.10.2011



**SG Interests**  
PO Box 26  
Montrose, CO 81402  
970-252-0696

**Bull Mountain Unit**

T. 11 S, R. 90 W, Sections 23 & 24

**McIntyre Flowback Pits 1 & 2  
CONSTRUCTION LAYOUT**

## **McIntyre Frac Pits 1 & 2 Storm Water Management Practices**

NRCS classifies the soils in the project site as Fughes loam located in old alluvium and/or complex landslide deposits derived from sedimentary rock. The soil is described as well drained with no flooding potential. The soil has a hydrologic group rating of C. Group C soils generally having a slow infiltration rate when thoroughly wet. The estimated pre-construction runoff coefficient is 0.1 with the post-construction runoff coefficient estimated at 0.3. A number of best management practices and diversion structures have been designed to control runoff and runoff resulting from the 100-yr 24-hr event, inclusive of the 25-yr 24-hr event. These structures are shown on the attached drawing.

The National Oceanic and Atmospheric Administration, NOAA Atlas 2 - Volume III, reports the 100-year 24-hour and 25-year 24 hour precipitation events at the frac pit locations to be approximately 3.0 and 2.4 inches respectively. Utilizing NOAA Atlas 2 regression and nomograph methodologies, the resulting rainfall intensities for various return periods, including the 100-year event, are computed in the "NOAA Atlas 2 Volume III Precipitation Computations", attached.

A runoff capture diversion channel, capable of conveying the 100-yr precipitation event, will be constructed up gradient of the frac facility on the south and east sides. The drainage area above the channel is approximately 10 acres and flow will be limited to overland or sheet flow. There are no defined channel flows from the adjacent area. Utilizing the Rational Method for computing peak runoff and assuming a time of concentration of 60 minutes, the estimated sheet discharge is 1.71 cfs (0.1 x 10 ac. x 1.71"). Using the Manning-Chezy open channel flow equation and constructing a runoff capture channel with dimensions of a 2 ft. bottom width, 2 ft. depth and 2H:1V side slopes, the channel flow capacity is estimated to be 29 cfs at one foot of depth. The runoff ditch will terminate near the natural drainage outlet. Straw bales and/or wattles will be installed at the outlet.

With the runoff diversion channel in place, the total tributary drainage basin within the area of construction disturbance is approximately 10.72 acres. Pit surface areas, capturing precipitation, reduce the tributary area to 8.93 acres. Again, using the Rational Method runoff and assuming a time of concentration of 60 minutes, the estimated post-construction peak discharge created by the 100-yr event is 4.6 cfs. (0.3 x 8.93 ac. x 1.71") Borrow ditches constructed along the access roads will convey runoff to the Staging Area located at the north end of the site. The runoff flows will then be diverted into a 24" diameter CMP culvert, fitted with a slide gate, with the discharge terminating into a sedimentation basin.

The sedimentation basin has been sized for the 100-yr precipitation peak discharge of 4.6 cfs. Detention volume has been computed for the peak discharge and a corresponding duration of 60 minutes. This equates to a detention volume of 16,560 ft.<sup>3</sup> (4.6 cfs x 60 sec/min x 60 min/hour). Releases from the sedimentation basin will be made through an 18" diameter CMP outlet pipe equipped with a slide gate. An additional 18" CMP positioned above the gated CMP will provide for overflow.

The borrow ditches and the CMP culverts have estimated flow capacities of 27 cfs and 29 cfs, respectively. Additional, as part of a comprehensive Storm Water Management Plan, erosion and sediment control structures will be installed as required at the site during construction and post-construction activities. The Storm Water management Plan will be updated as

Pit freeboard will be maintained at a minimum of 2 ft below finished pad grade. An additional pit berm of synthetic liner will extend 12" above finished grade providing sufficient space for a 3- inch 100-yr 24 hr storm event.

To evaluate winter and spring snow melt average precipitation, snow fall and snow fall depths were obtained for the Meredith, Colorado weather station from the Western Regional Data Center. The Meredith station data is attached. Meredith has an elevation of 8210 ft while the McIntyre frac pits are at an elevation of 7350 ft.

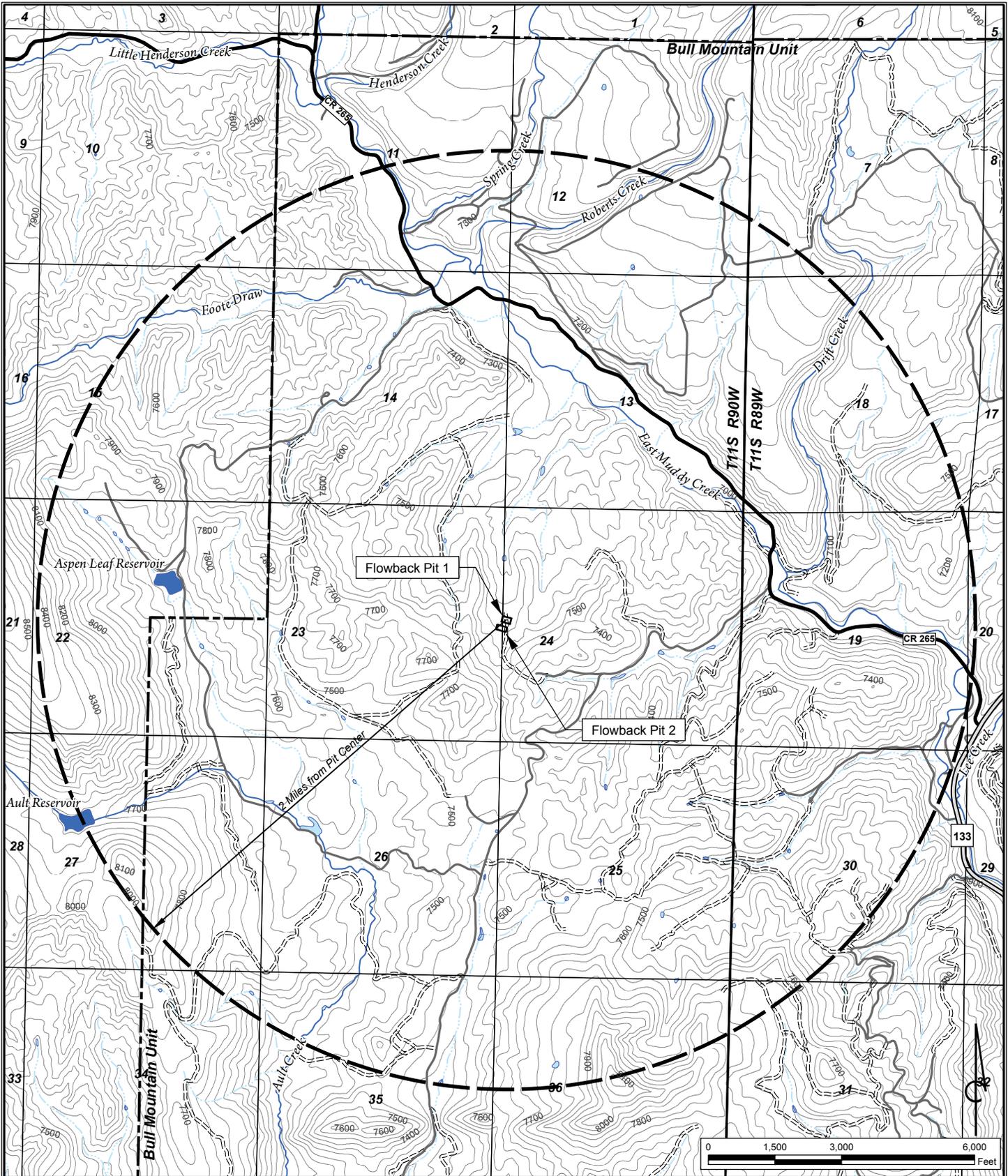
Although there will be variability in snowfall, the reported monthly average and peak precipitation events throughout the winter months are significantly less than the drainage system design capacity based on the 100-

year event in which 3 inches of precipitation falls in one day. Monthly winter precipitation ranges from 1.03 to 1.25 inches. The record winter period one-day precipitation event occurred in December of 1966 with 1.66 inches of precipitation.

Concerning spring snow melt, the weather data includes average monthly snow depths. The reported average January through April snow depths were 17, 23, 20, and 5 inches, respectively. Peak or maximum snow depths were not reported. Typical water equivalent content for snow ranges from 0.75 to 1.0 inches per one-foot of snow depth. Snow generally melts and sublimates over a period of several weeks as it ripens, however, if 23 inches of snow, for example, melted in one day, the equivalent water content estimate would be 1.91 inches. The drainage system diversion and runoff channels; and culverts have significant additional capacity over and above the 100-yr. 24 hr precipitation event and are appropriate for snow melt conditions. Continued maintenance and inspection of the drainage system is recommended throughout the life of the project.

Attachment 11

Revised Waterbody Map



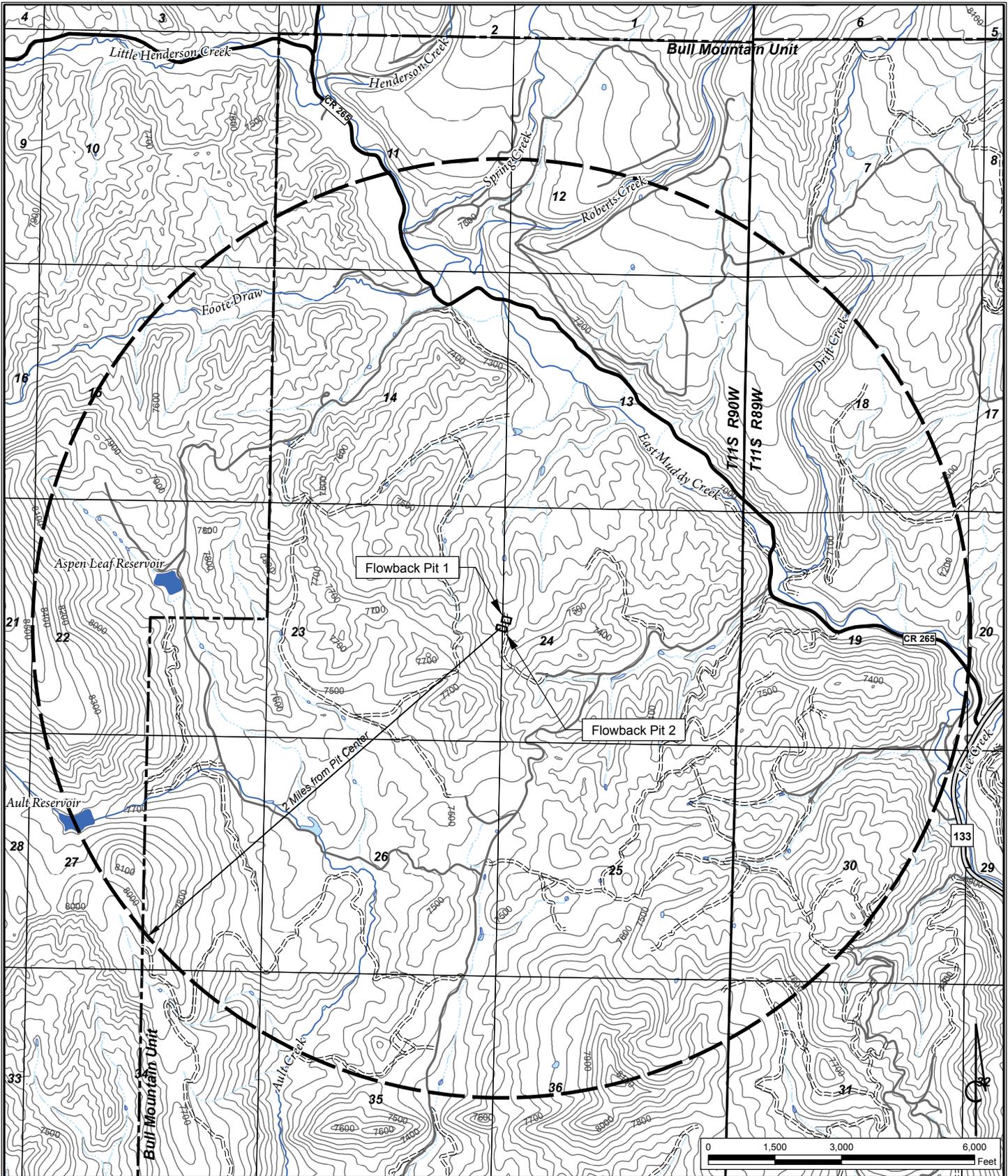
	Bull Mountain Unit		Township		Water Body		State Highway
	Two Mile Buffer Zone		Section		Unidentified Water Body		County Road
					Stream		Improved Dirt Road
					Unidentified Stream		Two-Track

**SG Interests**  
 PO Box 26  
 Montrose, CO 81402  
 970-252-0696

**Bull Mountain Unit**  
 T. 11 S, R. 90 W, Sections 23 & 24

CO State Plane Central NAD 83  
 SCALE: 1" = 3,000'  
 DATE: 11.11.2010

**McIntyre Flowback Pit 1  
 WATER BODIES**



- |                      |          |                         |                    |
|----------------------|----------|-------------------------|--------------------|
| Bull Mountain Unit   | Township | Water Body              | State Highway      |
| Two Mile Buffer Zone | Section  | Unidentified Water Body | County Road        |
|                      |          | Stream                  | Improved Dirt Road |
|                      |          | Unidentified Stream     | Two-Track          |

**SG Interests**  
 PO Box 26  
 Montrose, CO 81402  
 970-252-0696

**Bull Mountain Unit**  
 T. 11 S, R. 90 W, Sections 23 & 24

CO State Plane Central NAD 83  
 SCALE: 1" = 3,000'  
 DATE: 11.11.2010

**McIntyre Flowback Pit 2**  
**WATER BODIES**

Attachment 12

Well Permits

Form No.  
GWS-25

**OFFICE OF THE STATE ENGINEER**  
**COLORADO DIVISION OF WATER RESOURCES**  
818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203  
(303) 866-3581

LIC

WELL PERMIT NUMBER 263115  
DIV. 4    WD 40    DES. BASIN    MD

APPLICANT

WILLIAM VANNICE  
2192 CR 265  
SOMERSET, CO 81434-

(970) 929-6255

APPROVED WELL LOCATION

GUNNISON COUNTY  
SE 1/4 SE 1/4 Section 13  
Township 11 S Range 90 W Sixth P.M.

DISTANCES FROM SECTION LINES

200 Ft. from South Section Line  
777 Ft. from East Section Line

UTM COORDINATES (Meters, Zone:13,NAD83)

Easting:                      Northing:

PERMIT TO CONSTRUCT A WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
- 3) Approved pursuant to CRS 37-92-602(3)(b)(II)(A) as the only well on a tract of land of 47.86 acres described as that portion of Secs. 13 and 24, Twp. 11 S, Rng. 90 W, and Secs. 18 and 19, Twp. 11 S, Rng. 89 W, Sixth P.M., Gunnison County, more particularly described on the attached exhibit A.
- 4) The use of ground water from this well is limited to fire protection, ordinary household purposes inside not more than three (3) single family dwellings, the watering of poultry, domestic animals and livestock on a farm or ranch and the irrigation of not more than one (1) acre of home gardens and lawns.
- 5) The pumping rate of this well shall not exceed 15 GPM.
- 6) The return flow from the use of this well must be through an individual waste water disposal system of the non-evaporative type where the water is returned to the same stream system in which the well is located.
- 7) This well shall be constructed not more than 200 feet from the location specified on this permit *5/3/05*

APPROVED  
JSG

*He D. Simpson*  
State Engineer

*[Signature]*  
By

Receipt No. 0536661

DATE ISSUED    05-03-2005

EXPIRATION DATE    05-03-2007

Form No.  
GWS-25

**OFFICE OF THE STATE ENGINEER**  
**COLORADO DIVISION OF WATER RESOURCES**  
818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203  
(303) 866-3581

**WELL PERMIT NUMBER** 69658 - F -  
DIV. 4 WD 40 DES. BASIN MD

APPLICANT

SG INTERESTS I, LTD.  
PO BOX 26  
MONTROSE, CO 81402

(970) 252-0696

APPROVED WELL LOCATION

GUNNISON COUNTY  
NW 1/4 SE 1/4 Section 24  
Township 11 S Range 90 W Sixth P.M.

DISTANCES FROM SECTION LINES

2625 Ft. from South Section Line  
1904 Ft. from East Section Line

UTM COORDINATES (Meters, Zone: 13, NAD83)

Easting: 293018 Northing: 4328997

**PERMIT TO USE A WELL PERMITTED BY THE COGCC**

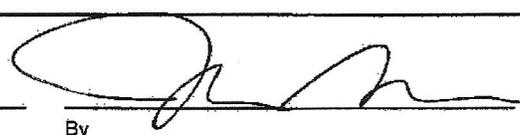
ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well is subject to the permitting requirements of the Colorado Oil and Gas Conservation Commission ("COGCC"), therefore, the well owner is not required to demonstrate compliance with the Water Well Construction Rules 2 CCR 402-2.
- 3) Approved pursuant to CRS 37-90-137(7)(b) for the use of a well permitted by the COGCC (API/Document #05-051-06057) for the dewatering of geologic formations by withdrawing nontributary water to facilitate oil/gas production. If oil/gas production ceases, all diversion of ground water from the well shall cease immediately and production of water from the well may resume only if a new water well permit is obtained for this well.
- 4) The owner shall mark the well in a conspicuous place with the State Engineer well permit number or with the applicant's well designation, FEDERAL 11-90-24 #1, and take the necessary means and precautions to preserve these markings.
- 5) The use of ground water produced during the operation of the oil/gas well is limited to drilling and mitigation for oil and gas production and exploration. All necessary discharge permits and approvals from the Colorado Department of Public Health and Environment, Water Quality Control Division and/or the COGCC shall be obtained prior to use of ground water pursuant to this permit. The State Engineer may request water quality data or information at any time to determine if the requirements of use to senior appropriators are met.
- 6) The pumping rate of this well shall not exceed 64.17 GPM.
- 7) The annual amount of ground water to be withdrawn shall not exceed 103.5 acre-feet.
- 8) Production from this well is limited to the hydrostratigraphic zone, pursuant to 17.7D01 regarding coalbed methane production zones, of the Piceance Basin: Mesaverde Formation, Cameo and South Canyon Coal Groups, from which the applicant is producing ground water associated with the production of oil/gas.
- 9) A flow meter or other measuring method acceptable to the Division Engineer must be used to measure the total amount of ground water produced from the well. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request. *90 6/2/10*

APPROVED  
JSG

State Engineer



Receipt No. 1503960

DATE ISSUED 06-07-2010

By EXPIRATION DATE

Attachment 13

Groundwater Monitoring Design

February 23, 2011

Ms. Catherine Dickert  
Environmental and Permitting Manager  
SG Interests, I Ltd.  
1065 Main Avenue, Suite 209  
Durango, CO 81301  
Phone: 970-209-6464  
[cdickert@sginterests.com](mailto:cdickert@sginterests.com)

PN: 52302GE

Subject: Proposed McIntyre #1 & #2, and #3 & #4 Ponds  
Monitor Well Comments  
Gunnison County, Colorado

Ms. Dickert,

This letter presents information you requested on monitor wells typically constructed in the State of Colorado.

Monitor wells are typically constructed above and below the subject facilities to determine the baseline water quality data above gradient from the site and the water quality below gradient from the subject site.

The following represents a typical monitor well installation procedure and includes the materials typically used for the installation:

Well bore holes are typically drilled using a truck or track mounted drilling rig with the oversight of a qualified geologist. Bore holes drilled for well installation are continuously logged by the geologist to ensure that all subsurface water-bearing zones, soil types, and soil characteristics (e.g., soil classification, physical characteristic, moisture condition, color) have been identified. Bore holes are drilled through surficial soils, weathered bedrock, and are typically a minimum of two feet into competent bedrock. Completion of wells a minimum of two feet into bedrock ensures that groundwater flowing along the bedrock/soil interface will be encountered by the well.

Monitoring wells are typically constructed using 2-inch diameter, SCH 40 PVC well casing and screen (0.01-inch or 0.02-inch slot). Each well is typically screened from three feet below ground to a minimum depth of two feet below the top of competent bedrock. The annulus surrounding each well will be filled with a silica sand filter pack (10-20 grade) to a depth of two feet below ground surface. Bentonite chips will be placed on top of the filter pack to a depth of 6-inches below ground surface (1.5-foot seal) then hydrated with potable water (see Figure 1). Concrete will be used to stabilize the well at the ground surface. Each well will be protected using a lockable steel security shroud (see Figure 2). Well installation procedures will be conducted in a manner to minimize groundwater contamination from outside sources (i.e., surface contaminants, drill rig oils, non-potable water used to hydrate bentonite, contaminated augers, etc.).

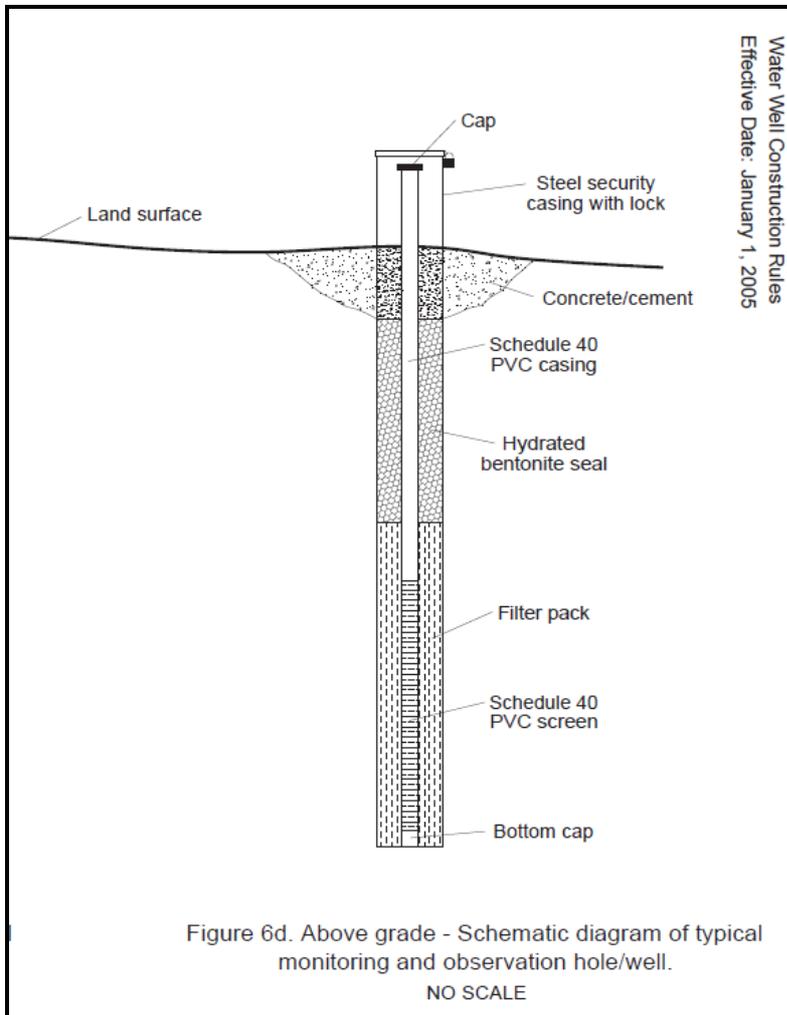


Figure1. Typical schematic of a monitoring well. (State of Colorado, Office of the State Engineer State Board of Examiners of Water Well Construction and Pump Installation Contractors, Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction, (Water Well Construction Rules) 2 CCR 402-2, Effective Date January 1, 2005)

The relative elevation of each monitoring well (based on the top of casing) is typically surveyed after completion. Relative elevations will allow a potentiometric surface of the groundwater to be developed and evaluated.

Groundwater monitoring typically includes water level measurements and groundwater sampling at each monitoring well. Water level and water quality results will provide a better understanding of the occurrence of groundwater and extent of groundwater contamination, if any exists.



Figure 2. Typical monitor well with steel riser cover cemented into ground.

We are available to provide a proposal for installation of the monitor wells at the McIntyre Ponds upon request. Trautner Geotech does not conduct water quality assessment as part of the monitor well installation.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully,  
**TRAUTNER GEOTECH**

Reviewed

Handwritten signature of J. Andrew Gleason in black ink.

J. Andrew Gleason  
Engineering Geologist

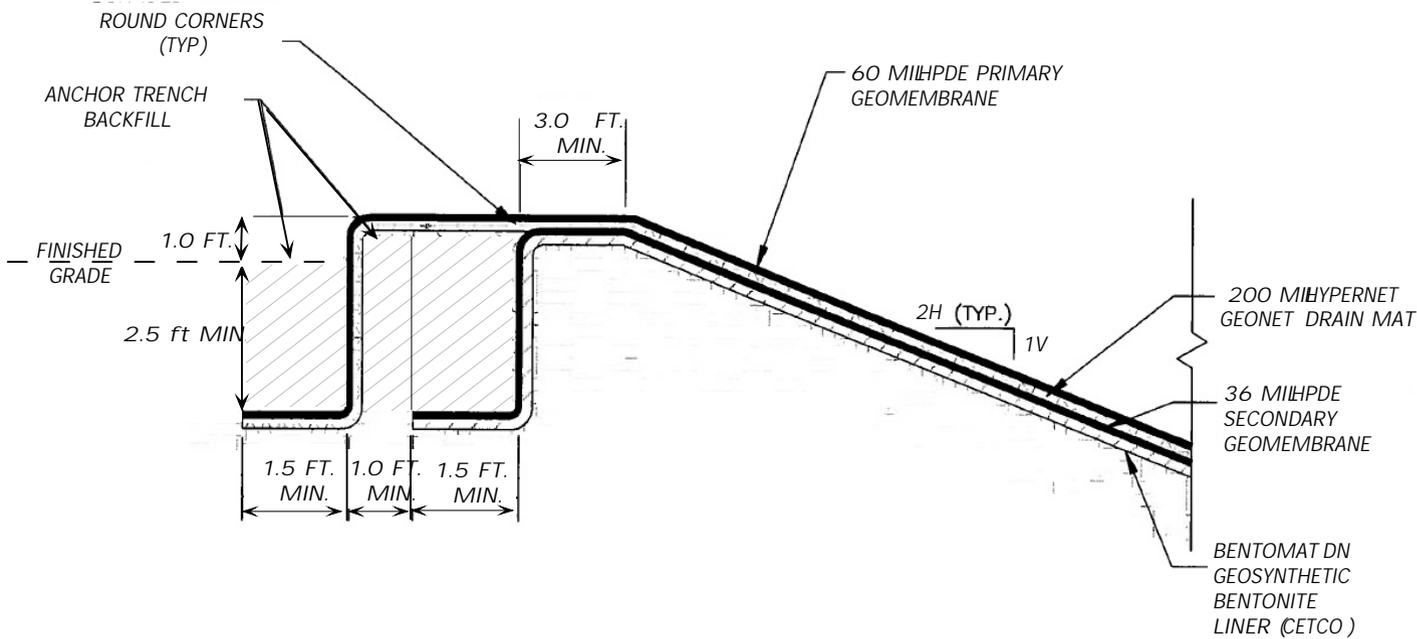
Handwritten signature of David L. Trautner, P.E. in blue ink.

David L. Trautner, P.E.  
Principal Geotechnical Engineer

Attachment 14

Anchor Trench Design

SG Interest, LTD.  
 McIntyre Flowback Pits 1 & 2  
 Anchor Trench Details\*



\* Subject to specific liner manufacturer's installation instructions

Attachment 15

Clarification of Soil Description

March 14, 2011

Ms. Catherine Dickert  
Environmental and Permitting Manager  
SG Interests, I Ltd.  
1065 Main Avenue, Suite 209  
Durango, CO 81301  
Phone: 970-209-6464  
[cdickert@sginterests.com](mailto:cdickert@sginterests.com)

PN: 52302GE

Subject: Proposed McIntyre #1 & #2, and #3 & #4 Ponds  
Geotechnical Engineering Comments Regarding Unconsolidated Soil Deposits  
Gunnison County, Colorado

Ms. Dickert,

This letter is in response to our recent meeting regarding the soil deposits at the subject project. Our cursory geotechnical engineering subsurface exploration and comments including the logs of the test borings are presented in our November 15, 2010 letter.

We advanced two (2) borings at each of the proposed sites. We encountered sandy silt and clayey silt with organic material to depths of about one and one-half (1½) feet below the ground surface in Test Borings One and Two, located at the McIntyre #1 and #2 pond site. The Unified Soil Classification System (USCS) of these soils based on visual-manual field classification (ASTM D2488) is MS in Test Boring One, and ML in Test Boring Two. The USCS soil classifications are shown on the logs of the soils presented in our November 15, 2010 letter. We encountered clay and silt soils with organics to one (1) foot below the surface in test Boring Three and to a depth of about two (2) feet below the surface in Test Boring Four. Both of these borings were located at the McIntyre #3 and #4 pond sites. The USCS soil classification of these soils is CL, based on visual-manual field classification. The “organics” listed in the classification is consistent with visual-manual field classification and indicates the presence of roots and similar organic material, but is not an indication that these are “organic” soil per USCS classification.

None of these soils classify as organic (OL or OH) per the USCS, therefore it is our opinion that they do not necessarily classify as “topsoil” in a strict sense. It is not possible to classify soils as topsoil based solely on field procedures, since determination of this classification typically must include laboratory determination of various nutrients. Laboratory determination of nutrients in soil is not typically performed for construction projects such as this, and is generally limited for specific evaluation of soil for agricultural needs. . If a definitive determination of existence of top soil is needed a biologist or chemist familiar with topsoil determination should be engaged.

Most natural shallow soils in western Colorado probably do not classify as topsoil, though they support the arid-climate plant life that exists in this region. We understand that the project design needs to include a stockpile of material for reclamation purposes to help reestablish plant life after closure of the ponds in the future. The depth of significant roots and other organic material at the McIntyre #1 and #2 sites is estimated to be generally less than six (6) inches, but may be slightly deeper in some portions of the small valley in which the site is located. There is no uniform depth of an active root zone at the Pond #3 and #4 site since some of the ground surface between ground foliage and shrubs is nearly bare other than sparse native grasses, therefore the depth of a blanket of soil with significant organic material does not exist the the #3-#4 site..

For purposes of stockpiling material for future reclamation we feel that the depth of cut to generate these stockpiles be based on the depth of the existing shallow, more organic-bearing materials, generally a minimum of about six (6) inches at the #1-#2 site. Although there is no definable "blanket of material to base a recommended cut to develop this material at the #3-#4 site, we feel it is appropriate to have a similar recommended minimum cut for uniformity of design, and to have a definable materials with a usable quantity for re-vegetation of the #3-#4 site at a later date. The balance of the organic-bearing soils below nominally six (6) inches to nominally eighteen (18) inches is probably less suitable for re-vegetation purposes and is generally may be less desirable for embankment berm construction but specific determination of use of material for berm construction should be conducted at a later date as the project progresses. Generally we evaluate soils for suitability for berm construction based on the general characterization, classification, and strength potential as part of design phase studies for these types or projects.

In summary, we feel that only the top nominally six (6) to eight (8) inches of material is suitable for establishment of a "topsoil" stockpile for later use. The suitability of soils beneath this layer should be evaluated for suitability for embankment fill construction as part of future, more comprehensive design level geotechnical engineering study.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully

TRAUTNER GEOTECH



David L. Trautner, PE, CPG