



01984997



State of Colorado Oil and Gas Conservation Commission



1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax: (303) 894-2109

CENTRALIZED E&P WASTE MANAGEMENT FACILITY PERMIT

Submit this Form and accompanying documents for each facility per Rule 908. Financial Assurance in the amount of \$50,000 is required to operate each facility.

Surety ID: _____

OGCC Operator Number: 10079		Contact Name and Telephone:	
Name of Operator: Antero Resource Piceance Corporation		Steve Fontenot	
Address: 1625 17th Street, Suite 300		No: (970) 274-6454	
City: Denver State: CO Zip: 80202		Fax: (970) 625-9929	
Surface Owner (if different than above): Gene Mulvihill			
Address: 355 Madison Ave. #3			
City: Morristown State: NJ Zip: 07960		Phone: (973) 267-5450	
Facility Name: Lundgren Frac/ Flowback Pit		Location (QtrQtr, Sec, Twp, Rng, Mer):	
Address:		NWSE, Sec. 32, T5S, R93W, 6th P.M.	
City: Rifle State: CO Zip: 81650		Latitude: 39 deg. 34' 12.64" N	
Phone:		Longitude: 107 deg. 44' 22.92" W	
Fax:			

**Complete the
Attachment Checklist**

	Oper	OGCC
Site description (topo, geol, hydro)	✓	
Adjacent land use description	✓	
Topographic map	✓	
Site drainage map with structures	✓	
Scaled drawing and survey map	✓	
Facility design & engineering	✓	
Operating plan	✓	
Water analysis report	✓	
Financial assurance	✓	
Closure plan	✓	
Local gov't zoning compliance	✓	
Local gov't permits and notice	✓	

1. Is the site in a sensitive area? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	2. What are the average annual precipitation and evaporation rates for the site? Precipitation: .7 inches/year Evaporation: 30 inches/year
3. Has a description of the site's general topography, geology and hydrology been attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	
4. Has a description of the adjacent land use been attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	5. Has a 1:24,000 topographic map showing the site location been attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
6. Has a site plan showing drainage patterns, diversion or containment structures, roads, fencing, tanks, pits, buildings and any other pertinent construction details been attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	
7. If site is not owned by the operator, is written authorization of the surface owner attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	8. Has a scaled drawing and survey showing the entire section(s) containing the proposed facility been attached? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
9. What measures have been implemented to limit access to the facility by wildlife, domestic animals or by members of the public? Briefly explain. <u>Antero Resource has constructed a livestock fence around the perimeter of the existing facility to mitigate the risk of livestock and wildlife entering the site, as well as to mitigate the risk of unauthorized personnel from entering the site</u>	
10. Is there a planned firelane of at least 10 feet in width around the active treatment areas and within the perimeter fence? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	11. Is there an additional buffer zone of at least 10 feet within the perimeter firelane? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
12. Have surface water diversion structures been constructed to accommodate a 100-year, 24-hour event? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	13. Has a waste profile been calculated according to Rule 908.b.6? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
14. Has facility design and engineering been provided as required by Rule 908.b.7? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	15. Has an operating plan been completed as required by Rule 908.b.8? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
16. Has ground water monitoring for the site been provided? <input type="checkbox"/> Y <input type="checkbox"/> N ***Attach Water Analysis Report, Form 25, for each monitoring well installed***	
17. Has financial assurance been provided as required by Rule 704? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	18. Has a closure plan been provided? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
19. Have local government requirements for zoning and construction been complied with? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	20. Have permits and notifications required by local governments and other agencies been provided? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N

Print Name: Steve Fontenot

Signed: Steve FontenotTitle: OPERATIONS SUPERINTENDENT Date: 12/13/06OGCC Approved: [Signature]Title: EPSDate: 2/6/07

CONDITIONS OF APPROVAL, IF ANY:

Facility Number: 149019



DEPARTMENT OF NATURAL RESOURCES
Bill Ritter, Jr., Governor
1120 Lincoln St., Suite 801
Denver, CO 80203
Phone: (303) 894-2100
FAX: (303) 894-2109
www.oil-gas.state.co.us

Cent. Fac #149019

February 7, 2007

Steve Fontenot
Antero Resources Piceance Corporation
1625 17th Street, Suite 300.
Denver, Colorado 80202

RE: Antero Resources Lundgren Frac/Flowback
Centralized E&P Waste Management Facility (Water) NWSE 32 -T5S-R92W
Garfield County, Colorado

Dear Mr. Fontenot:

The Colorado Oil and Gas Conservation Commission (COGCC) staff has reviewed the Permit for the above referenced site. All items required by the permit have been provided and the COGCC staff has approved the facility. Please refer to CE&PWMF No. 149019 on all future correspondence.

Should you have any questions, please call me at (303) 894-2100 ext.112.

Respectfully,

A handwritten signature in black ink, appearing to read "Robert H. Chesson". The signature is fluid and cursive, with a long horizontal line extending to the right.

Robert H. Chesson, C.P.G., P.G.
Environmental Protection Specialist

cc: Debbie Baldwin – COGCC
Jaime Adkins – COGCC
Randall Ferguson – COGCC
Chris Canfield - COGCC
Cody Smith – Wagon Wheel Consulting, Inc.



DEPARTMENT OF NATURAL RESOURCES

Bill Owens, Governor
1120 Lincoln St., Suite 801
Denver, CO 80203
Phone: (303) 894-2100
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www.oil-gas.state.co.us



01904905

#149019

January 18, 2007

Cody Smith
Wagon Wheel Consulting, Inc.
111 E. 3rd Street, Suite 213
Rifle, CO 81650

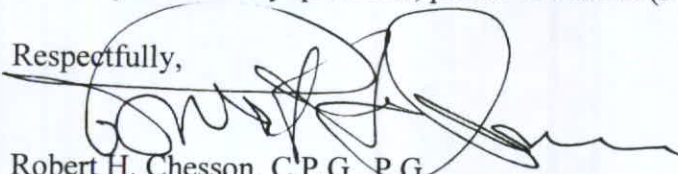
RE: Proposed Antero Resources Lundgren Centralized E&P Waste Facility
NWSE Section 32, Township 5 South, Range 93 West
Garfield County, Colorado

Dear Mr. Smith:

The Colorado Oil and Gas Conservation Commission (COGCC) staff has received your permit documents for the above referenced facility. Although we have not finished our complete review of the permit, one item in the submitted documents is lacking. Under Rule 908.d. – Financial Assurance, Antero is required to maintain a separate \$50,000 bond for the proposed facility. Review of the submitted financial assurance bonds with the permit has bonds for well plugging and surface damage only. An additional bond is required to satisfy the requirements of Rule 908. Questions concerning bond requirements can be made to Marsha Choury (303-894-2100 x109). Additionally, although Antero has submitted the facility for Garfield County Planning for approval under county land use regulations, the COGCC staff is unable to issue an operations permit for the proposed facility until the facility has obtained county approval. Please notify the COGCC when county approval has been obtained.

Should you have any questions, please call me at (303) 894-2100 ext.112.

Respectfully,


Robert H. Chesson, C.P.G., P.G.
Environmental Protection Specialist

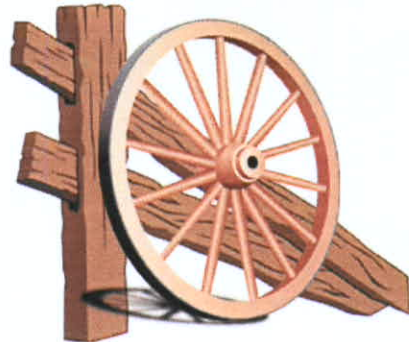
cc: Brian Macke - COGCC
Debbie Baldwin - COGCC
Jaime Adkins - COGCC
Randal Ferguson - COGCC
Chris Canfield - COGCC

#149019



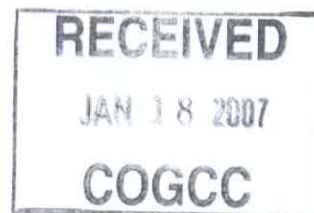
01984956

WAGON WHEEL CONSULTING, INC.
111 E. 3RD STREET, SUITE 213
RIFLE, CO 81650
OFFICE: (970) 625-8433
FAX: (970) 625-8435



January 17, 2007

Colorado Oil & Gas Conservation Commission
Attn: Robert Chesson
1120 Lincoln Street, Suite 801
Denver, CO 80203



Dear Mr. Chesson:

On behalf of Antero Resources Piceance Corporation Wagon Wheel Consulting, Inc. is submitting these two copies of the Centralized E& P Waste Management Facility Permit for the Lundgren Frac/Flowback Pit. If you should have any questions, please give me a call at the above number or on my cell phone 303-902-1532.

Sincerely,

Cody W. Smith
Senior Permitter

nls

**ANTERO RESOURCE PICEANCE CORPORATION****LUNDGREN FRAC/ FLOWBACK PIT****SITE DESCRIPTION**

The existing Lundgren Frac/ Flowback Pit is located in a remote area northeast of Rifle, Colorado, in Garfield County. The existing site occupies approximately one (1) acre of a 598.3 acre parcel. It is located in the NW ¼ of the SE ¼ of Section 32, Township 5 South, Range 93 West, in the 6th P.M. The area consists of a heavily treed area, sage brush flats and a small grassy area. Rough graded roads access the site and the natural gas well pad located immediately adjacent to the site. The topography of the site is gently sloping down to the southwest. Steeper slopes exist on the eastern side of the facility. The facility was constructed to allow approximately a 100 foot buffer zone between the pit and the steeper slopes to the east.

Regional ground water in the area is commonly found at a depth of 80 feet to 200 feet below ground surface. The Lundgren pit was designed to protect ground water resources. The pond is lined with a geosynthetic liner. No additional ground water monitoring devices have been installed. The site is located in an area that is separated from areas where surface water normally is present. The existing well pad, access road and ditches separate the site from fields and pastures that are used for Agriculture purposes. The site was designed to divert stormwater and surface runoff around the facility to eliminate the risk of surface water contacting stored water.

The existing facility presents very minimal impacts in the terms of Visual Impacts. Surrounding residence are situated with sufficient distance between facility and most being at lower elevations than the facility. A barrier of trees assist in mitigating visual impacts to residents located east of the facility.

#149019



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ANTERO RESOURCE PICEANCE CORPORATION

LUNDGREN FRAC/ FLOWBACK PIT

ADJACENT LAND DESCRIPTION

The Lundgren pit is located adjacent to an existing well location owned and operated by Antero Resource Piceance Corporation (Antero). Adjacent lands and properties are commonly utilized for farming and ranching operations. The location of the facility is fairly remote. The nearest resident is located approximately 900 feet southeast of the existing facility and at a significantly lower elevation than the pit. The existing Lundgren pit presents very minimal effects in terms of noise, dust, visibility and glare impacts; therefore, sufficient distance exists to provide protection to adjacent properties.



**CENTRALIZED E&P WASTE
MANAGEMENT FACILITY PERMIT**

LUNDGREN FRAC/FLOWBACK PIT

**GARFIELD COUNTY
COLORADO, USA**

WAGON WHEEL CONSULTING
111 E. Third St, Suite 213
Rifle, CO 81650
(970) 625-8433

ANTERO RESOURCE PICEANCE CORPORATION

LUNDGREN FRAC/ FLOWBACK PIT

OPERATION PLAN

Antero Resource Piceance Corporation (Antero) is planning to utilize their existing Lundgren Frac/ Flowback Pit to store water associated with their natural gas production operations. The existing pit will be utilized as an emergency backup storage facility. Antero is currently recycling all their water for their natural gas completion and production operations. During times of over burdened water will be when Antero intends to utilize the Lundgren pit. Water will be stored in the existing pit until demand rises for additional water resources are needed to complete operations.

Antero intends to utilize the services of water tanker trucks to transport water to and from location. No additional equipment such as tanks, pumps, pipelines, etc. will be used for the operations of the existing Lundgren Pit. Tanker trucks will utilize pumps located within the trucks to pump water to and from the pond.

During the normal operations Antero expects the usage of the existing pit will be very minimal. Operations during these times will consist of one round trip per day of an operator. At times of high usage Antero anticipate a maximum of 4,000 BBL will be hauled to the site (31 round trips) this being worst case scenario. This scenario is not expected to occur very often if ever.

The existing facility is designed as a non discharge facility and will hold a maximum of 42,715 BBL of water. Two (2) foot of freeboard will be maintained at all times to eliminate any risk of spill and/or overflow.

ANTERO RESOURCE PICEANCE CORPORATION

LUNDGREN FRAC/ FLOWBACK PIT

GROUND WATER REPORT

Antero Resource Piceance Corporation has currently applied to the Colorado Division of Water Resources for a Monitoring Well Permit as a plan to monitor the ground water under the existing pond. No samples of ground water have been taken at this time. Antero agrees to send a copy of all ground water sampling analysis to the applicable agencies as soon as the well is in place.

FORM
3

Rev 6/99

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax (303) 894-2109

FOR OGCC USE ONLY

PERFORMANCE BOND

BOND NO: LPM8756615. This bond is a perpetual instrument which shall remain in force and effect until all obligations have been met and the bond is released by the Colorado Oil and Gas Conservation Commission.

Surety Provider No:

OGCC Oper. No:

FATS No:

KNOW ALL PERSONS BY THESE PRESENTS, That we, Antero Resources II Corporation of the County of Denver in the State of Colorado as principals, and Fidelity and Deposit Company of Maryland as surety, authorized to do business in the State of Colorado, are held hereby and firmly bound unto the State of Colorado, in the penal sum of (\$30,000.00), Thirty Thousand & No/100 Dollars, lawful money of the United States, for the faithful payment of which we hereby bind ourselves, our heirs, executors, administrators and assigns.

The condition of this obligation is that whereas the above bounden principals propose the following oil and gas operation(s) on lands situated in the State of Colorado.

Type of Bond	Coverage	Location
<input checked="" type="checkbox"/> Plugging	<input checked="" type="checkbox"/> Blanket	Complete for Individual Bonds
<input type="checkbox"/> Surface	<input type="checkbox"/> Individual	Well Name and Number: _____
<input type="checkbox"/> Seismic	<input type="checkbox"/> Plugging 1 well	Owner of lands where off-site land-treatment facility is located: _____
<input type="checkbox"/> E&P Waste Facility	<input type="checkbox"/> Surface for 1 well	QtrQtr, Sec, Twp, Rng, Meridian: _____
<input type="checkbox"/> Downstream Gas Facilities	<input type="checkbox"/> Irrigated	County: _____
	<input type="checkbox"/> Non-irrigated	
	<input type="checkbox"/> Excess Inactive Wells	

NOW, THEREFORE, If the above bounden principals shall comply with all of the provisions of the laws of the State of Colorado and the rules, regulations and requirements of the Oil and Gas Conservation Commission of the State of Colorado, with reference to properly plugging of said well or wells; with reference to land damages and the restoration of the land, as nearly as possible, to its condition at the beginning of the lease; with reference to seismic operations the proper surface restoration and plugging of any shot holes, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Witness our hands, this 13th day of September 2004.

Principal: Antero Resources II Corporation
Address: 1625 17th Street, 3rd Floor
City: Denver State: CO Zip: 80202
Phone: (303) 357-7310 Fax: _____

Signed: _____

Name Printed: _____

Witness our hands, this 13th day of September 2004.

Surety: Fidelity and Deposit Company of Maryland
Address: 1400 American Lane, Tower I
City: Schaumburg State: IL Zip: 60196-1056
Phone: (800) 382-2150 Fax: _____

Signed: Sandra J. ShryackName Printed: Sandra J. Shryack

Approved: _____
Director, Oil and Gas Conservation Commission

Bond Release
Approved: _____
Director, Oil and Gas Conservation Commission

Dated: _____

Release Date: _____



State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax (303) 894-2109



FOR OGCC USE ONLY

PERFORMANCE BOND

BOND NO: LPM8756616. This bond is a perpetual instrument which shall remain in force and effect until all obligations have been met and the bond is released by the Colorado Oil and Gas Conservation Commission.

Surety Provider No:

OGCC Oper. No:

FATS No:

KNOW ALL PERSONS BY THESE PRESENTS, That we, Antero Resources II Corporation of the County of Denver, in the State of Colorado as principals, and Fidelity and Deposit Company of Maryland as surety, authorized to do business in the State of Colorado, are held hereby and firmly bound unto the State of Colorado, in the penal sum of (\$ 25,000.00), Twenty-Five Thousand & no/100 Dollars, lawful money of the United States, for the faithful payment of which we hereby bind ourselves, our heirs, executors, administrators and assigns.

The condition of this obligation is that whereas the above bounden principals propose the following oil and gas operation(s) on lands situated in the State of Colorado.

Type of Bond	Coverage	Location
<input type="checkbox"/> Plugging	<input checked="" type="checkbox"/> Blanket	Complete for Individual Bonds
<input checked="" type="checkbox"/> Surface	<input type="checkbox"/> Individual	Well Name and Number: _____
<input type="checkbox"/> Seismic	<input type="checkbox"/> Plugging 1 well	Owner of lands where off-site land-treatment facility is located: _____
<input type="checkbox"/> E&P Waste Facility	<input type="checkbox"/> Surface for 1 well	QtrQtr, Sec, Twp, Rng, Meridian: _____
<input type="checkbox"/> Downstream Gas Facilities	<input type="checkbox"/> Irrigated	County: _____
	<input type="checkbox"/> Non-irrigated	
	<input type="checkbox"/> Excess Inactive Wells	

NOW, THEREFORE, If the above bounden principals shall comply with all of the provisions of the laws of the State of Colorado and the rules, regulations and requirements of the Oil and Gas Conservation Commission of the State of Colorado, with reference to properly plugging of said well or wells; with reference to land damages and the restoration of the land, as nearly as possible, to its condition at the beginning of the lease; with reference to seismic operations the proper surface restoration and plugging of any shot holes, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Witness our hands, this 13th day of September, 2004.

Principal: Antero Resources II Corporation
Address: 1625 17th Street, 3rd Floor
City: Denver State: CO Zip: 80202
Phone: (303) 357-7310 Fax: _____

Signed: _____

Name Printed: _____

Witness our hands, this 13th day of September, 2004.

Surety: Fidelity and Deposit Company of Maryland
Address: 1400 American Lane, Tower I
City: Schaumburg State: IL Zip: 60196-1056
Phone: (800) 382-2150 Fax: _____

Signed: Sandra J. Shryack

Name Printed: Sandra J. Shryack

Approved: _____
Director, Oil and Gas Conservation Commission

Bond Release

Approved: _____
Director, Oil and Gas Conservation Commission

Dated: _____

Release Date: _____

**Antero Resources Lundgren Frac Pit
Re-vegetation Plan
Garfield County, CO**



Photo 1. Antero Lundgren Frac Pit. December 12, 2006.

December, 2006

Prepared by:

**WestWater Engineering
2516 Foresight Circle #1
Grand Junction, CO 81505
970-241-7076**

In Coordination with:

**Wagon Wheel Consulting
Rifle, CO**

Antero Resources Lundgren Frac Pit Re-vegetation Plan

December 2006

Introduction

This plan is for compliance with Garfield County Zoning Regulation 9.07.04 (12) (Board of County Commissioners, 2006). On December 12, 2006, a field inspection of the site was conducted by WestWater Engineering (WWE) biologists at the request of Wagon Wheel Consulting on behalf of Antero Resources. The inspection identified appropriate topics for inclusion in a re-vegetation plan. Factors considered include soil type and texture, existing land management, absence or presence of listed noxious weeds and likely potential natural vegetation community.

Conditions were poor to conduct the inspection with approximately 2 inches of compacted snow (Photo 1, page 1) covering most of the site and surrounding terrain. Some disturbed areas had ice under snow. Most native grasses present were senescent and could not be identified with certainty except to genus, e.g. *Hesperostipa*, *Sporobolus*, and *Elymus* (NRCS, 2006a). Snow cover precluded a thorough survey for rosettes of weeds potentially troublesome to re-vegetation success.

Landscape Setting

The site is located on a high, gently sloping terrace above and east of Rifle Creek near the edge of large, irrigated hay meadows. The northwest corner of the existing pit is located at point NWCOR on Figure 1. The terrace drops sharply in a near vertical manner to Cactus Valley a few meters east of the existing pit. Russian knapweed (*Acroptilon repens*) and salt cedar (*Tamarix ramosissima*) were found within 100 meters of the perimeter. The knapweed is in adjacent disturbed soils and the salt cedar is on the bank of an otherwise well vegetated ditch.



Photo 2. Russian knapweed.



Photo 3. Salt cedar.

According to the US Dept. of Agriculture, soil is Potts rolling loam composed of 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand (NRCS, 2006b). From a texture test conducted on site, soil on site is more clay and silt and less sand, i.e. at least 27 percent clay, 50 percent silt with little to no noticeable sand.

Natural vegetation observed in undisturbed soils around the site was sparse. Evidence of grazing by horses was plentiful including the presence of two horses at the time of inspection. No evidence or recent cattle grazing was observed. A perimeter fence precludes grazing of cattle or horses immediately on the banks of the pond. Native species present and observed immediately outside the existing perimeter fence includes basin big sagebrush (*Artemisia tridentata tridentata*), rabbitbrush (*Chrysothamnus* spp.), and winterfat (*Krascheninnikovia lanata*).

Characteristic species expected and their percent composition is shown in Table 1 (NRCS, 2006b). Examination of undisturbed land adjacent to the pit on December 12 confirmed the presence of a native vegetation plant community stressed by grazing, and invasion of regulated and unregulated invasive, weedy species.

Table 1. Characteristic vegetation and composition Potts rolling loam.		
Common Name	Scientific Name	Percent Comp.
western wheatgrass	<i>Pascopyrum smithii</i>	25
needle and thread	<i>Hesperostipa comata comata</i>	15
basin big sagebrush	<i>Artemisia tridentata tridentata</i>	10
bluebunch wheatgrass	<i>Pseudoroegneria spicatum spicatum</i>	10
indian ricegrass	<i>Achnatherum hymenoides</i>	10
bottlebrush squirreltail	<i>Elymus elymoides</i>	5
yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>	5

Recommended Seed Mix

The following seed mix (Table 2) contains only grasses. The reason for not including shrubs and forbs is the presence of russian knapweed and the likelihood herbicides will be needed to control the existing infestation and suppress and eliminate new infestations. Species included have been shown to perform well after treatment of russian knapweed with herbicides in Nevada (Graham and Johnson, 2005). Only native species are included with several sod-forming perennial grasses, which help prevent reinvasion more effectively than bunch grasses (Beck, 2006).

Table 2. Recommended Seed Mix and rate for drill or hydro-seed for Antero Lundgren Frac Pit.				
Scientific Name/Seeds per Pound	Common Name/Preferred Cultivar	No. PLS/FT ²	% of Mix by PLS Wt.	Application Rate Lbs PLS/acre
<i>Achnatherum hymenoides</i> 140,000	Indian ricegrass/ Paloma*	4	11	1.25
<i>Hesperostipa comata comata</i> 115,000	Needleandthread	4	14	1.5
<i>Pascopyrum smithii</i> 140,000	western wheatgrass/ Arriba*	8	23	2.5
<i>Pseudoroegneria spicata spicata</i> 140,000	bluebunch wheatgrass/ P7	4	11	1.25
<i>Elymus lanceolatus lanceolus</i> 154,000	thickspike wheatgrass	8	21	2.3
<i>Elymus lanceolatus psammophilus</i> 156,000	streambank wheatgrass	8	20	2.25
Total		36 PLS/FT ²	100	11.05 Lbs. PLS/AC
*WWE recommends accepting no other cultivar for this site. (NRCS, 2006a), Colorado Natural Heritage Program, 1998.				

Seeding rate should be doubled for broadcast application. Preferred seeding method for this site is hydro-seeding. Harrowing, followed by seed application, then re-harrowing is another good method where slope allows. Next best method is broadcast seeding followed by mulching with clean, certified weed-free straw. Mulch should be crimped into the soil where possible.



Photo 4. Steep pit berm at northwest corner.



Photo 5. Livestock observed during inspection.

Drilling seed is possible on top of pit berm but, presumably, that surface will be maintained vegetation-free when the pit is active. The basis of these recommendations is the berms are too steep for machinery to drill. However, it is not too steep to crimp mulch or imprint the soil with dozer tracks or other imprinting implements which leave cross-slope imprinting or furrowing.

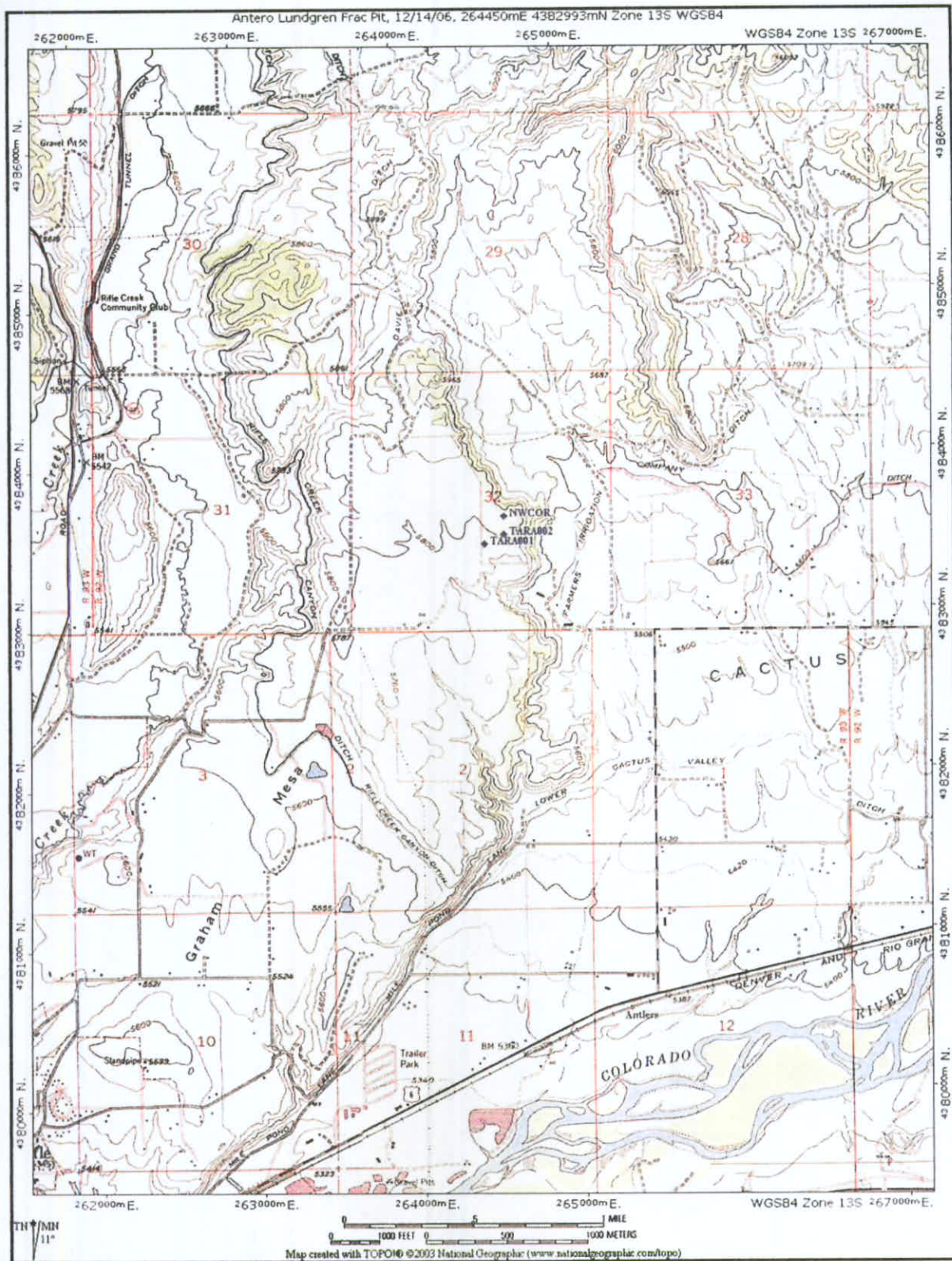


Figure 1. Antero Lundgren Frac Pit. Northwest corner of pit is at point NWCOR in Section 32. TARA indicates locations of observed tamarisk.

NOXIOUS WEED MANAGEMENT PLAN

Piceance Basin Project Garfield County, Colorado

Prepared for:
Antero Resources Piceance Corporation

June 2005

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Appendices

Appendix A	Weed Management Strategies
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NOXIOUS WEED MANAGEMENT PLAN

PICEANCE BASIN PROJECT

GARFIELD COUNTY, COLORADO

INTRODUCTION

Antero Resources Piceance Corporation (Antero) proposes to develop a conventional gas field east of Rifle, Garfield County, Colorado. The project is referred to as the Antero Resources Piceance Basin Project and will involve the construction of a test drill pad, access roads, and associated facilities. Approximately twelve (12) additional well pads may be added. The development of the well pads will be constructed in Garfield County, on private land and in public road rights-of-way (ROW).

Each well pad will require approximately 1.38 acres in new surface disturbance; if all thirteen (13) well pads are developed, the total surface disturbance would be approximately 17.94 acres. An additional 5 acres in surface disturbance would occur as a result of developing or improving access roads and installing gathering pipelines. The total project surface disturbance associated with the Antero wells is approximately 22.94 acres including well pads, access roads, and gathering pipeline rights-of-way. The well pads will be accessed from existing public roadways and constructed access roads. The project will involve ground disturbance of the entire project area or minor upgrades to access roads. Construction activities associated the well pad(s) and future pipeline(s) would be minor and temporary.

Further development of the project area would include a compressor station, associated gathering and transmission pipeline, and access roads. Approximate surface disturbance associated with the additional project activities has not been determined but would follow existing access roads and right-of-way corridors where possible.

The Garfield county weed advisory board identified numerous species of noxious weeds or other invasive plants that are known to occur in Garfield County. This noxious weed management plan provides methods Antero and its contractors will follow to prevent the spread of noxious weeds during construction and for the management of the disturbed areas of the project after construction.

NOXIOUS WEED SPECIES OF CONCERN

Noxious weed and invasive plant species are those that spread into areas where they are not native and typically displace native vegetation or bring about changes in species composition, community structure, and/or ecosystem function. A list of noxious weed species of concern in Garfield County is provided in Table 1. Some specific weeds of concern are; leafy spurge, Canada thistle, spotted knapweed, and Russian knapweed.

Appendix A provides a description of each of the weeds of concern in Garfield County, with specific management objectives regarding their containment or eradication.

Antero is committed to the prevention of the spread of noxious weeds associated with construction. Upon agency request, a noxious weed survey, identifying the location and type of existing weed infestations on or immediately adjacent to the well pads, and proposed access roads will be conducted prior to construction, where access is granted. Approved management procedures will be followed during construction to prevent the spread or re-establishment of weed populations on any areas disturbed during construction. The results of the survey will be made available to the Garfield County weed advisory board, upon request. After the well pad(s) is constructed, Antero is committed to containment of existing stands of noxious weeds, and eradication of new stands occurring within disturbed project areas.

MANAGEMENT METHODS

Several weed management methods are described in this section including prevention of the spread of weeds, eradication of new infestations, physical control methods such as pulling and mowing, seeding with competitive vegetation, and the use of herbicides for weed control. In general, the use of herbicides has been found to be the most effective and feasible method of weed control, and will be used everywhere except in isolated locations where other methods are necessary.

Prevention

Prevention is the most effective, efficient, and long-term strategy in the management of noxious and invasive species. Preventing invasions by new plant species and quickly detecting invasions that occur allows for immediate eradication measures to be implemented. Other preventative measures include reestablishing vegetation as quickly as possible in disturbed areas, ensuring that seed supplies are obtained from suppliers who can provide weed-free certified seed mixes, and pressure-washing vehicles and equipment at a sanitary location before they are brought into a work area or in-between work sites if necessary. Contractors may be required to wash all equipment or show proof of equipment washing before entering any of the project states. The inspector will make the decision if pressure-washing is required after passing through an area of noxious or invasive weeds. If areas of noxious weeds are nearly contiguous as might be found along some ROW's, pressure washing each time may not be necessary.

Follow up long-term monitoring is also an important preventative measure. Noxious weed monitoring on foot, will be conducted annually for at least three years following construction activities to ensure that noxious and invasive species do not get a foothold along the ROW. Landowner concerns will also be addressed as they arise.

Eradication

Complete eradication of large areas where infestations are already established may not be possible, as the area is likely to be re-invaded from adjacent lands, unless there are physical barriers that isolate the area. Eradication is most likely possible when the species has just begun to invade and establish itself in a new area, which highlights the importance of early detection and the post-construction monitoring program. Antero will coordinate and cooperate with the landowner and county weed agencies on weed eradication.

Table 1 Garfield County Designated Noxious Weed List

Scientific Name	Common Name	Garfield County, CO
<i>Cirsium arvense</i>	Canada thistle	X
<i>Cichorium intybus</i>	Chicory	X
<i>Arctium minus</i>	Common burdock	X
<i>Linaria dalmatica</i>	Dalmatian toadflax	X
<i>Centaurea diffusa</i>	Diffuse knapweed	X
<i>Cardaria draba</i>	Hoary cress	X
<i>Cynoglossum officinale</i>	Houndstongue	X
<i>Aegilops cylindrica</i>	Jointed goatgrass	X
<i>Euphorbia esula</i>	Leafy spurge	X
<i>Carduus</i> spp.	Musk thistle	X
<i>Crysanthemum leucanthemum</i>	Oxeye daisy	X
<i>Carduus acanthoides</i>	Plumeless thistle	X
<i>Lythrum salicaria</i>	Purple loosestrife	X
<i>Centaurea repens</i>	Russian knapweed	X
<i>Elaeagnus angustifolia</i>	Russian olive	X
<i>Tamarix ramosissima</i>	Salt cedar	X
<i>Tamarix parviflora</i>	Salt cedar	X
<i>Onopordum acanthium</i>	Scotch thistle	X
<i>Centaurea maculosa</i>	Spotted knapweed	X
<i>Centaurea solstitialis</i>	Yellow starthistle	X
<i>Linaria vulgaris</i>	Yellow toadflax	X

Source: Garfield County Weed Advisory Board 2005.

Physical Control

Physical control methods range from manual pulling of individual plants to the use of hand and power tools to uproot, girdle, or cut plants. Hand removal by pulling is appropriate when the plants are large enough that they will not break and leave the roots, which may re-sprout. Mowing or cutting of most weed species is seldom successful as this may stimulate lateral growth below the cut portion. This method can be effective in

localized or sensitive areas. To be effective, this method must generally be combined with hand application of an herbicide.

Competitive Vegetation

The use of native plants species to out-compete noxious and invasive species is an effective, long-term weed control method. Noxious weeds will usually grow in disturbed areas reseeded with native vegetation; however, after a few years, these weeds cannot compete and die off. In areas where noxious weeds have been allowed to flourish, the weeds may likely out-compete the native grasses. In these areas, a more vigorous approach will be needed to rid the area of the noxious weeds. The use of native Pure Live Seed (PLS) mixes will help ensure a healthy and strong revegetated site.

Herbicides

The use of herbicides on noxious and invasive plants can be an effective means of control. If herbicides are used, it will be on a plant by plant basis by hand application with backpack sprayers to avoid overspray to non-target species in adjacent plant communities. Broadcast spraying will not be conducted, and spraying will only take place when wind speeds are less than 8 miles per hour. This limits the use of herbicides to isolated stands of plants when individual plants are relatively small in size. Appropriate herbicides would be target-specific and have a short residue time in the environment. Application of all herbicides would be performed by a licensed and certified applicator. Herbicides would not be used within 100 feet of any wetland area or waterbody. Use of herbicides within 100 feet of a wetland or waterbody would be restricted to limited spot treatments.

Herbicide options for each noxious weed of concern are listed in Appendix A.

APPENDIX A

WEED MANAGEMENT STRATEGIES

Appendix A

Weed Management Strategies

Canada Thistle (*Cirsium arvense*): An introduced aggressive perennial with highly developed creeping horizontal roots. Produces from both seed and roots. Flower heads are approximately 0.5 inches in diameter and purple to white in color. Typical plant grows from 1 to 3 feet tall. It is one of the most widespread and economically damaging noxious weeds in Colorado. Infestations are found in cultivated fields, riparian areas, pastures, rangeland, forests, lawns and gardens, roadsides, and in waste areas.

Management Objective: Containment

Integrated Treatment:

Chemical: 2,4-D @ 2 lbs A.E./acre prior to bud; Dicamba @ 2 lbs A.E./acre in rapid growth stage; Curtail plus 2,4-D @ 2 lbs- .25 A.E./acre plus 1.0-1.5 A.E./acre, respectively, prior to bud or late fall; Glyphosate @ .5 to 1.0 A.E./acre.

Biological: Three insects currently available, (Canada thistle stem weevil; Canada thistle bud weevil; Thistle stem gall fly). It is best to release a complex of insects.

Cultural: Maintain soil fertility and moisture at optimum levels to favor grass growth.

Physical/Mechanical: Hand pulling is not effective. Cultivation will reduce density if done repeatedly every three to four weeks. Tillage generally ineffective.

Chicory (*Cichorium intybus*): A simple perennial, reproduces only by seed. The plant has a deep fleshy root and tufted basal leaves that resemble those of a dandelion. The stem is multi-branched and can reach over five feet tall. The flowers are bright blue, purple, or occasionally white, and occur along the stems of plants. Chicory is scattered throughout western Garfield County.

Management objective: Containment

Integrated treatment:

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: Close grazing by sheep will control the chicory in pastures.

Cultural: Re-seed disturbed areas adjacent to chicory infestations with appropriate perennial grasses.

Physical/Mechanical: None available.

Common Burdock (*Arctium minus*): An invasive biennial introduced from Europe. Upon germination it produces a rosette which winters over. The following spring it bolts and produces a tall erect stem with large basil, cordate, hairy leaves. The flowers are purple in color and approximately 1/2 to 3/4 inch in diameter. The flower head is covered with many slender hooked spines, which readily attach to clothing or passing animals.

Management Objective: Containment

Integrated Treatment:

Chemical: Best results usually obtained in rosette stage. 2,4-D @ .75 to 1 oz. water or 1 quart/acre. Roundup Ultra @ 1.5 oz/gal or 1 quart/acre; Curtail @ 1.5 oz/ gal of

water or 2 quarts/acre; Crossbow @ 1.5 oz/gal of water or 2 quarts/acre. Use nonionic surfactant @ 1 quart/acre.

Biological: No effective biological agent known.

Cultural: Minimize soil disturbances, encourage desirable plant growth. Livestock grazing usually spreads plant distribution.

Physical/Mechanical: Top growth removal through mowing or cutting is effective as is pulling or digging out the plant at flowering or early seed formation.

Dalmatian toadflax (*Linaria dalmatica*): A member of the Figwort family, it was introduced as an ornamental from Europe. It is a creeping perennial with stems from 2 to 4 feet tall. This plant is especially adapted to arid sites and can spread rapidly once established. Because of its deep, extensive root system and heavy seed production, this plant is difficult to manage.

Management objective: Containment

Integrated Treatment:

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: The defoliating moth, *Calophasia lunula*, has been release on Dalmatian and yellow toadflax. It may defoliate up to 20% of the leaves of the plant.

Cultural: Reseed disturbed areas adjacent to toadflax infestations with appropriate perennial grasses.

Physical/Mechanical: Repeated mowing 2-3 times per year will slow spread and reduce seed production.

Education: The key to Dalmatian toadflax management is to create an awareness among homeowners, nurseries, landscapers, and landscape architects that Dalmatian toadflax is a noxious weed and therefore should not be specified in planting, sold in nurseries or planted in home gardens or large-scale landscape projects.

Diffuse Knapweed (*Centaurea diffusa*): An invasive biennial, annual, or short lived perennial. The plant grows from 1-3 feet in height with a deep tap root. Urn-shaped flower heads are 3/16 to 1/4 inches in diameter. Flowers are generally white, with distinctive spiny bracts. Leaves are filiform and deeply divided. Seed viability extends 10 years plus, adding complexity to control.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Picloram @ .25 to .5 A.E./acre; Clopyralid @ .25 to .5 A.E./acre. Chemical control is considered the most cost effective means of control.

Biological: Two seed head flies, *Urophora affinis* and *U. quadrifasciata*, are available. They reduce seed production. A root-boring moth, *Agapeta zoegana*, causes considerable damage to roots.

Cultural: Reseeding of disturbed sites with fasts growing grasses helps prevent diffuse knapweed establishment.

Physical/Mechanical: Small infestations can be controlled with hand pulling, if done at least three times a year for several years. Any ground disturbance causes increased plant density. Mowing, while reducing some seed production, is not a viable alternative.

Hoary Cress (*Cardaria draba*): This plant also known as whitetop, is a creeping perennial, which reproduces by seed and creeping roots. The extensive root system spreads vertically and horizontally, with frequent shoots arising from the rootstock. Hoary cress is one of the earliest perennial weeds to emerge in the spring, producing flowers in May or June. It grows in waste places, cultivated fields, and pastures, and is capable of vigorous growth.

Management Objective: Containment

Integrated Treatment:

Chemical: Metsulfuron @ .12 to .45 oz A.E./acre, applied in spring before flower or in late fall after sufficient moisture has fallen to stimulate over-wintering growth. Picloram is not effective on this plant.

Biological: No known biological control is known.

Cultural: Mowing or cultivation effectiveness will be increased if other plants like perennial native grasses or alfalfa are seeded in the hoary cress stand as competitors. Maintain range and pasture in good condition. Promote healthy grass growth through proper irrigation and fertilization. Do not overgraze.

Physical/Mechanical: Removal of top growth is somewhat effective. Repeated treatments may reduce seed production and spread.

Houndstongue (*Cynoglossum officinale*): An introduced biennial which grows 1-4 feet in height. Leaves are alternate, up to 12 inches long and 3 inches wide. Leaves are entire, not lobed or toothed. Flowers are a deep reddish purple, small and exist on tenninal stems. The fruit is a nutlet approximately 1/3 of an inch long, with many small curved spines, which readily attach to animals or clothing. The plant contains lethal levels of alkaloids, which cause delayed liver disease in animals that consume sufficient amounts.

Management Objective: Containment

Integrated Treatment:

Chemical: Tordon 22K @ 1 oz/gallon of water or 1 quart/acre; or Clarity at the same rate. Need to add a nonionic surfactant @ 1 quart/acre, or .32 oz/gallon of water.

Biological: None know to be effective.

Cultural: Re-seed disturbed sites with fast growing native grasses. Maintain range and pasture in good condition. Promote healthy grass growth through proper irrigation and fertilization. Do not overgraze.

Physical/Mechanical: Houndstongue is a prolific seed producer, and the seeds are readily spread by their ability to stick to wildlife and domestic animals. Physical removal of the plan at flowering or in early seed formation, by pulling or digging, will break the cycle of the plant.

Jointed Goatgrass (*Aegilops cylindrical*): A non-native grass introduced from Turkey in the late 1800s. It is a winter annual, reproducing by seed and grows 15 to 30 inches tall in erect stems which branch at the base to give the plant a tufted appearance. The leaf blades are 1/8 to 1/4 inch wide (usually smooth) with small auricles at the base. The root system is shallow and fibrous. The most distinguishing characteristic is the 2 to 4 inch jointed, cylindrical, balanced

seed head. Jointed goatgrass is becoming an increasing problem in the wheat land areas of eastern Colorado.

Management objective: Containment

Integrated treatment:

Chemical: Roundup @ 4-6 oz. per acre applied in late fall or early spring, where desirable perennials are to be retained. If desirable perennials are not present, treat with Roundup @ 1 pint per acre applied while plant is green and growing and prior to seed development.

Biological: None known.

Cultural: Early livestock grazing can reduce seed production.

Physical/Mechanical: Repeated tillage, prior to seed development, will reduce plant density. Fire is also effective in removing seeds. Mowing is not effective, as plants will produce below the severed stem. Mowing in the fall or after seed maturity is a primary factor in spreading contaminated seed.

Leafy Spurge (*Euphorbia esula*): An invasive perennial, difficult to control, and requires long term commitment to achieve control. The plant grows 16 to 22 inches in height. The flowers are small, inconspicuous and surrounded by a pair of yellow-green heart shaped bracts. Seeds are small capsules, which float on water, and are viable for 8- 10 years. The root system when established will be 26-30 feet deep, with numerous laterals.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Picloram @ 1 pint/acre combined with 2 quarts of 2,4-D, applied at flowering time (Research indicates that this treatment should result in 85 % success after 4 years of successive treatment.) Picloram @ 1 quart/acre plus 1 quart of 2,4-D gives good fall treatment results. Plateau @ 10- 12 oz/acre plus crop oil (See label).

Biological: Sheep or goats will graze leafy spurge. If livestock graze leafy spurge after seed formation, hold the animals in a corral for at least seven days before removing them to an uninfested area to avoid seed spread. Several flea beetles (*Aphthona spp.*) are available from the Colorado Department of Agriculture Insectary in Palisade. These insects are available upon request at no charge to the public. Also available from the Insectary are the root boring beetle (*Oberea erythrocephala*), a stem and root crown mining long-horned beetle, and *Spurgia esulae*, a shoot tip gall midge.

Cultural: Any activity that encourages vigorous grass growth is very important. Overgrazing stresses grasses that makes them less competitive to leafy spurge.

Physical/Mechanical: Mowing leafy spurge at 14 to 21 day intervals may cause higher susceptibility to fall applied herbicides.

Musk Thistle (*Carduus nutans*): A non-native biennial. Leaves are dark green with a light green mid-rib and white margins. Flowers are solitary, 1.5 to 3 inches in diameter, purple with a distinctive flat top appearance.

Management Objective: Containment

Integrated Treatment:

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: Seedhead weevil (*Rhinocyllus conicus*); larvae destroy developing seed but are not 100 percent effective by themselves. Herbicides can be combined with weevils if the insects are allowed to complete their life cycles. Another weevil, *Trichosiromus horticola*, attacks the crown area of musk thistle rosettes and weakens the plant before it bolts. This weevil has reduced stand density in areas where it has become well established. A leaf feeding beetle, *Cassida rubiginosa*, causes considerable damage by skeletonizing leaves. It is recommended to release more than one type of insect on a weed since each type may work on different part of the plant.

Cultural: Musk thistle, like other biennial thistles, thrives on disturbance. The best management is to minimize disturbance. If it does occur, be certain to revegetate with competitive perennial grasses.

Physical/Mechanical: The most effective mechanical control is to hand pull this plant prior to flowering. This can be unrealistic on large acreages or when the ground is very dry. Another option is to use a shovel to cut the root below the surface of the soil, taking care not to disturb the soil more than necessary. If this is done prior to flowering the plant can be left in place after it is cut. If it has already flowered the plant should be removed and placed in a bag and disposed of. Mowing is not effective on this species unless repeated numerous times throughout the growing season since musk thistle will flower and produce seed even after one or two mowings.

Oxeye Daisy (*Chrysanthemum leucanthemum*): An introduced perennial ornamental that is an aggressive competitor. It forms dense patches in meadows, especially in areas grazed by cattle. Flowers are white with a bright yellow center. Leaves are spiral, sessile, and narrow lanceolate. They decrease in size from the ground to the flower head, as contrasted to "Shasta Daisy" which maintains leaf size up and down the stem. Roots are shallow with numerous branched rhizomes and strong adventitious roots.

Management Objective: Contain

Integrated Treatment:

Chemical: The plant is resistant to 2,4-D based herbicides, unless used at or above the 5 lbs A.E./acre. Picloram @ 1.5 pint with 1 quart of 2,4-D/acre has been effective in some research trials. Studies also indicate that application of nitrogen fertilizers at rates of 80-plus pounds/acre is as effective as chemical herbicide treatments.

Biological: None currently available.

Cultural: None available.

Physical/Mechanical: No information available.

Education: the key to oxeye daisy management is to create an awareness among homeowners, nurseries, landscapers, and landscape architects that oxeye daisy is

a noxious weed and therefore should not be specified in planting, sold in nurseries or planted in home gardens or large-scale landscape projects.

Plumeless Thistle (*Carduus acanthoides*): An invasive winter annual or biennial, which closely resembles Musk Thistle. Stems grow from 1-4 feet in height. Stem leaves are alternate and blend into the stem. Flower heads are a purplish pink, about 1-2 inches in diameter. Under the flower heads exist multiple rows of narrow, sharp spines, which support the pappus. The flower lacks the distinctive flat-topped appearance of Musk Thistle.

Management Objective: Containment

Integrated Treatment:

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: Seedhead weevil (*Rhinocyllus conicus*)

Cultural: The best management is to minimize disturbance and revegetate with competitive perennial species.

Physical/Mechanical: Mowing is generally not effective on plumeless due to the plant's capacity for rapid re-growth. Hand cutting is not effective unless there are repeated follow-up treatments. Hand cutting should only be conducted if there is a commitment to follow-up efforts. Plumeless tends to branch out where it is cut and then it re-flowers. Pulling plumeless can be very effective, especially if done after a light rain. Hand pulling, with a good set of gloves, is preferable to shoveling. Shoveling disturbs the ground this creating a potential seedbed for future infestations.

Purple Loosestrife (*Lythrum salicaria*): Also known as European wand loosestrife (*Lythrum virgatum*). An introduced perennial ornamental, commonly associated with waterways. The flower is attractive, with purple flowers vertically arranged on a tall spike. Leaves are lance shaped and notched at the base. They are attached to the stalk without stems in an alternate, opposite, or whorled pattern. A single plant may produce up to 120,000 seeds per stem, which forms a seed bank that is viable for 5-10 years. Control is difficult to achieve, due to association with water.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Glyphosate @ 4 pints/acre applied early to late bloom; 2,4-D @ 1-2 quarts/acre, applied early bud to early bloom; Triclopyr @ .5 to 2 Gal/acre, bud to mid-bloom.

Biological: Biological control may eventually bring weed populations under control, but it will not eliminate or prevent the spread of noxious weeds.

Cultural: None available.

Physical/Mechanical: Methods include hand pulling, mowing, and flooding. Hand pulling is effective when infestations are detected early. The root system must be completely removed, since the root sections can sprout and form new plants.

Education: the key to purple loosestrife management is to create an awareness among homeowners, nurseries, landscapers, and landscape architects that purple

loosestrife is a noxious weed and therefore should not be specified in planting, sold in nurseries or planted in home gardens or large-scale landscape projects.

Russian Knapweed (*Centaurs ripens*): A competitive invasive perennial that rapidly establishes dense monocultures. It is allelopathic in nature and detrimental to the health of horses. It has a deep and complex root system which extends vertically 15 to 30 feet with many horizontal rhizomes. The roots have a characteristic black sheath, which is most evident immediately below the ground surface. Stems are erect and open, standing 1-3 feet in height. Flowers are pink to lavender approximately 1/4 to 1/2 inch in diameter.

Management Objective: Contain

Integrated Treatment:

Chemical: Curtail @ 3 quarts/acre or Redeem @ 3 pints/acre applied bud to early flower; Picloram @ .38 lb A.E./acre, pre flower and fall treatment.

Biological: No effective biological agent known.

Cultural: Russian knapweed tends to form monocultures by eliminating other plants. Therefore, sowing desirable plant species is necessary after the weed is controlled. Research indicates that the native grasses, streambank wheatgrass and thickspike wheatgrass will establish in an area after Russian knapweed is suppressed with herbicides. If the Russian knapweed stand is not too old, and grasses are still present, stimulating grass growth by irrigation (where possible) should increase grass competition with knapweed and keep it under continual stress.

Physical/Mechanical: Repeated mowing combined with herbicide application will gradually stress the plant.

Russian Olive (*Elaeagnus angustifolia*): A hardy, fast-growing tree from Europe, Russian Olive has been promoted from windrow and ornamental plantings. This tree may reach heights from 10 to 25 feet. Trunks and branches are armed with 1 to 2 inch woody thorns. The leaves are covered with small scales which give the foliage a distinctive silvery appearance. Very common in Western Garfield County, especially along the Colorado River between Silt and Rifle.

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: None available.

Cultural: Plant native trees or less aggressive introduced trees. In riparian areas establish native riparian vegetation.

Physical/Mechanical: Small trees may be controlled mechanically by using an appropriate tool or shovel.

Salt Cedar (*Tamarix ramosissima* and *T. parviflora*): A deciduous or evergreen shrub or small tree, 5 to 25 feet tall. It has a wide range of tolerance to saline and alkaline soil and water. It copes with high concentrations of dissolved solids by absorbing them through its roots and excreting salts through glands in its stem and leaves. The excreted salts eventually form a saline crust on the soil. A single plant of salt cedar will use about 200 gallons of water per day while it

is actively growing. Introduced from Eurasia, tamarisk is widespread in Garfield County, along the Colorado River from Glenwood Canyon to the Mesa County Line.

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: There are experimental projects being conducted in a few areas in the West involving the release of mealybugs and leafbeetles. These are not cleared for general release. The recent listing of the Southwestern Willow Flycatcher (a native species that nests in salt cedar) under the Endangered Species Act has challenged efforts to move forward with release of insects for biocontrol.

Cultural: Establish native riparian vegetation.

Physical/Mechanical: Historical saltcedar management projects have included root plowing and raking, dozing, mowing, and prescribed burning. These methods provide only short-term benefits and are labor intensive.

Scotch Thistle (*Onopordum acanthium*): Non-native biennial. Leaves and stems have a silvery, gray-green color. The flower is purple, 1-2 inches in diameter. Plant grows in dense stands and will attain heights of 6-8 feet tall.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Contact Garfield County Vegetation Management or a licensed applicator for specific recommendations.

Biological: None currently available.

Cultural: Reseed disturbed areas with appropriate perennial grasses.

Physical/Mechanical: Digging the plant at the rosette stage is effective.

Spotted Knapweed (*Centaurea maculosa*): A biennial or short-lived perennial that has been introduced. It is an aggressive invader, which seriously degrades wildlife habitat, reduces density of desirable plants, and degrades water quality. The flower is purple to pink and is characterized by distinctive spotted bracts below the flower head. Plants grow from 8 inches to 4 feet in height. Difficult to control because of seed longevity and viability. Will germinate throughout the growing season.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Clopyralid @ 3 quarts/acre in the bud to bolt stage; Picloram @ .25 lb A.E./acre while the plant is green; Dicamba @ 1 lb A.E./acre combined with 2,4-D @ 2 lbs A.E./acre, applied at bud to bolt stage.

Biological: Two seed head flies (*Urophora affinis* and *U. quadrifasciata*) are capable of reducing seed production by 50%. Root mining insects as well as fungal and bacterial pathogens have shown some promise, but overall it is recommended that any biological control be combined with other integrated methods for best results.

Cultural: If desirable grass competition is evident in spotted knapweed stands, judicious herbicide application that does not injure grasses may release them to compete effectively with the weeds. Irrigation may help stimulate grass competition in

these cases. Seeding suitable perennial grasses necessary to prevent weed re-invasion.

Physical/Mechanical: None available.

Yellow Starthistle: (*Centaurea solstitialis*): An introduced winter annual that is a member of the knapweed family. Flowers are bright yellow and made up of many individual flowers and bracts. Each flower is armed with a ring of stout 1-2 inch spines, which radiates around the flower head. Individual plants can produce up to 150,000 seeds per plant, with 95% seed viability. Germination begins in the late fall and continues through late summer making control efforts difficult. The leaves are largely linear, growing along the stem. The leaves and stems are covered with a silky pubescent, which gives them a silver-gray colored appearance.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Picloram @ .25 A.E./acre prior to flower; Clopyralid @ .5 to .375 lb A.I./acre prior to flower. (It is noted that applications of Curtail @ 3 quarts/acre or Redeem give adequate control through the flowering stage).

Biological: Some success has been achieved with seed weevils and seed flies. In Garfield County, hope is to detect and eradicate any infestations of starthistle before biocontrols are necessary.

Cultural: Vigorous competitive grass is essential to maintain a plant community's resistance to starthistle invasion.

Physical/Mechanical: Mowing or cutting starthistle is rarely effective.

Yellow Toadflax (*Linaria vulgaris*): An introduced perennial ornamental that is highly competitive. Flowers are bright yellow with orange centers, resembling the physical appearance of Snap Dragons. Leaves are narrow, linear, and pointed on both ends. One plant can produce up to 500,000 seeds. Seed viability is + 10 years.

Management Objective: Eradicate

Integrated Treatment:

Chemical: Herbicide success highly variable due plant genetics and soil variation. Treatment of choice involves the application of Picloram @ 1 lb A.E./acre in the fall; Dicamba @ 4 lbs A.E./acre. Use of a surfactant improves success.

Biological: One insect species *Calophasia lunula* a defoliating moth has been release on yellow toadflax. It may defoliate up to 20 percent of the leaves.

Cultural: Attempt to maintain competitive communities of desirable species. Re-seed any open ground with perennial grasses to prevent invasion by other weed species.

Physical/Mechanical: Digging and pulling where feasible, can provide effective control of toadflax if conducted annually for 10 to 15 years.

Education: the key to yellow toadflax management and other escaped ornamentals is to create an awareness among homeowners, nurseries, landscapers, and landscape architects that Yellow toadflax is a noxious weed and therefore should not be specified in planting, sold in nurseries or planted in home gardens or large-scale landscape projects.

ANTERO RESOURCE PICEANCE CORPORATION

LUNDGREN FRAC/ FLOWBACK PIT

**LOCAL GOVERNMENT ZONING COMPLIANCE &
LOCAL GOVERNMENT PERMITS AND NOTICES**

The existing Lundgren Frac/ Flowback Pit is being permitted concurrently under the authority of Garfield County and the State of Colorado Division of Water Resources (CDWR). The process for obtaining and Special Use Permit via a review process is currently in progress with Garfield County Building and Planning Department and the Garfield Board of County Commissioners. A Notification of Construction application for a Non-Jurisdictional Impoundment has been submitted to the CDWR as well.

A copy of the Garfield County Special Use Permit application and the CDWR application is attached for reference. Antero agrees to comply with all Federal, State, and Local regulations, and will maintain compliance with the conditions set forth by all regulating agencies. Antero will insure that all personnel associated with the Lundgren Frac/ Flowback Pit operations must be familiar with the conditions placed on operations of the facility.



GARFIELD COUNTY
Building & Planning Department
108 8th Street, Suite 401
Glenwood Springs, Colorado 81601
Telephone: 970.945.8212 Facsimile: 970.384.3470
www.garfield-county.com

Special Use Permit

GENERAL INFORMATION

(To be completed by the applicant.)

$\frac{3}{4}$ Street Address / General Location of Property: Located approximately six miles Northeast of Rifle, off of County Road 233

$\frac{3}{4}$ Legal Description: Located in the NW $\frac{1}{4}$ of SE $\frac{1}{4}$, Section 32, Township 5 South, Range 93 West of the 6th P.M.

$\frac{3}{4}$ Existing Use & Size of Property in acres: Farm and Grass Lands/ Oil & Gas Production

$\frac{3}{4}$ Description of Special Use Requested: To obtain permission to continue utilizing an existing Frac/ Flowback Water pit for storage of water to be recycled for continued frac and drilling operations of Natural gas.

$\frac{3}{4}$ Zone District: ARRD

$\frac{3}{4}$ Name of Property Owner (Applicant): Mr. & Mrs. Gene Mulvihill

$\frac{3}{4}$ Address: 355 Madison #3 Telephone: (973) 267-5450

$\frac{3}{4}$ City: Morristown State: NJ Zip Code: 07960-6910 FAX: 209-4764

$\frac{3}{4}$ Name of Owner's Representative, if any (Attorney, Planner, etc):

Wagon Wheel Consulting, Inc.

$\frac{3}{4}$ Address: 111 E. 3rd Street, Suite 213 Telephone: (970) 625-8433

$\frac{3}{4}$ City: Rifle State: CO Zip Code: 81650 FAX: 625-8435

STAFF USE ONLY

$\frac{3}{4}$ Doc. No.: _____ Date Submitted: _____ TC Date: _____

$\frac{3}{4}$ Planner: _____ Hearing Date: _____

I. APPLICATION SUBMITTAL REQUIREMENTS

As a minimum, specifically respond to all the following items below and attach any additional information to be submitted with this application:

1. Please submit, in narrative form, the nature and character of the Special Use requested. Submit plans and supporting information (i.e. letters from responsible agencies). Include specifications for the proposed use including, but not limited to, the hours of operation, the number and type of vehicles accessing the site on a daily, weekly and/or monthly basis, and the size and location of any existing and/or proposed structures that will be used in conjunction with the proposed use, and provisions for electric power service and any other proposed utility improvements. Be specific.
2. If you will be using water or will be treating wastewater in conjunction with the proposed use, please detail the amount of water that would be used and the type of wastewater treatment. If you will be utilizing well water, please attach a copy of the appropriate well permit and any other legal water supply information, including a water allotment contract or an approved water augmentation plan to demonstrate that you have legal and adequate water for the proposed use.
3. Submit a site plan /map drawn to scale that portrays the boundaries of the subject property, all existing and proposed structures on the property, and the County or State roadways within one (1) mile of your property. If you are proposing a new or expanded access onto a County or State roadway, submit a driveway or highway access permit.
4. Submit a vicinity map showing slope / topography of your property, for which a U.S.G.S. 1:24,000 scale quadrangle map will suffice.
5. Submit a copy of the appropriate portion of a Garfield County Assessor's Map showing all the subject property and public and private landowners adjacent to your property (which should be delineated). In addition, submit a list of all property owners, public and private landowners and their addresses adjacent to or within 200 ft. of the site. This information can be obtained from the Assessor's Office. We will also need the names (if applicable) of all mineral right owners of the subject property. (That information can be found in your title policy under Exceptions to Title).
6. Submit a copy of the deed and a legal description of the subject property.
7. If you are acting as an agent for the property owner, you must attach an acknowledgement from the property owner that you may act in his/her behalf.
8. Submit an statement that specifically responds to each of the following criteria from Section 5.03 of the Zoning Regulations:
 - (1) Utilities adequate to provide water and sanitation service based on accepted engineering standards and approved by the Board of County Commissioners shall either be in place or shall be constructed in conjunction with the proposed use.
 - (2) Street improvements adequate to accommodate traffic volume generated by the proposed use and to provide safe, convenient access to the use shall either be in place or shall be constructed in conjunction with the proposed use;
 - (3) Design of the proposed use is organized to minimize impact on and from adjacent uses of land through installation of screen fences or landscape materials on the periphery

of the lot and by location of intensively utilized areas, access points, lighting and signs in such a manner as to protect established neighborhood character;

9. Depending on the type of Special Use Permit requested, you may need to respond to additional review standards in the Garfield County Zoning Resolution Section 5.00 [Supplementary Regulations]. This may include uses such industrial uses [section 5.03.07 & 5.03.08], Accessory Dwelling Units [section 5.03.21], Utility line/Utility Substations, etc. Specific sections of the Zoning Resolution which can be located on the Garfield County web site at http://www.garfield-county.com/building_and_planning/index.htm, or information can be obtained from this office
10. A \$400.00 Base Fee: Applicant shall sign the "Agreement for Payment" form and provide the fee with the application.
11. Submit 2 copies of this completed application form and all the required submittal materials to the Building and Planning Department. Staff will request additional copies once the Special Use Permit application has been deemed technically complete.

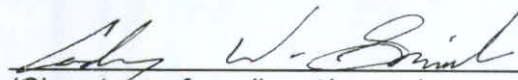
II. PROCEDURAL REQUIREMENTS

(The following steps outline how the Special Use Permit Application review process works in Garfield County.)

1. Submit this completed application form, base fee, and all supplemental information to the Garfield County Planning Department. It will be received and given to a Staff Planner who will review the application for technical completeness.
2. Once the application is deemed technically complete, the Staff Planner will send you a letter indicating the application is complete. In addition, Staff will also send you a "Public Notice Form(s)" indicating the time and date of your hearing before the Board of County Commissioners. Prior to the public hearing, Staff will provide you with a Staff Memorandum regarding your requested Special Use. (If Staff determines you application to be deficient, a letter will be sent to you indicating that additional information is needed to deem your application complete.)
3. It is solely the Applicant's responsibility to ensure proper noticing occurs regarding the requested Special Use and the public hearing. **If proper notice has not occurred, the public hearing will not occur.** Notice requirements are as follows:
 - a. Notice by publication, including the name of the applicant, description of the subject lot, a description of the proposed special use and nature of the hearing, and the date, time and place for the hearing shall be given once in a newspaper of general circulation in that portion of the County in which the subject property is located at least thirty (30) but not more than sixty (60) days prior to the date of such hearing, and proof of publication shall be presented at hearing by the applicant.
 - b. Notice by mail, containing information as described under paragraph (1) above, shall be mailed to all owners of record as shown in the County Assessor's Office of lots within two hundred feet (200') of the subject lot and to all owners of mineral interest in the subject property at least thirty (30) but not more than sixty (60) days prior to such hearing time by certified return receipt mail, and receipts shall be presented at the hearing by the applicant.

- c. The site shall be posted such that the notice is clearly and conspicuously visible from a public right-of-way, with notice signs provided by the Planning Department. The posting must take place at least thirty (30) but not more than sixty (60) days prior to the hearing date and is the sole responsibility of the applicant to post the notice, and ensure that it remains posted until and during the date of the hearing.
4. The Applicant is required to appear before the Board of County Commissioners at the time and date of the public hearing at which time the Board will consider the request. In addition, the Applicant shall provide proof, at the hearing, that proper notice was provided.
5. Once the Board makes a decision regarding the Special Use request, Staff will provide the Applicant with a signed resolution memorializing the action taken by the Board. Following the Board's approval, this office will issue the Special Use Permit to the applicant. If the Board's approval includes specific conditions of approval to be met, this office will not issue the Official Special Use Permit certificate until the applicant has satisfied all conditions of approval. The Special Use Permit approval is not finalized until this office has issued the Official Special Use Permit certificate signed by the Chairman of the Board of County Commissioners.

I have read the statements above and have provided the required attached information which is correct and accurate to the best of my knowledge.


(Signature of applicant/owner)

Wagon Wheel Consulting, Inc.
Last Revised: 02/2006

FOR OFFICE USE ONLY

DAM NAME _____ NO. _____ WATER DIV: _____ DIST: _____

**NOTICE OF INTENT TO CONSTRUCT A NON-JURISDICTIONAL
WATER IMPOUNDMENT STRUCTURE¹**

This notice is required per Section 37-87-125, C.R.S. (1998).

This notice must be submitted to the Division Engineer's Office a minimum of 10 days prior to construction.

(PLEASE PRINT OR TYPE NOTICE)

OWNER INFORMATION

Name: Antero Resources Piceance Corporation Telephone: (970) 625-9922

Address: 1625 17th Street, Suite 300 Denver CO 81650
Street/P.O. Box/ Rural Route City State Zip Code

Responsible Person: Steve Fontenot Telephone: (970) 274-6454

Address: 792 Buckhorn Drive Rifle CO 81650
Street/P.O. Box/ Rural Route City State Zip Code

Contractor: Wagon Wheel Consulting, Inc. Telephone: (970) 625-8433

STRUCTURE INFORMATION

Name of Dam: Lundgren Frac/ Flowback Pit Water Division: _____ Water District: _____

Location: 1/4 1/4 Sect: NW Qtr Sect: SE Sect: 32 Township: 5S Range: 93W P.M. 6th
Option 1 → Distance of dam from Section lines² 2055 ft from ☐ N ☒ S. 1990 ft from ☒ E ☐ W
OR
Option 2 → Utilizing GPS: Set to UTM Datum. Measure on crest of dam at streamline/outlet.
Northing _____ m. Easting _____ m.
Note: GPS settings must be NAD27 CONUS

Dam Dimensions: Vertical Height: 8 ft., Length: 225 ft., Slopes: U/S: 1.5 H:1V, D/S 2 H:1V

Reservoir: Surface Area: 1 acres, Capacity: 3.44 acre feet, Drainage Area: 0 acres

Emergency Spillway: Width: 175 ft., Side Slopes: 1.5 H:1V, Freeboard: 2 ft.³

Outlet Drain: Type: N/A, Size: _____ inches, Location _____

Stream Name / or Water Source:⁴ Frac/ Flowback Water from Natural Gas Production activities.

Proposed Water Use: Storage and Recycling Water Court Case No. (If applicable) _____

Steve Fontenot
Signature of Owner

12/13/06
Date

DIVISION ENGINEER'S REQUIREMENTS: _____

DWR (12/98)

Signature of Division Engineer

Date

¹ Vertical height is 10 feet or less at longitudinal centerline of dam from lowest point of ground surface to flowline crest of spillway, and reservoir is 20 surface acres or less at high water line, and impounds 100 acre-feet or less of water.

² See Example on reverse side of form

³ Vertical distance from bottom of spillway to crest of dam.

⁴ If construction in reservoir intercepts groundwater (note stream name that groundwater is tributary to), a well permit is required.



December 11, 2006

Mr. and Mrs. Gene Mulvihill
355 Madison, #3
Morristown, NJ 07960-6910

1625 17th Street - Suite 300
Denver, Colorado 80202
Office: 303.357.3300
Fax: 303.357.3315

RE: Surface Lease and Easement Agreement
NW/4SW4 Section 32, T5S - R92W
Garfield County, Colorado

Dear Mr. and Mrs. Mulvihill:

Antero Resources Piceance Corporation desires to use the surface of your property described above to construct and operate a facility for the handling and evaporation of water associated with oil and gas drilling and production operations associated, some of which may be from lands other than those upon which you own minerals.

This letter is written to evidence that your permission for such activity has been granted to Antero Resources Piceance Corporation and the terms of such use are governed by the Surface Lease and Easement Agreement dated December 11, 2006.

If you agree with this, please acknowledge the foregoing by dating and signing this document in the presence of a notary public, and returning the original to my attention.

Thank you for your cooperation in this matter.

Regards,

W. J. Pierni
Division Landman

The foregoing is agreed to and accepted this 28th day of December, 2006.

Gene Mulvihill

Gail Mulvihill

STATE OF NJ)
COUNTY OF Morris)

This instrument was acknowledged before me on this 28th day of December 2006, by Gene Mulvihill and Gail Mulvihill.

My commission expires: 8/20/2010

Notary Public

SURFACE LEASE AND EASEMENT AGREEMENT

This Surface Lease and Easement Agreement ("Agreement") is made and entered into this 11th day of December, 2006, by and between Gene Mulvihill and Gail Mulvihill as Owner, and Antero Resources Piceance Corporation, formerly Antero Resources Corporation ("Operator"). Owner and Operator are hereinafter collectively referred to as the "Parties" and sometimes referred to individually as a "Party." As used herein, the terms Operator and Owner shall include Operator, Owner, and their respective officers, directors, employees, agents, representative subcontractors and assigns.

WITNESSETH:

WHEREAS, Owner holds title to the surface estate of the following described property ("Lands"):

Township 5 South, Range 92 West
Section 32: NW/4SE/4
Garfield County, Colorado

WHEREAS, Operator desires to utilize the Lands to construct, operate, and maintain a facility ("Facility") for the handling and evaporation of water associated with oil and gas drilling and production operations from lands other than those of Owner.

WHEREAS, Owner desires to grant a lease and easement to Operator necessary to construct, operate, and maintain the Facility.

NOW, THEREFORE, in consideration of the mutual Agreement and of the terms, covenants and conditions to be kept and performed by the Parties, it is mutually agreed as follows:

AGREEMENT:

1. Owner hereby leases, gives, grants, and conveys unto Operator, its agents, employees, servants and assigns, an exclusive right-of-way and easement on, over, through and across the Lands necessary to construct, operate, and maintain the Facility.
2. Operator will save and hold Owner harmless from and against any and all expenses, costs and liabilities of any kind or nature whatsoever including attorney fees and court costs, arising from or in connection with any valid claim for damages to persons or property caused by the acts or omissions of Operator in the installation, construction repair, maintenance and all operations related to the Facility.
3. Operator further agrees that it shall maintain all roads used by it in a good state of repair and said maintenance shall be at the sole cost, risk and expense of Operator.
4. Within thirty (30) days of the date of this Agreement, Operator agrees to pay Owner a sum of \$2,500 as consideration for the rights granted herein through December 10, 2007. On or before December 11, 2007 and annually thereafter, Operator may pay Owner an

amount of \$2,500 to extend its rights to construct, operate, and maintain the Facility for the succeeding year. Failure to timely pay such amount shall not be deemed a breach or termination of this Agreement until Owner shall have provided Operator notice of such failure to pay and Operator has not remedied such failure to pay within 60 days of receipt of such notice from Owner.

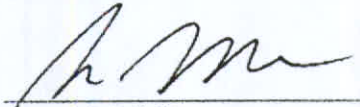
5. This Agreement shall not be placed or filed of record without the written consent of both Parties. However, the Parties agree to execute an appropriate memorandum suitable for recording, if necessary, and such may be recorded by either party generally referring to this Agreement and describing in general or specific terms, the location of any site, facility, or road of Operator.
6. The terms, covenants and conditions hereof shall be binding upon and inure to the benefit of the Parties hereto, their heirs, successors, assigns, agents, employees and servants.

IN WITNESS WHEREOF, the Parties have executed this Agreement effective as of the date first above written.

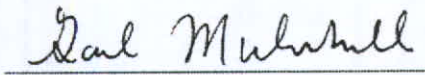
OPERATOR:
ANTERO RESOURCES PICEANCE CORPORATION

Brian A. Kuhn, Vice President

OWNER:



Gene Mulvihill



Gail Mulvihill

ACKNOWLEDGEMENTS

STATE OF COLORADO)
) §
COUNTY OF DENVER)

On this _____ day of December 2006, before me personally appeared Brian A. Kuhn, known to me to be the Vice President of Antero Resources Piceance Corporation and that he executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above written.

My Commission Expires: _____

Notary Public: _____

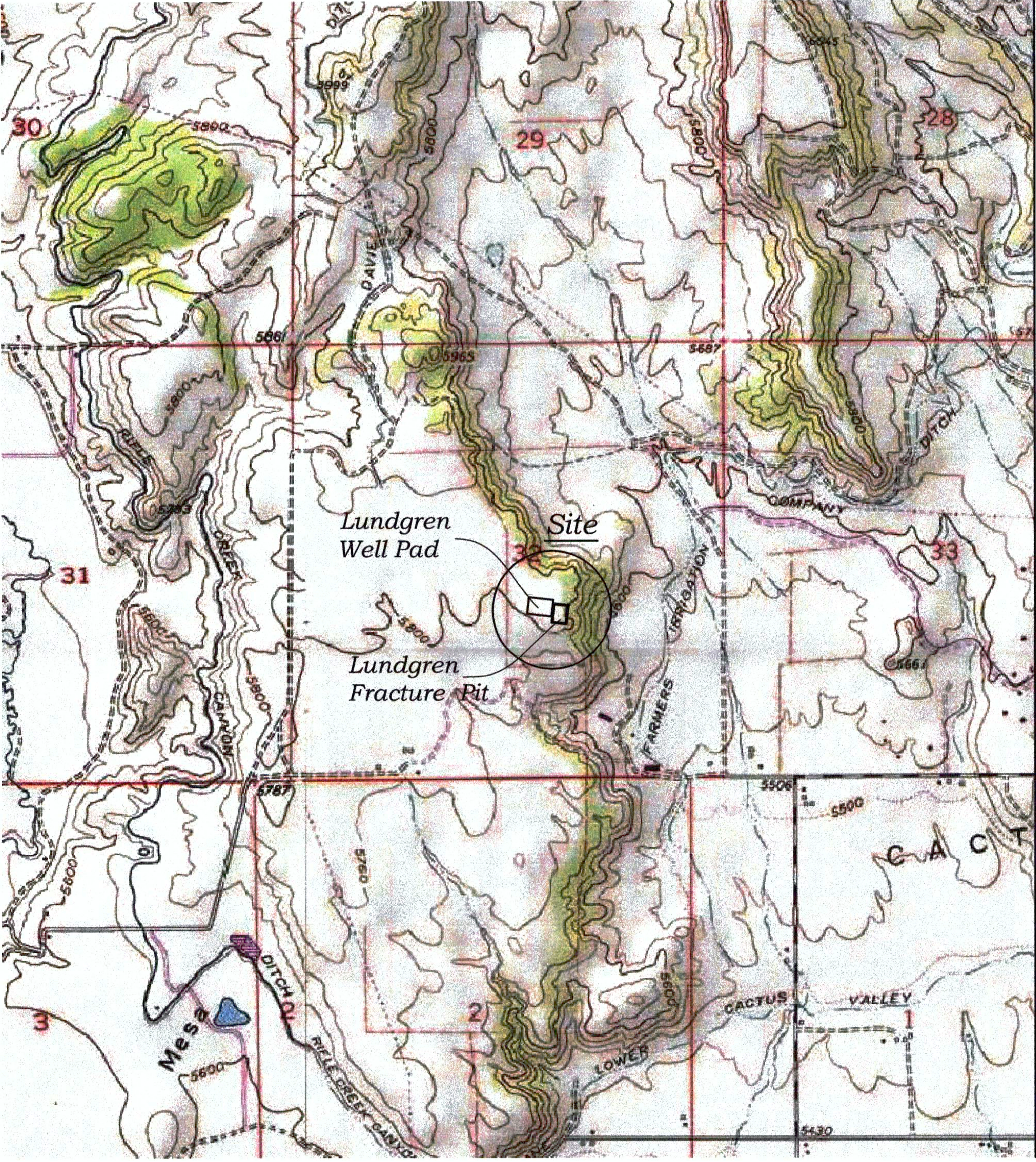
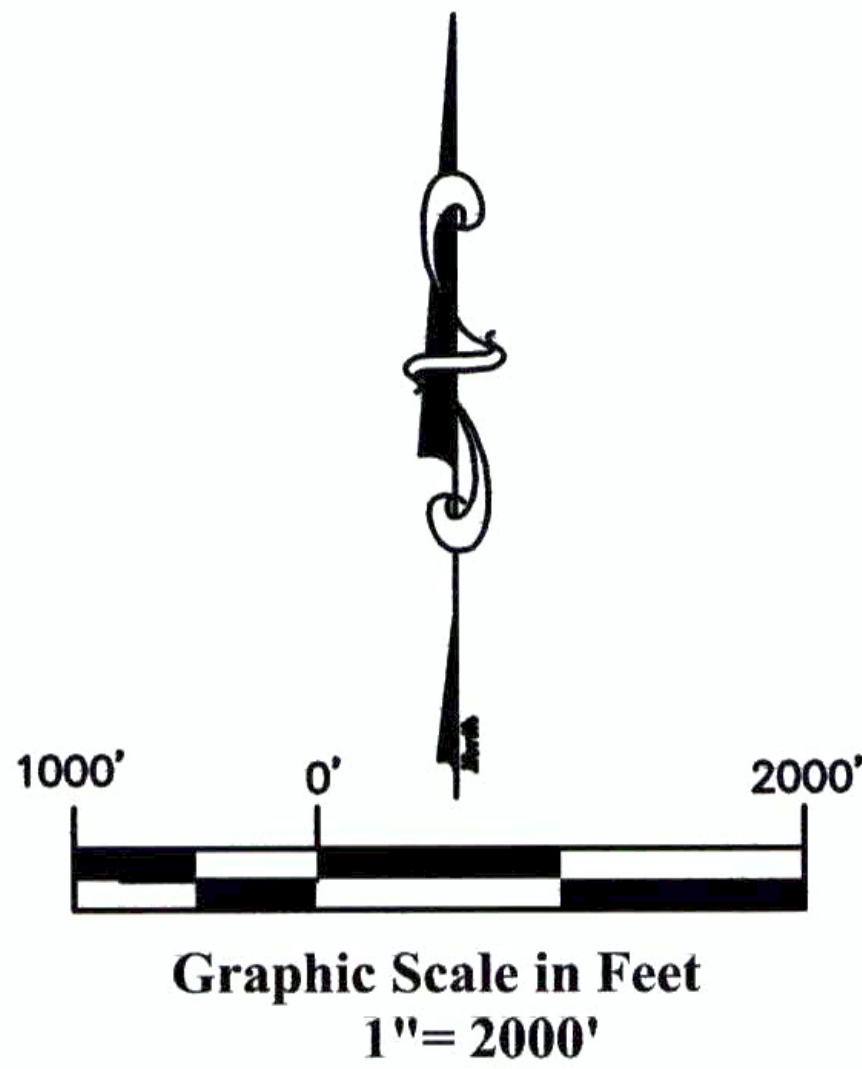
STATE OF NEV)
) §
COUNTY OF MOHAVE)



The foregoing instrument was acknowledged by Gene Mulvihill and Gail Mulvihill before me on this 28th day of December 2006.

My Commission Expires: 8/25/2010

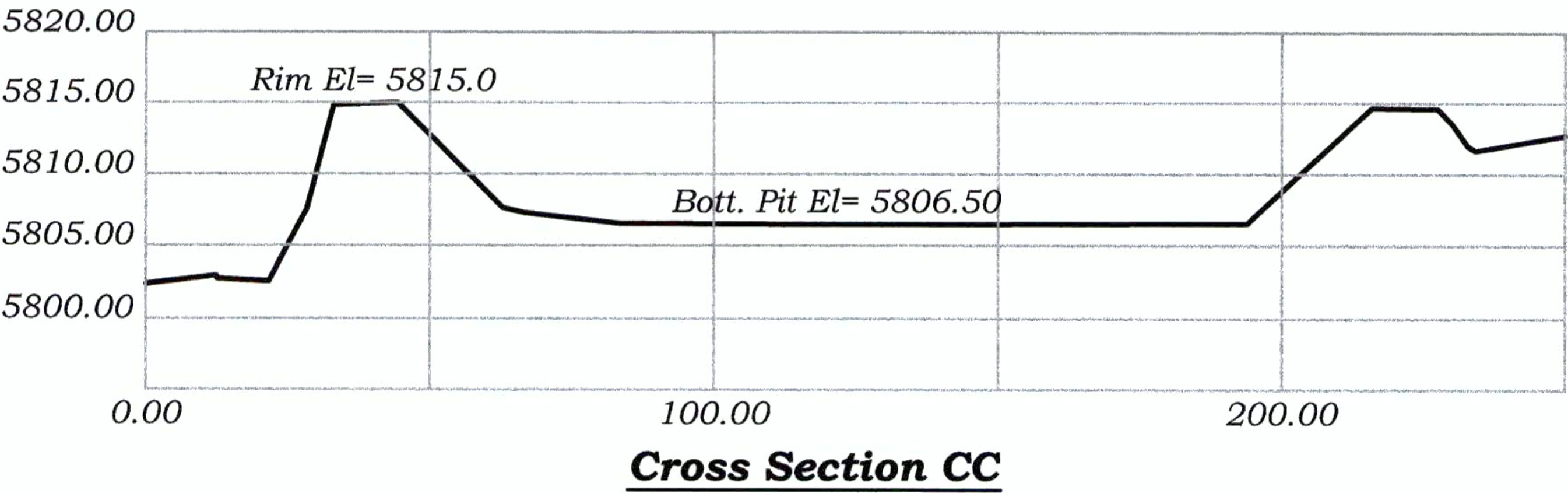
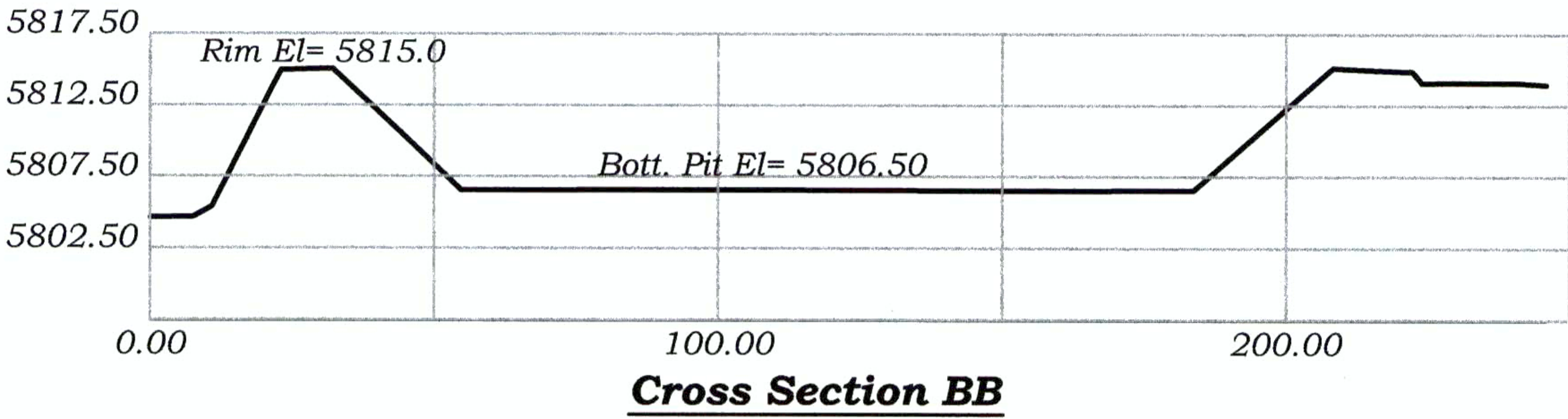
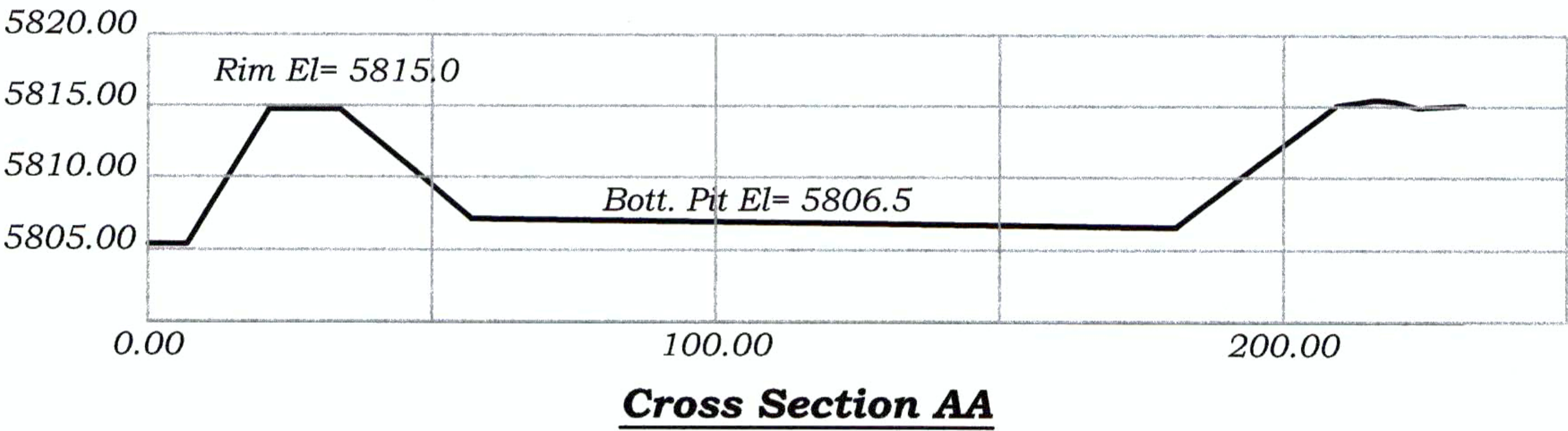
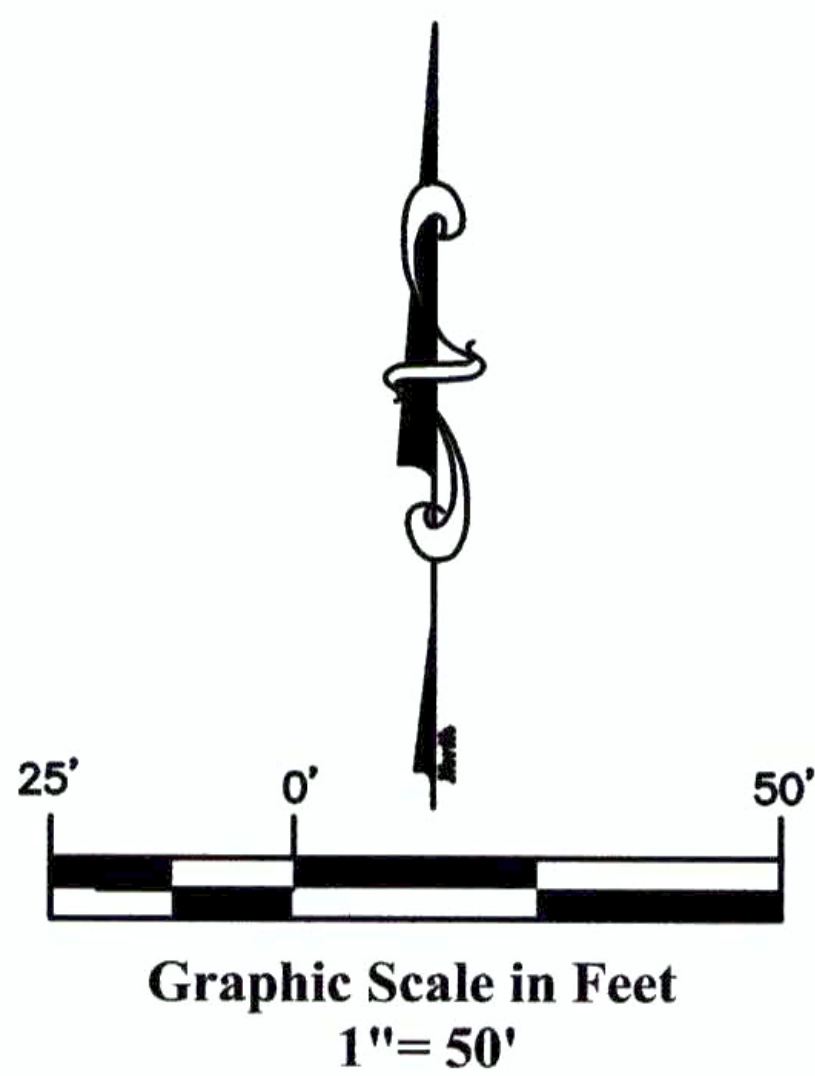
Beverly Pilger
Notary Public: Beverly Pilger

Lundgren
Centralized Facility
Vicinity Map



	River Valley Survey, Inc. 110 East 3rd. Street, Suite 207 Rifle, Colorado 81650 Ph: 970-379-7846		Project: Luundgren Facility	Proj. No. 06001-05	Fracture Pit Facility Prepared For Antero Resources
	Field Date: 05-12-06	Scale: 1"= 2000'	Situate In: Situate In: The SE¼ Sec. 32, Township 5 S., Range 92 W.		
	Date: 05-18-06	Sheet: 3 of 3			

Lundgren
Cenrtralized Facility
Pit Cross Sections



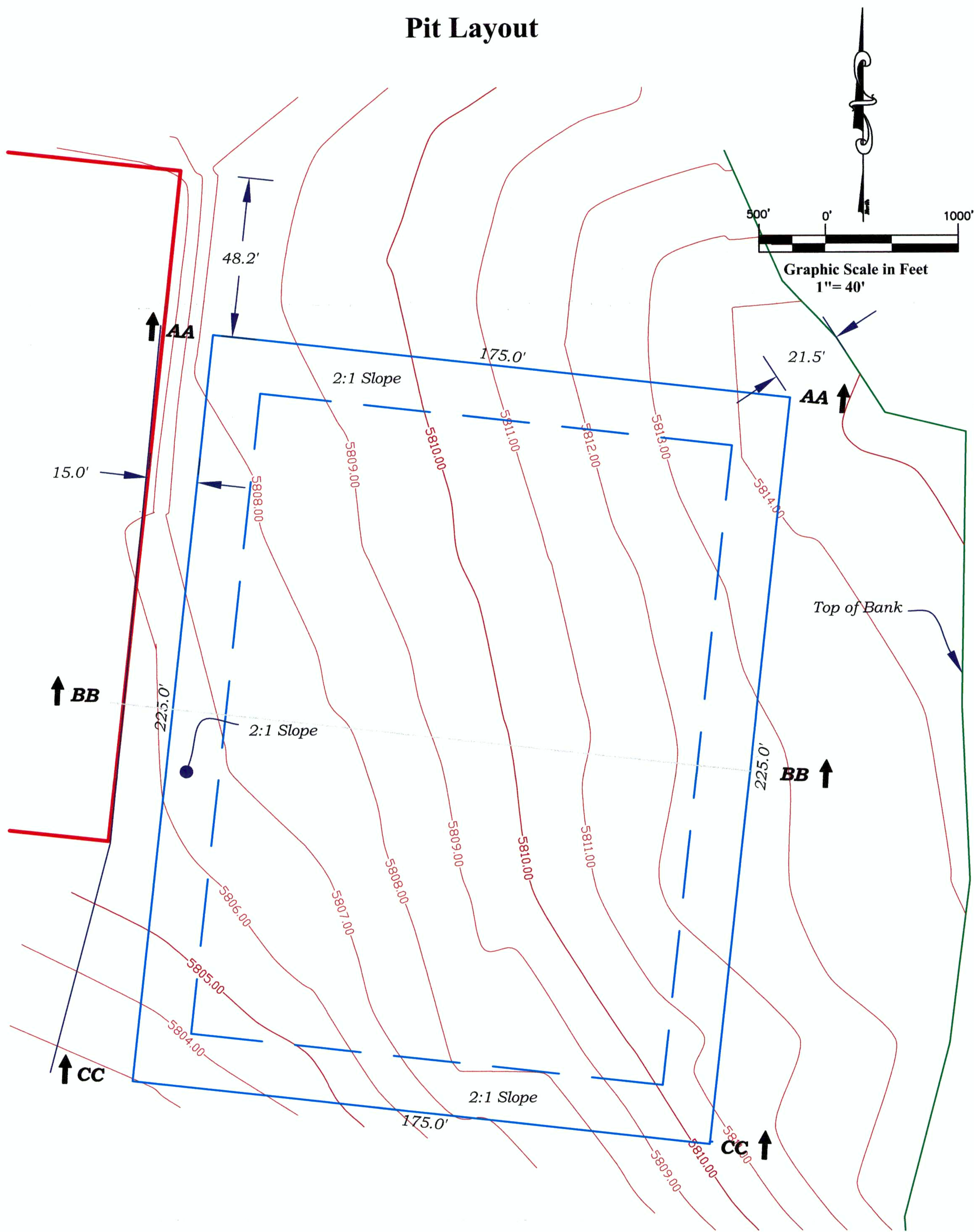
River Valley Survey, Inc.
110 East 3rd. Street, Suite 207
Rifle, Colorado 81650
Ph: 970-379-7846

Project: Luundgren Facility	Proj. No. 06001-05
Field Date: 05-12-06	Scale: 1"= 50'
Date: 05-18-06	Sheet: 2 of 3

Fracture Pit Facility
Prepared For Antero Resources
Situate In:
Situate In: The SE¼ Sec. 32,
Township 5 S., Range 92 W.



Pit Layout



River Valley Survey, Inc.
110 East 3rd. Street, Suite 207
Rifle, Colorado 81650
Ph: 970-625-5775

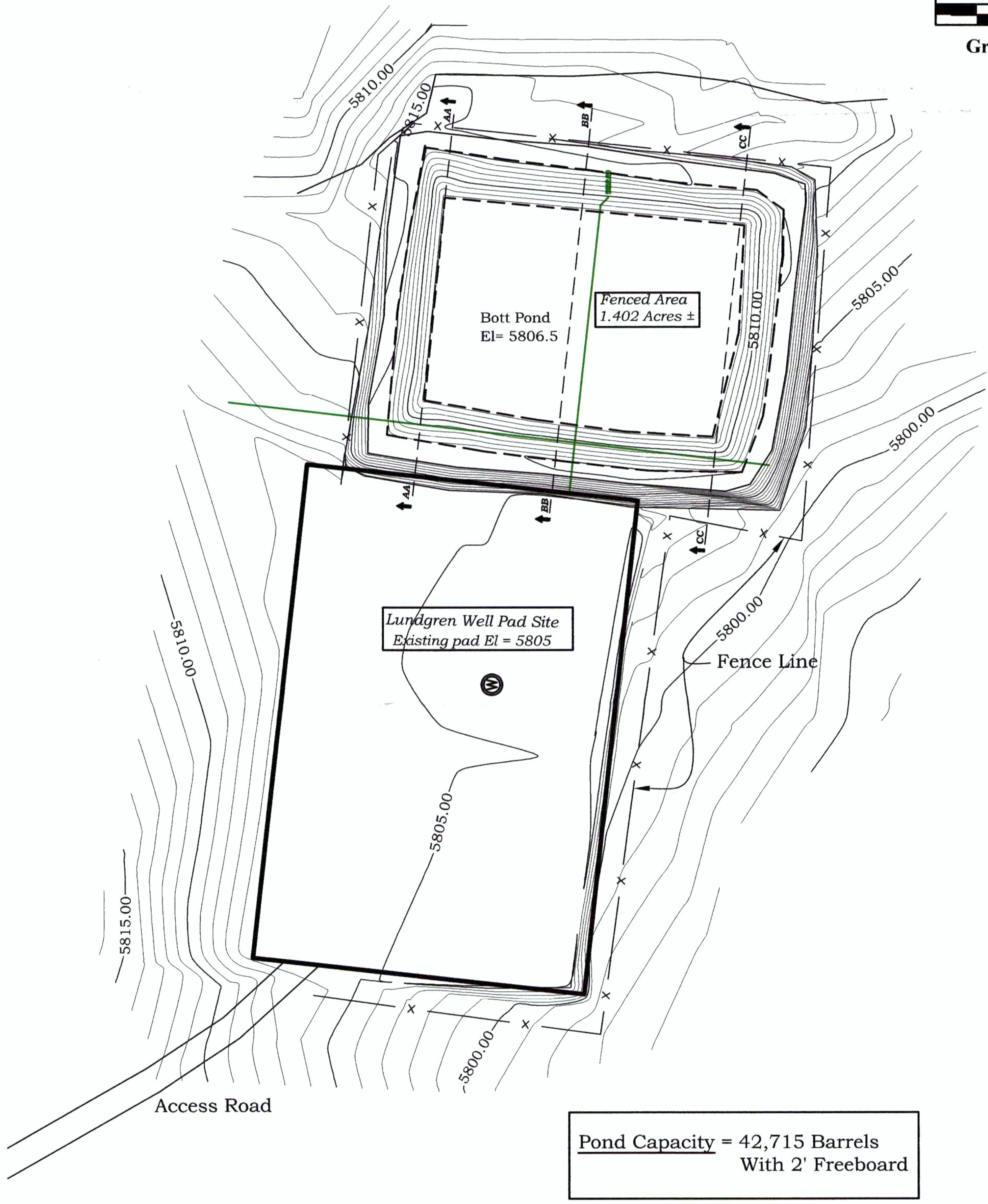
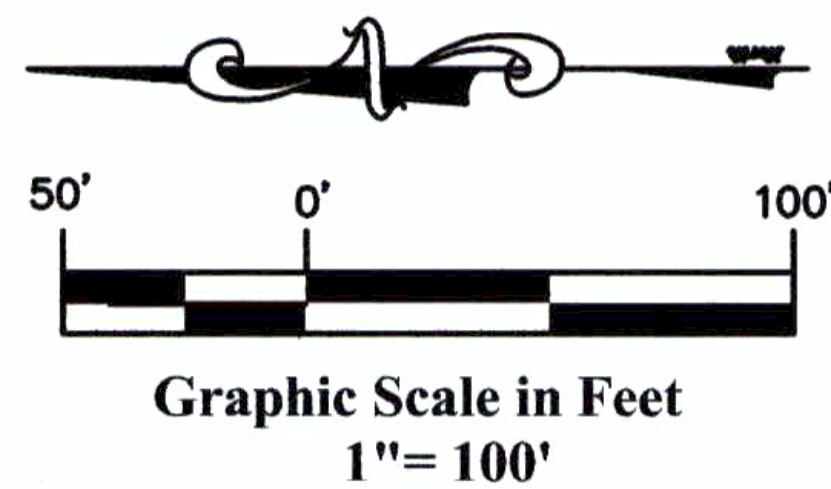
Project: Frac Pit
Field Date 12-21-05

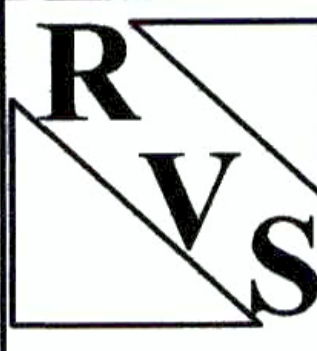

Proj. No. 05020-05

Well Location Plat
Prepared For Antero Resources
Situates In:



Lundgren
Centrtralized Facility
As-Built Exhibit



 River Valley Survey, Inc. 110 East 3rd. Street, Suite 207 Rifle, Colorado 81650 Ph: 970-379-7846	Project: Lundgren Facility	Proj. No. 06001-05	Fracture Pit Facility Prepared For Antero Resources Situate In: The SE¼ Sec. 32, Township 5 S., Range 92 W. 
	Field Date: 05-12-06	Scale: 1"= 100'	
	Date: 05-18-06	Sheet: 1 of 3	