OLSSON ASSOCIATES

QUICKSILVER RESOURCES

Pirtlaw Partners 24-33 APD

Oil Exploration and Production Special Use Permit
Quicksilver Resources Inc.
Routt County, Colorado
December 2011 (Revised January 2012)

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Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

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ARTICLE I: PROJECT NARRATIVE

I. INTRODUCTION

Quicksilver Resources Inc. (Quicksilver) is an exploration and production company engaged in the development and production of oil and natural gas properties within North America. Based in Fort Worth, Texas, the company is widely recognized as a leader in the development and production of unconventional reservoirs including shale gas, coal bed methane, and tight gas sands. The company currently has US offices in Fort Worth, Texas; Glen Rose, Texas; Steamboat Springs, Colorado; and Cut Bank, Montana. The company's Canadian subsidiary, Quicksilver Resources Canada Inc., is headquartered in Calgary, Alberta.

1.1 Contact Information

Operator: Quicksilver Resources Inc.
1169 Hilltop Parkway, Suite 204
Steamboat Springs, CO 80407
Phone: (970) 817-6761
Fax: (970) 879-5771

Surface Owner: Pirtlaw Partners, Ltd.
1929 Allen Parkway FL 12
Houston, TX 77019

1.2 Names and Addresses of Adjacent Surface Property Owners

The names and addresses of adjacent surface land owners are presented in Table 1.

Table 1. Adjacent Surface Land Owners

Tax Parcel	Property Owner	Address	City	St.	Zip Code
930322002	WARRICK, MARILYN M.	2340 W MULBERRY	FORT COLLINS	CO	80521
930301001	BRUCHEZ RANCH, LLC	P O BOX 1805	HAYDEN	CO	81639
930261001	PIRTLAW PARTNERS, LTD.	1929 ALLEN PKWY FL 12	HOUSTON	TX	77019
930323001	WARRICK, MARILYN M.	2340 W MULBERRY	FORT COLLINS	CO	80521
930333001	PIRTLAW PARTNERS, LTD.	1929 ALLEN PKWY FL 12	HOUSTON	TX	77019
939052001	PIRTLAW PARTNERS, LTD.	1929 ALLEN PKWY FL 12	HOUSTON	TX	77019
939041001	PIRTLAW PARTNERS, LTD.	1929 ALLEN PKWY FL 12	HOUSTON	TX	77019

1.3 Names and Addresses of Adjacent Mineral Owners

The names and addresses of adjacent mineral owners are presented in Table 2.

Table 2. Mineral Owners

NAME	ADDRESS	CITY	ST	Zip Code
Victor-American Fuel Company	P.O. Box 1019	Tannersville	NY	12845

1.4 Lease and Surface Use Agreement

Quicksilver Resources Inc. has entered into a lease agreement with Victor-American Fuel Company for oil exploration and production. A copy of the Mineral Lease Agreement (Appendix C) and a copy of the Surface Use Agreement (Appendix D) have been provided in the application.

2.0 PROJECT OVERVIEW

2.1 Important Dates

- Phase 1 –
  - Estimated Commencement of Drilling Operations: 03/22/2012
  - Estimated Conclusion of Drilling Operations: 03/31/2012
- Phase 2 –
  - Estimated Commencement of Drilling Operations: 08/15/2012
  - Estimated Conclusion of Drilling Operations: 08/31/2012

- Estimated Commencement of Interim Reclamation/Final Reclamation: Since this is an exploratory well, the County and Quicksilver have determined that it's inappropriate to assign a final reclamation date at this time. Final Reclamation will occur according to the Reclamation Plan (Appendix H), and the well will be closed according to applicable state and federal regulations.

2.2 Project Description

On behalf of Quicksilver Resources Inc. (Quicksilver), Olsson Associates (Olsson) is requesting a Special Use Permit for Oil Exploration and Production within Routt County (County). All applicable sections, including Sections 5, 6, and 9, of the *Routt County Zoning Regulations* (*Regulations*) have been addressed and are located within this application. All applicable Colorado Oil and Gas Conservation Commission (COGCC) and Colorado Department of Public Health and Environment (CDPHE) applications have been submitted, and Routt County will be provided a copy of the approved permits.

Quicksilver acknowledges that the proposed pad site and access road are located on the Wolf Mountain Ranch Phase 2a conservation easement, with the conservation easement being held by The Nature Conservancy, and funding for the conservation easement provided, in part, by the Colorado Division of Wildlife and Colorado Wildlife Commission, and the Routt County Purchase of Development Rights Fund. In recognizing the elevated level of public interest in this property, Quicksilver has undertaken numerous planning and mitigation measures in order to ensure that the conservation values of Wolf Mountain Ranch are not significantly impacted. The proposed Pirtlaw Partners Ltd. 24-33 pad site will be located in Section 33, Township 7 North, Range 87 West of the 6th Prime Meridian. The pad site will be located approximately 6 miles northeast from the Town of Hayden. The disturbance will encompass an area of approximately 3.3 acres. The total soil cut will be approximately 15,944 cubic yards and the fill will be approximately 14,575 cubic yards at the proposed pad site.

Quicksilver's light duty vehicles (pickups) will access the proposed pad location from US Highway 40 heading north along County Road (CR) 70. The larger (five axle vehicles) will access the site from US Highway 40 heading north to County Road (CR) 52, loop around on CR52 and go south on US Highway 40 onto County Road (CR) 70. There is an existing private access road off CR 70, used primarily for agricultural operations, which will be used by Quicksilver for their operations. An access road will be constructed to connect the pad site to the private roadway. The surrounding area consists of primarily low density (35+ acre) residential and agricultural properties. Quicksilver has previously drilled the Pirtlaw Partners Ltd. 1-3 well, which is located within a mile of the proposed well. The 24-33 well is the result of the continuing development required in the Victor-American lease. Quicksilver will utilize mitigation techniques, as discussed in this application, in order to minimize impacts to the surrounding area.

The Pirtlaw Partners Ltd 24-33 is an exploratory well and data is currently unavailable to determine oil productivity. Due to lease stipulations the Pirtlaw Partners Ltd 24-33 well must be spud by April 4, 2012. As noted in the Drilling Plan the well will be spud (drilled) to 1200' with a 60' surface rig. This section of the well will be drilled with water-based fluids. Surface casing will be set and cemented and then the surface rig will move off location to accommodate CPW sage grouse stipulations until August, 2012. At that time a conventional rotary drill rig will be delivered to the site and used to drill out from the surface casing using oil-based fluids to access the deeper producing horizon. The target formation is the Niobrara formation, with an estimated target depth of 7,800'. Completion operations will consist of hydraulic fracturing by using technologically advanced equipment, methods, and fracing fluids (see Article 1 Section 5 for further details). Excess gas will be flared off using an on-site flare.

Quicksilver will evaluate and potentially use multiple/different types of well stimulation methods in order to determine the best and most productive application for extracting hydrocarbons (oil) from well sites in Routt County. At the time of permitting, these differing methods may not be defined for each individual well. Given the exploratory nature of the development and the ongoing geologic analysis, Quicksilver may use one method in one location and another for another location. Based on the success (or lack thereof) of a particular stimulation process,

Quicksilver may need to shift the particular procedure, which was identified at the time of permitting, to another procedure. Any well stimulation process that is to be utilized will comply with the regulatory requirements set forth by the COGCC. For that reason we would like to identify the following types of well stimulation procedures and request these be included as a blanket description of our well stimulation processes at the time of permitting.

The principle of stimulating or fracing a well is similar, regardless of technique. The differing factor is the base fluid which is used as the carrying medium for the propping agents (sand) into the hydrocarbon-formations. Whether it is water, butane/propane, oil, nitrogen/C02, or another base fluid, the concept is the same- to carry the sand into the shale formation under extremely high pressure so that the sand permeates the shale formation and remains within the shale fractures to maintain open pathways for the flow of hydrocarbons.

1. Water Based Fracture
    a. Base fluid is water and additional additives.
    b. Chemicals other than water are disclosed in onsite Material Safety Data Sheets (MSDS) and to Local Government Designees (LGD) via COGCC reporting requirements (COGCC 305.A). These chemicals include, but are not limited to: butane, propane, native oil, nitrogen, or CO2.
    c. Sand is used as a propping agent.
2. Butane or Propane Fracture
    a. Gelled (liquefied) butane or propane and additional additives.
    b. Chemicals other than water are disclosed in onsite MSDS and to LGDs via COGCC reporting requirements.
    c. Sand is used as a propping agent.
3. Native Oil
    a. Oil that is native to the targeted producing zone.
    b. Oil is used to produce oil.
    c. Sand is used as a propping agent.
4. Nitrogen/CO2
    a. The high-pressure gas is used to overpressure the producing zone.
    b. May be used in conjunction with water or oil.
    c. Limited success and effectiveness.
5. Other
    a. As yet to be identified fracing technology or technique.

Excess gas will be flared off using an on-site flare. The duration and profile of the flare will be dependent on the hydrocarbon-bearing formations encountered and the fracing technique used. A water-based frac may result in increased truck traffic and a reduced flare profile, as compared to a gas frac process, which uses no water and greatly reduces the truck volume, but results in a larger and longer flare event. There will be periods during the flow back process when an un-obscured flare flame will be visible due to the safety and engineering design of the flare system. However, following this initial brief flow-back period, flare shrouds, thermal vapor oxidizers or other similar control devices will be employed to reduce or eliminate the visible portion of the

flare. Quicksilver's intent is to apply best practices to our operations throughout the entire process to minimize flare visibility.

Quicksilver will employ a closed loop drilling system in order to negate the need for fluid waste pits. Closed-loop systems employ a suite of solids control equipment to minimize drilling fluid dilution and provide the economic handling of the drilling wastes. A typical closed-loop system includes a series of linear-motion shakers, mud cleaners and centrifuges followed by a dewatering system. The combination of equipment typically results in a "dry" location where a reserve pit is not required, used fluids are recycled, and solid wastes can be reused on the drill site, landfarmed, or hauled off to a disposal facility. Quicksilver will construct a cuttings pit to contain the solid wastes generated during the process of drilling the surface section (i.e. surface casing) of the well. This process involves drilling with water only (i.e. no drilling mud), and results in nearly dry "cuttings" from the wellbore comprised of the natural rock chips and material being drilled through. The cuttings in the pit will be tested for compliance with COGCC Table 910-1 levels. If the cuttings meet those concentrations, the pit will be backfilled per COGCC rules and the cuttings interned therein. Cuttings that do not meet the concentrations of Table 910-1 will be removed from the pit and disposed of at an approved solid waste disposal facility. Additionally, cuttings generated after the surface casing is set will be contained on site in a closed loop system and removed for disposal at an approved solid waste disposal facility. During the production phase, oil will be extracted 24 hours a day from the well using one of the following lift methods: (1) pump jack, powered by on-site generators or gas-driven engines; (2) plunger lift; (3) PCP Pump; (4) jet pump; or (5) other similar low profile artificial lift methods. Oil and produced water will be hauled off site by tanker trucks. Liquids will be transferred to the Great Divide Disposal Facility in Moffat County. The pad location will be inspected by a Quicksilver employee or subcontractor on a regular basis during the production phase, in accordance with company policy and site specific requirements.

A thorough onsite assessment of animal and plant species was conducted by a professional biologist, including recommendations from the Colorado Division of Wildlife (CDOW), to address possible impacts. A complete analysis of this assessment is located in Appendix E of this document. No federally-listed threatened, endangered, candidate, or BLM sensitive-wildlife species were observed during surveys. No state-listed threatened, endangered, or special-concern wildlife species were observed in the project area. According to the Wildlife and Biological Resources Evaluation, the proposed project will not significantly affect native vegetation or wildlife habitat, and appropriate mitigation measures will be implemented. The primary potential impact to wildlife in the area will be due to increased human presence in the area during construction, maintenance, and operation of the oil pad site. Quicksilver will work with the CDOW and Routt County to mitigate human and wildlife interactions. All noxious weeds will be controlled in accordance with Quicksilver's Best Management Practices and the recommendations of the Weed Management Plan.

2.3 Equipment

Equipment on-site is fully described in Figure 3 Rig Layout and will be confined to the disturbed areas. All trucks required to transport equipment to the site will adhere to the appropriate regulations for oversize and overweight vehicles. Quicksilver will apply the appropriate level of traffic safety precautions including flaggers and traffic control during delivery and removal of heavy equipment. Quicksilver anticipates the primary sources of noise impacts will come from the operation of drilling equipment and diesel generators. All drilling and generator noise will be mitigated (as needed) to the prescribed regulatory levels using sound-reduction equipment. All equipment will be installed and utilized according to appropriate local, state, and federal regulations. All applicable building permits, including foundation and electrical, will be obtained. All permanent above-ground structures will be painted to blend with the natural surroundings.

2.4 Employees

Quicksilver employees are skilled professionals with a thorough understanding of drilling operations. All employees are trained in emergency response procedures, and follow all applicable local, state, and federal regulations. Employee housing will not be required during the development and operation of this well site. There will be between 6 and 12 individuals located on the well site throughout the construction, drilling and completion phases. Employees will typically travel to and from the site via individual pickup trucks.

3.0 Operation Plan

3.1 Drilling

In order to accommodate lease restriction deadlines and the Routt County regulatory process the drilling process will be conducted in two (2) phases. Initial installation of the Pirtlaw Partners Ltd 24-33 pad site for Phase 1 drilling will take approximately six to seven days. Once the well pad has been constructed, a surface drilling rig will be brought on-site. The rig will be approximately 60' tall and will operate 24 hours a day; seven days a week until drilling operations are complete to 1200'. This should take approximately two days to drill and set surface and six days to mobilize and demobilize. In August, 2012, for Phase 2 drilling, the pad upgrades for a 160' drilling rig will take approximately one week. Upon completion of the construction a drilling rig will be brought on-site. The rig will be approximately 160' tall and operated 24 hours a day; seven days a week, until drilling operations are complete. The well will be drilled vertically. The target formation is the Niobrara formation, with a proposed depth of 7.800' below the ground surface. In accordance with COGCC regulations, the vertical hole will be cased in cement to prevent any leakage of the well to the surrounding area, and prohibit fluids from entering the well. The drill traveling through the Niobrara formation will have a casing liner that will be slotted or perforated to allow liquid flow in and out of the hole. The operator will flow test at intervals while drilling to determine the best areas for oil production. Drilling operations will occur for approximately ten to eleven days.

3.2 Completion

The completion phase will take approximately 1 to 2 weeks and will be done in three steps, as detailed below.

3.2.1 Well Prepping

Well prepping will be done with a workover (WO) rig and support equipment will be delivered on tractors or flatbed trailers. Two to three containment tanks will be delivered and unloaded with a winch truck. Well prepping will involve about 4 to 6 trucks for mobilization and rigging. The WO rig will most likely remain at the project location throughout the completion activities. Well prepping takes approximately 2 days.

3.2.2 Well Stimulation

The completion activities will start immediately upon prepping the well. The fracturing crew will begin well stimulation and during the fracturing stages, 2 to 3 fracing trucks and pickups will arrive and leave in the morning and afternoon. This will last about 5 to 8 days, depending upon the flow testing required between stages. At the end of this period all completion equipment would depart, with the exception of the initial WO rig and support equipment.

3.2.3 Production Equipment Installation

After the fracturing phase, the WO rig will stay on location to install production tubing and begin flow testing the well. During this period there will be sporadic truck traffic in and out of location to haul off flowback and production fluids. Once flow testing is completed, the well will begin to produce. The WO rig, along with support equipment, would then be removed. There will be some pickup truck traffic required to support clean-operations and interim reclamation on the pad site.

3.3 Production

Once the well has been drilled and stimulated, one of the lift methods described in Section 2.2 above will be installed and the well will be tested. Depending on the viability of the well, the operator anticipates the oil to be transported off-site by tanker trucks; pipelines are not anticipated to be installed at this time.

4.0 ENVIRONMENTAL ANALYSIS

4.1 Weed Mitigation Plan

No noxious weeds have been detected on or immediately adjacent to the proposed oil pad site. Vegetation removal and soil disturbance during construction can create optimal conditions for the establishment of invasive, non-native species. Construction equipment traveling from weed-infested areas into weed-free areas could disperse noxious or invasive weed seeds and propagates, resulting in the establishment of these weeds in previously weed-free areas. Several simple practices will be employed to prevent most weed infestations. The following practices will be adopted for any activity to reduce the costs of noxious weed control through prevention. The practices include:

A) Prior to delivery to the site, equipment will be thoroughly cleaned of soils remaining from previous construction sites which may be contaminated with noxious weeds.
B) If working in sites with weed-seed-contaminated soil, equipment will be cleaned of potentially seed-bearing soils and vegetative debris at the infested area prior to moving to uncontaminated terrain.
C) All maintenance vehicles will be regularly cleaned of soil.
D) Driving vehicles through areas where weed infestations exist will be avoided if possible.

The pad site and much of the access road are located in sagebrush shrubland that burned a few years ago. Much of this area had also been brush hogged previous to the fire and cleared of much of the sagebrush. The CDOW recommendations on impact minimization efforts will be utilized by Quicksilver's operations and are included within the Wildlife and Biological Resources Evaluation.

4.2 Wildlife Mitigation Plan

No federally-listed threatened, endangered, candidate, or BLM sensitive-wildlife species were observed during surveys. During the surveys, no state-listed threatened, endangered, or special-concern wildlife species were observed in the project area. Both Greater Sage Grouse (GSG) and Columbian Sharp-tailed Grouse (CSTG) are known to inhabit the area. The lower part of the access road, where the access road uses existing ranch roads, skirts the edge of a historic GSG lek buffer. The access road and pad do not impact the mapped summer production areas and lek buffers for CSTG. The primary potential impact to wildlife in the area will be due to increased human presence in the area during construction, maintenance, and operation of the oil pad site. Accordingly, CDOW recommendations for seasonal wildlife closures will be followed. Specifically, there will be no construction of roads, drilling and workover operations during the timing intervals established via consultation with the CDOW in order to protect breeding, nesting, and brood rearing habitat for GSG and CSTG.

The project area is year round habitat for elk and mule deer, and, of particular importance, the project area provides severe winter range for both species. Disturbance associated with construction equipment and personnel may cause elk and mule deer to select habitats in more

secluded areas away from the project area. Any construction and/or operational activities during the winter months may impact mule deer and elk population in the surrounding area. The CDOW recommendations on impact minimization efforts will be utilized by Quicksilver's operations and are included within the Wildlife and Biological Resources Evaluation.

Flagging or other markings will be utilized to prevent avian collisions. In order to comply with the Migratory Bird Treaty Act and to demonstrate effects to reduce potential impacts on nesting birds, if any brush/tree clearing should become necessary, it will take place outside of the nesting seasons. Nesting season for most species in this area is generally considered to be between May 15 and July 31; June 1 to July 15 is the peak period when most incubation and brood rearing takes place. If brush/tree clearing can occur prior to May 1, most affected birds will relocate to alternate nesting sites. After mid-to-late July, most fledging has occurred and brush/tree clearing impacts would be minimized. See Appendix E for further details.

4.3 Visual Impact Analysis

During drilling and completion operations, the approximately 60-foot (Phase 1) to 160-foot (Phase 2) drill and workover rigs will be partially visible from CR 70 and US 40. Once the drill rigs are removed and production equipment is installed on site, the equipment will be painted to reduce visual impact. Equipment will be partially visible from CR 70, and will be minimally visible from US 40 due to existing topography and vegetation. The facility is not located within the Routt County Skyline Area Map. The pad site was shifted downslope to the west, into a corner of the Victor-American lease area, in order to reduce visibility. The access road corridor was carefully designed and reviewed by several parties in the field in order to reduce the visibility from US Highway 40 and the Hayden area, and to reduce cut and fill slopes. The lower portion of the access road utilizes existing ranch roads that already meet oil field access standards. Timely reclamation efforts will reduce the visibility of the cut and fill slopes of the access road and pad.

4.4 Reclamation Plan

Interim and final reclamation will occur in accordance with Routt County, CDPHE, and COGCC regulations. The disturbed area will be re-vegetated to sagebrush shrubland and re-graded to pre-construction topography. Due to wildlife and hunting activities, the operator will work with the CDOW and Routt County to determine the most appropriate time for reclamation to avoid wildlife conflicts. Quicksilver has prepared a Reclamation Plan for this proposed facility and it is included as a component of this submittal (see Appendix H). As discussed in the Wildlife and Biological Resources Evaluation, the Reclamation Plan will target restoration of sagebrush shrubland with a diverse native grass and forb understory in support of GSG and CSTG, which, according to CDOW, are the primary wildlife habitat conservation values of this area.

4.5 Geologic Hazards Assessment

No geologic hazards have been identified which would impede drilling operations.

4.6 Hydrologic Hazard Assessment

Quicksilver will work with surrounding property owners to sample wells and springs according to Routt County and COGCC regulations. In the event of a spill, Quicksilver will follow all applicable local, state and federal regulations, the Emergency Response Plan, and the Spill Prevention Control and Countermeasures Plan. The site has been designed to accommodate drainage by utilizing Stormwater Best Management Practices.

4.7 Air Pollution Controls

According to Colorado Regulation Number 3, Part A, Section II.D.1.III, oil exploration and production operations shall provide written notice to the COGCC of proposed drilling locations prior to commencement of such operations. Air Pollutant Emission Notices are not required until after exploration and/or production drilling, workovers, completions, and testing are finished. If production will result in reportable emissions, Quicksilver will file an Air Pollutant Emission Notice with the Division within 30 days after well completion, but no later than 90 days following the first day of production. If production will not occur, or production will not result in reportable emissions, the owner or operator shall submit written notice to the Division indicating that the well was plugged, or that emissions are otherwise not reportable. Quicksilver is committed to working with the COGCC, CDPHE, and Routt County to address air quality mitigation.

5.0 TRAFFIC ANALYSIS

5.1 Directions to the Proposed Site

Light Vehicle Traffic

Proceed in an easterly direction from Hayden, Colorado, along US Highway 40, approximately 5.9 miles to the junction of CR 70 to the north. Turn left and proceed in a northerly direction approximately 2.1 miles to the beginning of the proposed access to the east. Follow the existing private drive for approximately 1.3 miles. Total distance from the town of Hayden to the proposed well location is approximately 9.3 miles.

Five Axle Traffic

Proceed easterly from Hayden, Colorado 6.4 miles along US Highway 40 to the intersection with Routt County Road #52, turn left or north and proceed .5 miles to the intersection of US Highway 40 turn right or proceed west toward Hayden .5 miles to Routt County Road #70 turn right or northwesterly and proceed 2.1 miles along County Road 70 to an existing set of corrals and a private gravel drive to the right, proceed 0.3 miles along the private drive; turn right and follow the flagged route 1.0 miles to the proposed location. Total distance Hayden, Colorado to the proposed well location is approximately 10.3 miles.

5.2 Access Road

The subject property has legal access to CR 70. The existing access road was primarily utilized for agricultural operations. Minimal road improvements are anticipated at this time. The pad access road will be constructed to meet County Road and Bridge (R&B) Department's private roadway standards and will accommodate the International Fire Code access standards.

5.3 Traffic Circulation

Trip generation is generally determined using rates found in the ITE *Trip Generation* manual. Rates from this publication are applied to values related to the size of the proposed site to estimate the trips expected to enter and exit the site. In this case, no rates are provided for facilities similar to this use. To estimate trips expected for this site, information was gathered regarding the expected traffic based on previous projects similar to this one.

Approximately 95% of traffic generated from the proposed activity will travel through Craig heading west along US 40. There may be 1 to 2 pickup trucks per week heading through the Steamboat Springs area along US 40. All traffic will enter the site from CR 70. See the Traffic Study (Appendix G) for further information on anticipated traffic volumes for each phase of the proposed operation. The following trucks are typically utilized during drilling exploration and extraction: drill/workover rigs, light (pickup) trucks, heavy trucks, trucks for frac fluid loading, and winch trucks. Based upon the anticipated arrival and departure times of the site's traffic, the

operator's peak trip generation hour is expected to occur between 7:00-8:00 a.m. and 5:00-6:00 p.m. during normal operations.

Quicksilver will work with all applicable agencies and surrounding property owners to insure that all trucks will safely enter and exit the proposed access from US 40 and CR 70. Flaggers will be utilized to control traffic for overweight vehicles and additional signage may be placed along the highway to inform drivers of turning trucks.
The following table summarizes the expected average and maximum trips for each phase:

QUICKSILVER RESOURCES INC. OIL WELL TRAFFIC SUMMARY TABLE

APPROXIMATE VEHICLE TRAFFIC

Phases	Equipment Types	Timeline of Activity (Approx)	Total Vehicle Trips In & Out (Approx)
#1. Lease Road & Pad Site Construction – Phase 1	Two Dozers, Trackhoe, Motor Grader, Light Duty Crew Pick-up Truck, Fuel/Service Truck (2 Ton), Dump Truck, Flatbed Tractor Trailer	6 Days	18
#1. Lease Road & Pad Site Construction – Phase 2	Dozers, Trackhoes, Motor Grader, Scraper, Light Duty Crew Pick-up Truck, Fuel/Service Truck (2 Ton), Dump Truck, Flatbed Tractor Trailer	7 Days	70
#2. Drilling – Phase 1	Tractor trailer trucks bringing in rig components, casing, cementing and service vehicles	9 Days	30
#2. Drilling – Phase 2	Tractor trailer trucks bringing in rig components		200
Service trucks to supply the drilling rig during operations.	Service vehicles include: Fuel trucks, trucks for frac fluid loading, drill pipe, crew trucks (pick-up type), cement trucks, dump trucks	15 Days	168
#3. Completions (Fracing)	Completions rig tractor trailer, Trailer mounted tanks, Fluid tanker trucks, Sand trucks, Control and data trucks, Workover rig tractor trailer	19 Days	350
#4. Setting of Surface Equipment	Tractor trailer trucks for oil and water tanks, Crane, Forklift, Backhoe, Light duty Pick-up trucks, Crew Work Trucks (1 Ton), Welding Trucks (2 Ton), Tractor Trailer flatbed pipe trucks	10 Days	184
#5. Production	Frac Fluid Hauler 18 Wheeler, Production Oil Hauler 18 Wheeler, Light Duty Pick-up	7 Days	42

Total Activity (Approx)	73 Days	1062 Trips

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Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

ARTICLE II: GENERAL COMPLIANCE AND APPROVAL CRITERIA OF SECTIONS 5, 6, & 9 OF THE *ROUTT COUNTY ZONING REGULATIONS*

Section 5: General Performance and Development Standards

5.1 General Performance Standards

Quicksilver will adhere to all applicable standards of Section 5 of the *Routt County Zoning Regulations*.

5.1.1 Health, Safety, and Welfare

All operations will be conducted in a safe and organized manner to protect human and environmental health.

5.1.2 Local, State, and Federal Regulations and Standards

All applicable local, state, and federal regulations and standards shall be met. All applicable permits shall be obtained before the commencement of drilling operations.

5.1.3 Building Construction and Enforcement

Quicksilver will obtain all required building permits for the associated drilling equipment and structures. An Individual Sewage Disposal System (ISDS) permit will not be required for the proposed activity; the operator will be utilizing a vault-and-haul system.

5.1.4 Outdoor Storage

Pipe tubes will be stored outside. Quicksilver does not anticipate storing any additional equipment on location. Any additional equipment that will not be used on the location will be stored in the rental yard in Craig, Colorado. Due to existing topography, the facility, including equipment and outdoor storage, will be partially visible from CR 70.

5.1.5 Outdoor Storage of Vehicles/Implements/Equipment

All vehicles and equipment utilized for drilling operations will be properly licensed.

5.2 Dimensional Standards

All applicable on-site dimensional standards will be met (see Figure 5 for further details).

5.4 Parking Standards

The pad site has been configured to allow for sufficient parking space for all vehicles.

5.5 Addressing Standards

The subject property has not been addressed by Routt County.

5.6 Access to Buildable Lot Standards

The subject property has legal access to County Road 70. Minimal road improvements are anticipated at this time along the private access road.

5.7 Right of Way Access Standards and Permits

No new accesses will be proposed to County Road 70. A Right of Way Access Permit will not be required for the proposed operations. Minimum intersection sight distance has been met and addressed within the Traffic Study. It appears the existing access road has been constructed to accommodate drainage; Best Management Practices (BMPs) will be utilized to control drainage and sediment erosion.

5.8 Road Construction Standards and Permits

A Road Construction and Grading and Excavation Permit (if applicable) will be obtained for the pad access road. The pad access road will be constructed to meet R&B Department's standards and BMPs for erosion and sediment erosion control.

5.9 Sign Standards and Permits

All signs will be constructed according to Routt County standards. Additional signage may be placed along CR 70 to inform drivers of turning trucks.

5.11 Water Body Standards and Permits

Quicksilver has conducted a complete assessment of the disturbances associated with this project (including roadways and potential water crossings) according to Army Corps of Engineers criteria for waterway protection. As a result of this assessment, Quicksilver has determined that traffic and drilling operations will not affect waterways in the surrounding area. Quicksilver intends to preserve water resources and will work with surrounding property owners to sample wells and springs before and during drilling and production operations.

5.12 Airport Overlay Zone District Standards

A Federal Aviation Administration (FAA) Notice of Proposed Construction application will not be required with for this development since the oil rig will be less than 200 feet tall. The determination of this finding has been included as Appendix J.

Section 6: General Standards and Mitigation Techniques

Quicksilver will adhere to all applicable standards of Section 6 of the *Routt County Zoning Regulations*.

6.1.1 Health, Safety, and Welfare

All operations will be conducted in a safe and organized manner to protect human and environmental health.

6.1.2 Master Plans

Drilling operations in the proposed area of Routt County is consistent with the *Routt County Master Plan*.

6.1.3 Local, State, and Federal Regulations and Standards

All applicable local, state, and federal regulations and standards shall be met. All applicable permits shall be obtained before the commencement of drilling operations.

6.1.4 Public Road Use Performance Standards

Quicksilver will work with the Road and Bridge Department to mitigate impacts from drilling operations on County Roads. All applicable R&B permits will be obtained before commencement of drilling operations.

6.1.5 Industrial Standards

The pad and access road has been designed to accommodate Best Management Practices. See Figure 6 BMPs for further details.

6.1.6 Outdoor Lighting

The proposal will comply with the Routt County Outdoor Lighting Standards.

6.1.7 Significant Negative Impacts

A) Quicksilver will work with the R&B to mitigate impacts from drilling operations on the roadways. All applicable R&B permits will be obtained before commencement of drilling operations.

B) Flaggers will be utilized for transportation of rig and overweight equipment. Quicksilver will work with R&B, CDOT, and the surrounding property owners to mitigate dust, noise, and traffic volumes.
C) There are no mapped hazards at the well site.
D) Both Greater Sage Grouse (GSG) and Columbian Sharp-tailed Grouse (CSTG) are known to inhabit the area. The lower part of the access road, which uses existing ranch roads, skirts the edge of a historic GSG lek buffer. The access road and pad site do not impact the mapped summer production areas and lek buffers for CSTG. The primary potential impact to wildlife in the area will be due to increased human presence in the area during construction, maintenance, and operation of the oil pad site. Accordingly, the CDOW recommendations for seasonal wildlife closures will be followed. Specifically, there will be no construction of roads, drilling and workover operations during the timing intervals established via consultation with the CDOW in order to protect breeding, nesting, and brood rearing habitat for GSG and CSTG. Recommendations for wildlife mitigation will be followed according to the CDOW review comments and Wildlife and Biological Resources Evaluation.
E) Produced water and liquids will be transferred to the Great Divide Disposal Facility in Moffat County. Water will not be discharged on the ground or in waterbodies.
F) Dust will be controlled on the private access road with magnesium chloride. If dust complaints are received, the operator will work with R&B and surrounding properties to conduct mitigation measures.
G) The proposed Pirtlaw Partners Ltd. 24-33 will be located approximately 8 miles southwest of Steamboat Springs, Colorado. During drilling and completion operations, the approximately 160-foot drill and workover rigs will be partially visible from the CR 70 and US 40. Once the drill rigs are removed and production equipment is installed on site, equipment will be painted to reduce visual impact. Equipment will be partially visible from CR 70, and will be minimally visible from US 40 due to existing topography and vegetation. The facility is not located within the Routt County Skyline Area Map. The pad site was shifted downslope to the west, into a corner of the Victor-American lease area, in order to reduce visibility. The access road corridor was carefully designed and reviewed by several parties in the field in order to reduce the visibility from US Highway 40 and the Hayden area, and to reduce cut and fill slopes on the access road and pad. The lower portion of the access road utilizes existing ranch roads that already meet oil field access standards. Timely reclamation efforts will reduce the visibility of the cut and fill slopes.
H) This area is mapped as a low risk wildfire area. Fire extinguishers will be located on site.
I) On-site generators will be installed with noise reduction mufflers. The operator will utilize noise reduction equipment.
J) There are no wetlands located in the surrounding vicinity.
K) The surrounding area consists of primarily low density residential and agricultural properties. Quicksilver will utilize mitigation techniques to control dust, noise, and traffic in order to minimize their impacts to the surrounding area. There will be some

odors emitted from the drilling operations; however, odors will not travel to other locations due to the remoteness and elevation of the pad site.

L) There will be some vibrations emitted from the drilling operations; however, vibrations will not travel to other locations due to the remoteness of the pad site.

P) Interim and final reclamation will occur in accordance to Routt County, CDPHE, and COGCC Regulations. The disturbed area will be re-vegetated and re-graded to pre-construction conditions. Due to wildlife and hunting activities, the operator will work with the CDOW and Routt County to determine the most appropriate time for reclamation to avoid wildlife conflicts.

Q) The operator will control all noxious weeds on-site.

6.1.8 Approval Criteria for Specific Land Uses

Quicksilver will adhere to all applicable standards of Section 8 and 9 of the *Routt County Zoning Regulations*.

6.2 Public Road Use Performance Standards

Quicksilver will work with R&B to mitigate impacts from drilling operations on County Roads. All applicable R&B permits will be obtained before commencement of drilling operations.

6.3 Outdoor Lighting Standards

Lighting will be partially visible from CR 70 during drilling operations. Lightning will not be utilized during the production phases of the well. Outdoor lighting will be fully downcasted and opaquely shielded. Lighting will not affect the FAA operations at the Yampa Valley Regional Airport.

6.4 Mitigation Standards in General

Quicksilver will utilize mitigation methods to minimize noise, odor, sound, and environmental impacts on the County Road and surrounding properties.

6.5 Mitigation Techniques for Development within a Natural Hazard Area

6.5.5 Geologic Hazard, Unstable or Potentially Unstable Slopes

No geologic hazards were identified which would impede drilling operations.

6.6 Mitigation Techniques for Development within Critical Wildlife Areas

The proposed pad site is not located within a Critical Wildlife Area. However, recommendations for wildlife mitigation will be followed according to the CDOW review comments and Wildlife and Biological Resources Evaluation.

6.7 Mitigation Techniques to reduce Water Quality and Quantity Impacts

BMPs will be implemented to protect drainage and sediment erosion. Quicksilver intends to work with surrounding property owners to sample wells and springs before and during drilling and production operations.

6.8 Mitigation Techniques to reduce Air Quality Impacts

According to Colorado Regulation Number 3, Part A, Section II.D.1.III, oil exploration and production operations shall provide written notice to the COGCC of proposed drilling locations prior to commencement of such operations. Air Pollutant Emission Notices are not required until after exploration and/or production drilling, workovers, completions, and testing are finished. If production will result in reportable emissions, Quicksilver will file an Air Pollutant Emission Notice with the Division within 30 days after the well completion, but no later than 90 days following the first day of production. If production will not occur, or production will not result in reportable emissions, the owner or operator shall submit written notice to the Division indicating that the well was plugged, or that emissions are otherwise not reportable. Quicksilver is committed to working with the COGCC, CDPHE, and Routt County to address air quality mitigation.

6.9 Mitigation Techniques to reduce Impacts to Scenic Quality

During drilling and completion operations, the approximately 160-foot drill and workover rigs will be partially visible from the CR 70 and US 40. Once the drill rigs are removed and production equipment is installed on-site, the equipment will be painted to reduce visual impact. Equipment will be partially visible from CR 70, and will be minimally visible from US 40 due to existing topography and vegetation. The facility is not located within the Routt County Skyline Area Map. The pad site was shifted downslope to the west, into a corner of the Victor-American lease area, in order to reduce visibility. The access road corridor was carefully designed and reviewed by several parties in the field in order to reduce the visibility from US Highway 40 and the Hayden area, and to reduce cut and fill slopes. The lower portion of the access road utilizes existing ranch roads that already meet oil field access standards. Timely reclamation efforts will reduce the visibility of the cut and fill slopes.

6.10 Mitigation Techniques to reduce Noise Impacts

On-site generators will be installed with noise reduction mufflers. Quicksilver will coordinate development activities to mitigate truck traffic impacts during the operational phases.**6.12 Mitigation Techniques to reduce Impacts to Agricultural Uses**

Operations and truck traffic will not adversely impact surrounding agricultural uses. The operator will work with property owners to resolve issues which may arise.

6.13 Mitigation Techniques to reduce Impacts to Residential and Recreation Uses

Operations and truck traffic will not adversely impact residential and recreation. The operator will work with local land use authorities and property owners to resolve issues as they arise.

Section 9: Regulations and Standards for Mining

9.1 Purpose

Quicksilver will obtain and meet all applicable standards and permits from local, state, and federal agencies. Reclamation Bonding and Financial Insurance will be provided to Routt County prior to the issuance of the Special Use Permit.

9.2 General Standards for All Mining, Resources Extraction, and Accessory Uses

A) Quicksilver will work with the surface owner to mitigate possible impacts resulting from the proposed operation, and protect the conservation values of the Phase 2a Conservation Easement.
B) Quicksilver will work with Routt County, property owners, and surrounding operators to mitigate cumulative impacts along US Highway 40, CR 70, and the private access road.
C) Equipment kept on site will be painted sage green to blend in with the surrounding natural environment. Lighting will be utilized during drilling operations, but will not be utilized during the completion and production phases.
D) There are no residences within 150 feet of the well. The operator will mitigate drilling and generator noise using sound reduction equipment.
E) This development will not affect entryways to growth centers, as identified in the Routt County Master Plan.
F) The existing intersections at CR 70 and private access road will provide adequate sight distance and turning radius for the largest turning vehicles. Quicksilver will mitigate impacts from truck traffic by implementing the appropriate safety measures, including flagging, signage, and signaling.
G) Financial Insurance will be provided to Routt County prior to the issuance of the Special Use Permit.
H) Reclamation Bond will be provided to Routt County prior to the issuance of the Special Use Permit.
I) See response to Section 9.2.G & 9.2.H
J) Land survey monuments will be recorded.
K) Quicksilver will utilize technologically advanced procedures and equipment in order to mitigate significant negative impacts.

9.3 Oil, Gas, and Coal Bed Methane Exploration and Development

9.6.1 Permit Term

Quicksilver acknowledges that the requested Special Use Permit shall be 1) drilled and reclaimed within one year of the life of the COGCC APD Permit, 2) oil testing within eighteen months, and 3) production shall last for the life of the well without further Routt County Planning Department permitting.

9.6.2 Standards

A) Drilling fluids will be transferred to an approved disposal site. All applicable hauling permits will be obtained from the R&B and CDOT before materials are transferred on or off site.
B) In the event of a spill, Quicksilver will follow all applicable local, state and federal regulations, the Emergency Response Plan, and the Spill Prevention Control and Countermeasures Plan. BMPs will be utilized to mitigate possible spills on-site.
C) No flowlines are proposed with this operation.
D) Signs shall be posted to direct emergency crews to the subject site. An Emergency Response Plan has been provided to Routt County. Copies will be provided to the Sheriff's Department and Fire Protection District.
E) Interim and final reclamation will occur in accordance to Routt County, CDPHE, and COGCC Regulations. The disturbed area will be re-vegetated to sagebrush shrubland and re-graded to pre-construction topography. Due to wildlife and hunting activities, the operator will work with the CDOW and Routt County to determine the most appropriate time for reclamation to avoid wildlife conflicts.
F) All domestic water wells and springs will be sampled before the commencement and during drilling and production operations. Quicksilver will work with property owners to sample wells and springs regularly.
G) Drilling liquids will not be discharged in any waterway.
H) Interim and final reclamation will occur in accordance with Routt County, CDPHE, and COGCC Regulations. The disturbed area will be re-vegetated to sagebrush shrubland and re-graded to pre-construction topography. Due to wildlife and hunting activities, the operator will work with the CDOW and Routt County to determine the most appropriate time for reclamation to avoid wildlife conflicts.

ARTICLE III: APPENDICES

APPENDIX A. ROUTT COUNTY APPLICATION FORM AND PRE-APPLICATION CHECKLIST

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

Routt County
Planning Department
P.O. Box 773749
Steamboat Springs, CO 80477
(970) 879-2704
fax (970) 879-3992

OIL, GAS, and COAL BED METHANE WELLS
Exploration and Production

APPLICATION FORM

ACTIVITY # _____

PARCEL # 944061001

Petition: Pirtlaw Partners 24-33 Special Use Permit

Applicant's Name: Quicksilver Resources Inc.

Signature of Petitioner: Judith R. Clifford

Mailing Address: 1169 Hilltop Parkway, Suite 204 Steamboat Springs, CO 80407

Telephone: 970-817-6761 FAX: 970-879-5771

Petitioner's Email Address: jclifford@qrinc.com

Representative: Olsson Associates

Address: 826 21 ½ Rd. Grand Junction, CO 81505

Telephone: 970-263-7800 FAX: 970-263-7456

Representative's Email Address: ggriffin@oaconsulting.com

Type of Operation: Oil Exploration and Production Special Use Permit

General Location: Section 33, Township 7 North, Range 87 West of the 6th Prime Meridian; approximately 5.9 miles east from Hayden Colorado.

Acreage: Approximately 1538 Acres

Address: 77019 CR 70, Hayden, CO

Legal Description: SE 1/4SW1/4, S1/2SE1/4 of Section 33, Township 7 North, Range 87 West, 6th P.M.

Primary Staff Contact: Judith R. Clifford, Quicksilver Resources Inc.
Grant C. Griffin, Olsson Associates

Routt County
Planning Department
P.O. Box 773749
Steamboat Springs, CO 80477
(970) 879-2704
fax (970) 879-3992

PRE-APPLICATION COMPLETENESS CHECKLIST

APPLICANT: _____ PHONE_____ FAX _____

MAILING ADDRESS_____

ACTIVITY CODE: _____ SUBTYPE: _____

DESCRIPTION _____

PRE-APP MTG DATE: _____ PLANNER _____

A complete application shall be accompanied by the following:

ALL 11

- ☑ Application cover with signatures of applicant and all owners (if different than applicant)
- ☑ List of adjacent property owners mailing addresses and two sets of mailing labels / mineral owners
- ☑ Filing fee of $ 1500.00
- ☑ Complete legal description
- ☑ Area Map
- ☑ Deed, Chain of Title research or lease agreement
- ☑ Narrative (include: activity type and duration, # employees, # customers, equipment used, hours of operation, terrain, number and size parcels, road conditions and dimensions, and any special relevant features as to the physical characteristics of the development).
- ☑ Pre-Application Completeness Checklist

In addition the following information will also be required:

- ☑ **Site Plan (Consult Planner for appropriate scale)**
- ☑ Lot layout with acreage and contours
- ☐ Building locations and envelopes for all structures including residential and agriculture buildings
- ☑ Access with all driveway locations, easement and highway access permits, county road review approval comments, road dimensions, materials and grade with road names and location of road signs, internal roads, haul roads, etc.
- ☑ Parking and staging areas
- ☐ Pedestrian circulation including on site trails and off site connections and sidewalks
- ☑ Fencing: Perimeter ~~and internal to lot lines~~
- ☐ Snow storage
- ☐ Lighting Plan
- ☑ Signs
- ☐ Dumpster location
- ☑ Outdoor storage
- ☑ Stockpile locations
- ☑ Sanitation facilities
- ☐ Utility plan including easements, services letters and proposed lines
- ☐ Drainage Plan showing all drainages, irrigation ditches and water bodies
- ☐ Survey
- ☐ Landscape plan
- ☐ Phasing Plan
- ☑ Reclamation Plan
- ☐ Subdivision/PUD Plan
- ☑ Certificate of Liability Insurance w/ Routt County as Additional Insured — #1 mil
- ☐ Covenants
- ☐ Draft agreement to restrict uses on the remainder parcels(s) along or other legal documentation (i.e., conservation easement).
- ☐ Completed LPS Design Criteria Objectives narrative with comments regarding mitigation and compliance.
- ☐ Open space remainder parcels, percentage of open space, lot coverage
- ☑ Engineered Plan and Profile for all roads If needed
- ☐ Flight area for airport
- ☐ State approval
- ☑ Traffic Study
- ☐ Trail map
- ☐ Wildlife Mitigation Plan including habitat, migration corridors and production areas identified
- ☑ Erosion and sedimentation plan with best management practices identified including 404 permits (or application)
- ☐ Emergency services access and standards
- ☐ Flood plain management including floodway, and 100 year floodplain delineation
- ☐ Hydrologic Study
- ☐ Wetlands mapping If needed
- ☑ Visual impact analysis from major roadways
- ☐ Soils report/study/map
- ☑ Slope analysis for steep sites with greater than 30% slope or for areas with significant cut and fill and/or mining
- ☑ Geologic report including all hazard areas
- ☑ Cross section of cuts and fills
- ☐ Historical/archaeological resources
- ☑ Wildfire Analysis
- ☐ Air Pollution Control Plan
- ☐ Water Rights/Well Production
- ☐ Roof design and building elevations with heights
- ☑ Hazardous materials storage If needed
- ☐ Other Special agreement(s) as necessary
- ☐ Road maintenance classification
- ☐ Report or Permit from Environmental Health
- ☐ Licenses/Certifications (CDL, First Aid, Food Service etc)
- ☐ Surface agreements if completed at time of application

Additional Comments:

State O&G Permit

State Stormwater Permit

Attached Appendix A Submittal Reqmnts
Drilling Info

Also refer to Routt County Zoning Regs Sec 5 - Gen Performance Standards; Sec 6 - Gen Standards & Mit Techniques; Sec 6.1.7 Significant Negative Impacts; Sec 9 - Regs & Standards www.co.routt.co.us

APPENDIX B. PROPERTY DEED

603 / 1155

Reception No. ______ Recorder.
Recorded at ______ o'clock ______ M., ______

WARRANTY DEED

BOOK 603 PAGE 1155

STATE DOCUMENTARY FEE
DATE JAN 31 1985
$ 58.60

THIS DEED, Made this day of , 19 , between PAPOULAS LAND COMPANY, A COLORADO CORPORATION

a corporation duly organized and existing under and by virtue of the laws of the State of COLORADO , grantor, and

ROBERT L. WALTRIP

whose legal address is P. O. BOX 13548
HOUSTON, TEXAS 77019

of the *County of , State of ~~XXXXX~~ TEXAS, grantee:

WITNESSETH, That the grantor, for and in consideration of the sum of -TEN DOLLARS AND OTHER GOOD AND VALUABLE CONSIDERATION-- ~~XXXXXXX~~ the receipt and sufficiency of which is hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm, unto the grantee, his heirs and assigns forever, all the real property, together with improvements, if any, situate, lying and being in the County of ROUTT, State of Colorado, described as follows:

SEE THE ATTACHED EXHIBIT 'A'.

TOGETHER WITH ALL OF THE COAL, OIL, GAS, MINERALS AND MINERAL RIGHTS LYING ON, IN AND UNDER THE ABOVE DESCRIBED LANDS NOT HERETOFORE RESERVED OR CONVEYED TO OR BY OTHER PARTIES WHICH NOW REMAIN WITH THE LAND. THIS SHALL INCLUDE ALL REVERSIONARY RIGHTS WHATSOEVER WHICH MAY BE HELD BY OR THROUGH SELLER,

AND TOGETHER WITH ALL WATER, WATER RIGHTS AND DITCH RIGHTS APPURTAINING TO THE SAID DESCRIBED LAND.

Recorded at ______ Reception No. 340744
Jan 31 1985 Kim Bonner, Recorder Routt County, CO

~~XXXXXXXXXXXXXXXXXXXXXXXX~~

TOGETHER with all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof, and all the estate, right, title, interest, claim and demand whatsoever of the grantor, either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances.

TO HAVE AND TO HOLD the said premises above bargained and described with the appurtenances, unto the grantee, his heirs and assigns forever. And the grantor, for itself, and its successors, does covenant, grant, bargain and agree to and with the grantee, his heirs and assigns, that at the time of the ensealing and delivery of these presents, it is well seized of the premises above conveyed, has good, sure, perfect, absolute and indefeasible estate of inheritance, in law, in fee simple, and has good right, full power and authority to grant, bargain, sell and convey the same in manner and form as aforesaid, and that the same are free and clear from all former and other grants, bargains, sales, liens, taxes, assessments, encumbrances and restrictions of whatever kind or nature soever, except SEE THE ATTACHED EXHIBIT 'B'.

The grantor shall and will WARRANT AND FOREVER DEFEND the above-bargained premises in the quiet and peaceable possession of the grantee, his heirs and assigns, against all and every person or persons lawfully claiming the whole or any part thereof. The singular number shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders.

IN WITNESS WHEREOF, The grantor has caused its corporate name to be hereunto subscribed by its President, and its corporate seal to be hereunto affixed, attested by its Secretary, the day and year first above written.

Attest:

PAPOULAS LAND COMPANY, A COLORADO CORPORATION

______ Secretary

By James Papoulas, President

STATE OF COLORADO
County of ROUTT } ss.

The foregoing instrument was acknowledged before me in the County of ROUTT State of COLORADO, this 25th day of January, 19 85, by James Papoulas as President and as Secretary of PAPOULAS LAND COMPANY, a corporation.

My commission expires DECEMBER 29 1985
Witness my hand and official seal.

Linda C. Squier
Notary Public
P. O. BOX 773990
STEAMBOAT SPRINGS, CO 80477
Address

*If in Denver, insert "City and".

No. 40B. Rev. 5-84. WARRANTY DEED (Corporation) Bradford Publishing, 5825 W. 6th Ave., Lakewood, CO 80214 — (303) 233-6900

603 / 1155

603/1156

EXHIBIT 'A'

BOOK 603 PAGE 1156

(ATTACHED TO AND MADE A PART OF THAT CERTAIN WARRANTY DEED DATED THIS _____ DAY OF _____, 19____, FROM PAPOULAS LAND COMPANY, A COLORADO CORPORATION, GRANTOR, TO ROBERT L. WALTRIP, GRANTEE.)

Township 6 North, Range 87 West of the 6th P.M.

Section 3: The W½NW¼, the W½E½NW¼, and the SW¼, excepting therefrom a tract of land in the E½SW¼ of Section 3, Township 6 North, Range 87 West of the 6th P.M., bounded by a line described as follows: Beginning at the S¼ corner of said Section 3, thence N 89°00' W along the section line 303.96 feet to the top of a sand stone bluff, thence N01°28'35" W 631.81 feet, thence N 11°04'39" W 320.95 feet, thence N 17°07' W 544.93 feet, thence N 00°59'22" W 618.64 feet, thence N 06°46'58" W 445.40 feet, thence N 89°10' E 560.52 feet to the center of said Section 3, thence S 01°00'58" E 2541.76 feet to the point of beginning.

Section 4: E½, E½W½, W½NW¼, NW¼SW¼

Section 5: NE¼NE¼, N½NW¼NE¼

Section 9: E½, NE¼SW¼

Section 10: W½W½, E½SW¼ and a tract of land situate in the E½NW¼ Section 10, Township 6 North, Range 87 West of the 6th P.M., located in Routt County, Colorado, more particularly described as follows: Beginning at the NW corner of said E½NW¼ Section 10, whence the ¼ corner common to Section 3 and said Section 10, Township 6 North, Range 87 West of the 6th P.M. bears S 89°00' E 1312.41 feet, the line runs:

thence S 89°00' E 1008.45 feet to the top of a sand stone bluff;
thence S 14°58' W along said sand stone bluff 267.24 feet;
thence S 30°51'11" W 740.12 feet;
thence S 42°06; W 292.60 feet;
thence S 19°44' E 454.00 feet;
thence S 11°43' E 474.55 feet;
thence S 08°19' E 369.43 feet;
thence S 29°14' E 319.48 feet to the southerly boundary line of said E½NW¼ Section 10;
thence N 89°04' W along the southerly boundary line of said E½NW¼ Section 10 868.14 feet to the SW corner of said E½NW¼ Section 10;
thence N 00°58' 30" E 2629.60 feet to the point of beginning.

603/1156

Township 7 North, Range 87 West of the 6th P.M.

Section 15: All

Section 20: N½NE¼

Section 21: N½N½

Section 22: N½NW¼

Section 27: NW¼, N½SW¼

Section 28: All

Section 29: E½

Section 32: SE¼, S½NE¼

Section 33: S½S½, NW¼SW¼

Section 34: SW¼SW¼, W½SE¼SW¼

An undivided 75% interest in and to:

Township 7 North, Range 87 West of the 6th P.M.

Section 20: N½SE¼

Section 21: N½S½

Section 22: N½SW¼

An undivided 50% interest in and to:

Township 7 North, Range 87 West of the 6th P.M.

Section 20: S½NE¼ and S½SE¼

Section 21: S½N½ and S½S½

Section 22: S½NW¼ and S½SW¼

Containing 4,688.44 acres.

603/1158

EXHIBIT 'B'

BOOK 603 PAGE 1158

(ATTACHED TO AND MADE A PART OF THAT CERTAIN WARRANTY DEED DATED THIS _____ DAY OF _____, 19 _____, FROM PAPOULAS LAND COMPANY, A COLORADO CORPORATION, GRANTOR, TO ROBERT L. WALTRIP, GRANTEE.)

1. Taxes for the year of closing and subsequent years.

2. Reservation of right of way for any ditches or canals constructed by authority of United States, in U.S. Patents of record.

   (NOTE: Affects all of Subject Property)

3. Reservation of right of proprietor of any penetrating vein or lode to extract his ore, in U.S. Patents recorded in Book 28 at Pages 88, 89 and 320; Book 49 at Pages 212 and 343; and in Book 64 at Pages 516, 542, 543, 577 and 578.

   (NOTE: Affects a portion of Subject Property)

4. All coal as reserved in United States Patents recorded in Book 64 at Pages 167 and 172; Book 77 at Page 150; and in Book 160 at Page 345.

   (NOTE: Affects S½NE¼ and SE¼ of Section 32; Lot 4, SW¼NW¼ and NW¼SW¼ of Section 4; and Lot 1 and SE¼NE¼ of Section 5)

5. Easement and right of way for an access roadway, and the right to lay down, construct, maintain, inspect, remove, replace, reconstruct, and repair pipes or pipelines in the ditches along the side of said access roadways, as granted to Alminex U.S.A., Inc., a Colorado corporation of Craig, in the instrument recorded September 13, 1977 in Book 439 at Page 644, the location of which is shown in the map attached to said instrument.

6. Easement and right of way for pipes and pipelines for the transportation of oil, petroleum or any of its products, gas, water and other substances, or any thereof, and the right to construct, operate and maintain telephone, telegraph and electric lines, as granted to Alminex U.S.A., Inc., a Colorado corporation, in the instrument recorded September 13, 1977 in Book 439 at Page 650, the location of which is shown in the map attached to said instrument.

7. Easement and right of way for telephone and telegraph lines, as granted to The Colorado Telephone Co. by John B. Dawson and Mrs. John B. Dawson by instrument recorded June 17, 1911 in Book 69 at Page 469, in which the specific location of the easement is not defined.

8. Undivided interest in all oil, gas and other mineral rights together with so much of the surface of the same as may be necessary for the proper and convenient working of such minerals, oil, gas and other substances, as reserved by The Victor-American Fuel Company, a Maine corporation in a deed recorded June 30, 1947 in Book 230 at Page 265, and any interests therein or rights thereunder.

   (NOTE: Affects those portions of subject property which lie within sections 3, 4, 5, 9 and all of Section 10 except the E½NW¼ thereof)

603/1158

9. All oil, coal, gas and other minerals, together with the right to use so much of the surface as may be necessary as convenient for prospecting, exploration, mining, extracting and removal of such minerals, as reserved by County of Routt, State of Colorado, in a deed recorded October 27, 1947 in Book 230 at Page 589, and any interests therein or rights thereunder.

   (NOTE: Affects those portions of subject property lying within Section 15, 20, 21, 22, 27, 28 and 29)

10. Undivided grantors interest in all oil, gas and other mineral rights, as reserved by Farrington R. Carpenter and Eunice P. Carpenter in the Deed to John Papoulas recorded May 6, 1950 in Book 242 at Page 197, and any and all rights and interest thereunder.

    (NOTE: Affects SW¼SE¼)

11. Undivided grantors interest in all oil, gas and other mineral rights, as reserved by Clyde A. Craig and Veda E. Craig in the Deed to Homer F. Wilson and E. James Wilson recorded July 21, 1971 in Book 348 at Page 839, and any and all rights and interest thereunder.

    (NOTE: Affects E½NW¼, Section 10)

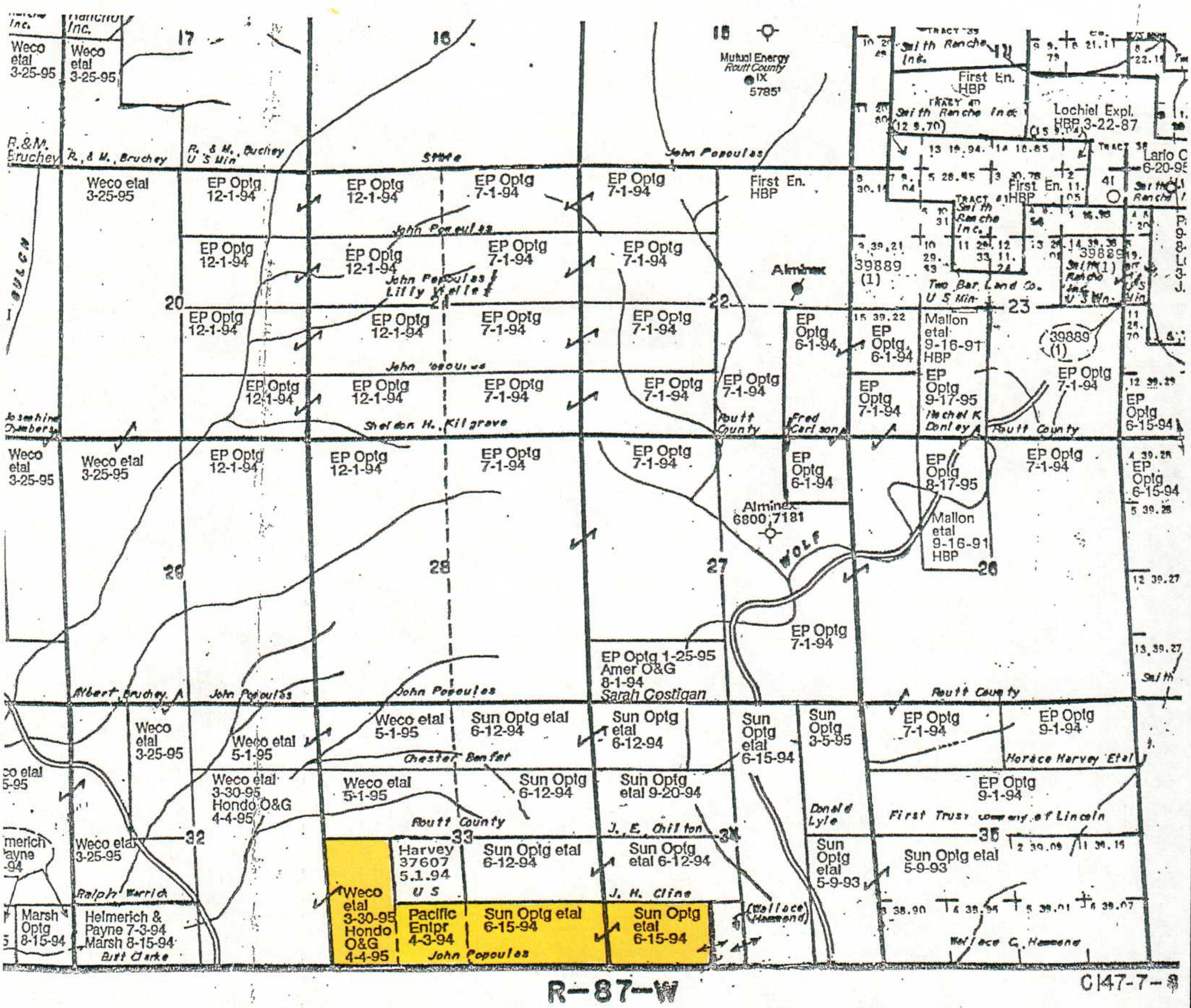
12. Undivided 1/2 interest in all oil, gas and other mineral rights together with the right of egress and ingress to prospect, mine and remove the same as reserved by Eva Mae Coverston in a deed recorded December 13, 1962 in Book 311 at Page 15, and any interests therein or rights thereunder.

    (NOTE: Affects E½NW¼, Section 10)

13. Easement and right of way for railroad purposes, as granted to The Denver and Salt Lake Railway Company, a corporation organized and existing under and by virtue of the laws of the State of Delaware, by The Dawson Land Company, a corporation orgainzed and existing under and by virtue of the laws of the State of Delaware, in the instrument recorded August 4, 1934 in Book 180 at Page 439, the location of which is shown in the map attached to said instrument.

14. Lack of a right of access from the land to any open public road, street or highway as to those portions of subject property lying within Section 15, 20, 21, 22, 27, 28 and 29.

    NOTE: This exception is necessary because it does not appear from the instruments in the office of the Clerk and Recorder of the County in which subject property is situate that any right of access exists to an open public roadway.



Weco etal 3-25-95
EP Optg 12-1-94
EP Optg 7-1-94
First En. HBP
Mutual Energy Routt County IX 5785'
Lochiel Expl. HBP 3-22-87
Alminex
Alminex 6800' 7181
Mallon etal 9-16-91 HBP
EP Optg 9-17-95
EP Optg 8-17-95
EP Optg 6-1-94
EP Optg 6-15-94
EP Optg 1-25-95 Amer O&G 8-1-94 Sarah Costigan
Weco etal 5-1-95
Sun Optg etal 6-12-94
Sun Optg etal 9-20-94
Sun Optg etal 6-15-94
Sun Optg 3-5-95
EP Optg 9-1-94
Weco etal 3-30-95 Hondo O&G 4-4-95
Harvey 37607 5.1.94
Pacific Enlpr 4-3-94
Sun Optg etal 5-9-93
Helmerich & Payne 7-3-94 Marsh 8-15-94
Marsh Optg 8-15-94
John Popoulas
Routt County
WOLF
R-87-W
C147-7-8

scale: 1" = 3,000'

No. 465151-1

WARRANTY DEED

ROBERT L. WALTRIP, also known as R. L. WALTRIP, GRANTOR, for **TEN DOLLARS** and other valuable consideration, in hand paid, hereby sells and conveys to **PIRTLAW PARTNERS, LTD., a Texas Limited Partnership, GRANTEE,** whose street address is 1929 Allen Parkway, 12th Floor, Houston, Texas 77019, the real property in the County of Routt and the State of Colorado as more fully described in the deeds recorded at the following books and pages in the records of the Clerk and Recorder for Routt County, Colorado, said book and page indicating the first page of the conveyance document ("Property"):

Book 544 at Page 47;
Book 587 at Page 69;
Book 603 at Page 1155;
Book 603 at Page 1202;
Book 617 at Page 441;
Book 619 at Page 1695;
Book 619 at Page 1718;
Book 632 at Page 540;
Book 632 at Page 541
Book 643 at Page 840;
Book 643 at Page 842;
Book 647 at Page 427
Book 661 at Page 1583;
Book 663 at Page 1639;
Book 687 at Page 1211;
Book 693 at Page 1659;
Book 717 at Page 392

DOCUMENTARY FEE
DATE 7/17/96
$ none

together with all water rights conveyed in said deeds;

less the real property and water rights described in the deeds recorded at the following books and pages in the records of the Clerk and Recorder for Routt County, Colorado, said book and page indicating the first page of the conveyance document:

Book 619 at Page 1741;
Book 645 at Page 1888;
Book 663 at Page 1638;
Book 668 at Page 1423;
Book 669 at Page 1206;
Book 687 at Page 1210;
Book 693 at Page 1657;
Book 709 at Page 573;
Book 709 at Page 574;
Book 709 at Page 577

465151 B-722 P-687 07/17/96 01:33P PG 1 OF 2 REC 11.00 DOC 0.00
Kay Weinland Routt County Clerk & Recorder

No. 465151-1

No. 465151-2

with all its appurtenances, including all water rights contained in said deeds subject to all easements, rights-of-way, and prescriptive rights, whether of record or not; and all encumbrances, restrictions, and other matters shown of record in Routt County, Colorado, to the extent they are validly existing and affect the Property.

For the consideration, and subject to the exceptions to conveyance and warranty, Grantor has GRANTED, SOLD and CONVEYED, and by these presents does GRANT, SELL and CONVEY, the Property above described unto the Grantee; TO HAVE AND TO HOLD the Property and premises, together with all and singular the rights and appurtenances thereto in anywise belonging, unto Grantee, and Grantee's successors and assigns forever, and Grantor does hereby bind Grantor and Grantor's heirs, successors, and assigns, to warrant and forever defend, all and singular, the Property and premises unto the Grantee, and Grantee's successors and assigns, against every person whomsoever lawfully claiming, or to claim the same, or any part thereof; provided that as to any party claiming by, through, or under the Grantee named herein, the Grantor makes no warranty whatsoever, it being the intent of Grantor to make a general warranty of title to this Grantee only and no warranty of title to any party claiming by, through or under the Grantee. This deed is made with full substitution and subrogation of Grantee in and to all covenants and warranties by others heretofore given or made in respect of the Property hereby conveyed or any part thereof.

IN WITNESS WHEREOF the undersigned have executed this warranty deed this 15th day of July, 1996.

GRANTOR

Robert L. Waltrip

Robert L. Waltrip, also known as
R. L. Waltrip

STATE OF Colorado)
) SS.
County of Routt)

The foregoing instrument was acknowledged before me this 15th day of July, 1996, by Robert L. Waltrip, also known as R. L. Waltrip.
Witness my hand and official seal. My commission expires: 9-9-97

Notary Public

NOTARY PUBLIC STATE OF COLORADO

465151 B-722 P-687 07/17/96 01:33P PG 2 OF 2

No. 465151-2

No. 465152-1

QUITCLAIM DEED

CLAIRE H. WALTRIP, for **TEN DOLLARS** and other valuable consideration, in hand paid, hereby sells and **QUITCLAIMS** to **PIRTLAW PARTNERS, LTD., a Texas Limited Partnership, GRANTEE,** whose street address is 1929 Allen Parkway, 12th Floor, Houston, Texas 77019, the real property in the County of Routt and the State of Colorado as more fully described in the deeds recorded at the following books and pages in the records of the Clerk and Recorder for Routt County, Colorado, said book and page indicating the first page of the conveyance document ("Property"):

Book 544 at Page 47;
Book 587 at Page 69;
Book 603 at Page 1155;
Book 603 at Page 1202;
Book 617 at Page 441;
Book 619 at Page 1695;
Book 619 at Page 1718;
Book 632 at Page 540;
Book 632 at Page 541
Book 643 at Page 840;
Book 643 at Page 842;
Book 647 at Page 427
Book 661 at Page 1583;
Book 663 at Page 1639;
Book 687 at Page 1211;
Book 693 at Page 1659;
Book 717 at Page 392

DOCUMENTARY FEE
DATE 7/17/96
$ none

together with all water rights conveyed in said deeds;

less the real property and water rights described in the deeds recorded at the following books and pages in the records of the Clerk and Recorder for Routt County, Colorado, said book and page indicating the first page of the conveyance document:

Book 619 at Page 1741;
Book 645 at Page 1888;
Book 663 at Page 1638;
Book 668 at Page 1423;
Book 669 at Page 1206;
Book 687 at Page 1210;
Book 693 at Page 1657;
Book 709 at Page 573;
Book 709 at Page 574;
Book 709 at Page 577

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Kay Weinland Routt County Clerk & Recorder 11.00 0.00

No. 465152-1

NO. 465152-2

with all its appurtenances, including all water rights contained in said deeds subject to all easements, rights-of-way, and prescriptive rights, whether of record or not; and all encumbrances, restrictions, and other matters shown of record in Routt County, Colorado, to the extent they are validly existing and affect the Property.

IN WITNESS WHEREOF the undersigned have executed this QUITCLAIM deed this 15TH day of July, 1996.

GRANTOR

Claire H. Waltrip

STATE OF Colorado)
) SS.
County of Routt)

The foregoing instrument was acknowledged before me this 15TH day of July, 1996, by Claire H. Waltrip.

Witness my hand and official seal.
My commission expires: 9.9.97

Notary Public

465152 B-722 P-688 07/17/96 01:34P PG 2 OF 2

NO. 465152-2

APPENDIX C. MINERAL LEASE AGREEMENT

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

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Kay Heinland Routt County, CO 0 G LEASE 11.00 D 0.00

THE STATE OF COLORADO

COUNTY OF ROUTT | ss

CHANGE OF LEASE DESCRIPTION

THAT WHEREAS, heretofore, under date of May 1, 2005, Victor American Fuel Company, whose address is P.O. Box 1019, Tannersville, New York 12485 as Lessor, did execute and deliver to Lynn Properties, c/o R. Craig Ponder, 6560 Fannin Street, Suite 1148, Houston, Texas 77030, as Lessee, an oil and gas lease, recorded in Routt County, Colorado Reception Number 627253 of the Routt County, Colorado Clerk Records of Routt County, Colorado. covering certain land situated in Routt County, Colorado, said land being more fully described in said lease, reference to said Lease and to the record thereof being here made for all purposes; and,

WHEREAS, it is the desire of the parties to said oil and gas lease to amend said lease so as to correct the description of the land intended to be included in said lease;

NOW, THEREFORE, in consideration of the premises and One Dollar ($1.00) and more cash in hand paid by Lynn Properties, hereinafter referred to as Lessee, to Victor American Fuel Company, hereinafter to as Lessor, the receipt and sufficiency of which are hereby acknowledged and confessed, Victor American Fuel Company, as Lessor, does hereby agree with Lynn Properties that said instrument shall be, and the same is hereby reformed and amended so that the land covered and to be covered thereby is described as follows:

	Net	Gross
Township 7 North, Range 87 West, 6th P.M.		
Section 33: SE/4SW/4, S/2SE/4	120	120
Section 34: S/2SW/4, W/2SE/4, W/2NE/4	240	240
Township 6 North, Range 87 West, 6th P. M.		
Section 3: Lot 3 (NE/4NW/4, 40.98ac), Lot 4 (NW/4NW/4, 40.78ac), S/2NW/4, SW/4, S/2SE/4	401.76	401.76
Section 4: Lot 1 (NE/4NE/4,40.76ac), Lot 2 (NW/4NE/4, 40.92ac) Lot 3 (NE/4NW/4, 41.09 ac), S/2NW/4, SE/4NW/4, E/2SW/4, SW/4SW/4,SE/4	522.77	522.77
Section 5: SE/4 less a 10.79 acre tract, more particularly described in warranty deed	149.21	149.21
Section 5: SW/4, a 100.79 Acre tract, more particularly described in warranty deed	100.79	100.79
Sections 5 & 8: a 59 acre tract located in the approximate S/2 of Section 5 and the approximate N/2NE of Section 8	59	59
Section 9: NE/4, N/2SE/4, SE/4SE/4, E/2NW/4, NE/4SW/4	400	400
Section 10: W/2NW/4, SW/4	240	240
Section 11: S/2SE/4, SE/4SE/4	120	120
Section 12: SW/4SW/4	40	40
Section 13: NW/4NW/4	40	40
Section 14: S/2NW/4, NW/4SW/4, NE/4NW/4 less 3.15 acre tract	156.85	156.85
Section 15: E/2SE/4, SE/4SW/4, SW/4SE/4	160	160
Township 6 North, Range 86 West, 6th P. M.		
Section 33: SE/4SW/4, S/2SE/4	120	120
Township 3 North, Range 85 West, 6th P. M.		
Section 6: SW/4NW/4	40	40

and containing 2,910.38 gross and net acres, more or less.

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Lessor hereby in all things adopts, ratifies and confirms said lease as the same is hereby amended, ans hereby leases, demises and lets all of the acreage above described and referred to unto Lessee, subject to and under the terms and provisions of said lease.

The provisions hereof shall extend to and be binding upon the heirs, legal representatives, successors and assigns of the parties hereto.

WITNESS our hands and seals this the _____day of _____A.D., 2006

VICTOR AMERICAN FUEL COMPANY

Richard J. Rem, Pres Sec

By: Richard J. Rem

Title: President

Social Security or Tax ID Number: SS # 840-46-4328

MIRIAM WEISBECKER
Notary Public - State of New York
No. 02WE6056910
Qualified in New York County
My Commission Expires Jan. 4, 2010

ACKNOWLEDGMENT–CORPORATION

STATE OF _____

COUNTY OF _____

On this_____ day of _____, A.D. 2006, before me personally appeared Richard J. Rem, to me personally known, who, being by me duly sworn, did say that he is the President of Victor American Fuel Company and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said Richard J. Rem acknowledged said instrument to be free act and deed of said corporation.

WITNESS my hand and seal this 20 day of March A.D. 2006

[SEAL]

Miriam Weisbecker

Notary Public

My Commission Expires: Jan 4, 2010

MIRIAM WEISBECKER
Notary Public - State of New York
No. 02WE6056910
Qualified in New York County
My Commission Expires Jan. 4, 2010

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Page: 1 of 8
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Kay Heinland Routt County, CO 0 C LESSR 41.00 D 0.00

PRODUCERS 88-PAID UP

OIL AND GAS LEASE

AGREEMENT, Made and entered into the 1st[th] day of May, 2005, by and between The Victor-American Fuel Company, whose address is P. O. Box 1019, Tannersville, NY 12485, hereinafter called Lessor (whether one or more) and Lynn Properties, whose post office address is c/o R. Craig Ponder, 6560 Fannin Street, Suite 1148, Houston, Texas 77030, hereinafter called Lessee:

WITNESSETH, That the Lessor, for and in consideration of Ten and More Dollars cash in hand paid, the receipt of which is hereby acknowledged, and the covenants and agreements hereinafter contained, has granted, demised, leased and let, and by these presents does grant, demise, lease and let exclusively unto the said Lessee, the land hereinafter described, with the exclusive right for the purpose of mining, exploring by geophysical and other methods, and operating for and producing therefrom oil and all gas of whatsoever nature or kind, with rights of way and easements for laying pipe lines, and erections of structures thereon to produce, save and take care of said products, all the certain tracts of land situated in the County of Routt , State of Colorado, described as follows, to-wit:

Township 7 North, Range 87 West, 6th P.M.	
Section 33: SE/4SW/4, S/2SE/4	60
Section 34: SW/4SW/4, W/2SE/4SW/4	60
Section 34: E/2SE/4SW/4, W/2SE/4, W/2NE/4	180
Township 6 North, Range 87 West, 6th P. M.	
Section 3: W/2 except E/2E/2NW/4	310
Section 3: 10 Acre tract in W/2SE/4 E of County Road	10
Section 3: E/2E/2NW/4	10
Section 4: E/2W/2	160
Section 4: SW/4SW/4	40
Section 5: NE/4SW/4, SE/4	200
Section 9: E/2NW/4	80
Section 10: W/2NW/4, SW/4 (100% all coal)	240
Section 10: SE/4	160
Section 11: S/2SE/4, SE/4SE/4	120
Section 12: SW/4SW/4	40
Section 13: NW/4NW/4	40
Section 14: S/2NW/4, NW/4SW/4, NE/4NW/4 less 3/15 acre tract	156.85
Section 15: E/2SE/4	80
Section 15: NE/4 West of Channel of Wolf Creek (100% coal)	65
Section 15: SE/4SW/4, SW/4SE/4	80
Township 9 North, Range 87 West, 6th P. M.	
Section 9: NE/4N/2SE/4, SE/4SE/4, NE/4SW/4	90
Township 6 North, Range 86 West, 6th P. M.	
Section 33: SE/4SW/4, S/2SE/4	120
Township 3 North, Range 85 West, 6th P. M.	
Section 6: SW/4NW/4	40

and containing 2,341.85 acres, more or less, hereinafter referred to as the "Leased Premises."

1. It is agreed that this lease shall remain in force for a term of three (3) years from this date and as long thereafter as oil or gas of whatsoever nature or kind is produced from said lease premises or on acreage pooled therewith, or drilling operations are continued as hereinafter provided. If, at the expiration of the primary term of this lease, oil or gas in not being produced on the leased premises

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or on acreage pooled therewith but Lessee is then engaged in drilling or re-working operations thereon, then this lease shall continue in force so long as operations are being continuously prosecuted on the leased premises or on acreage pooled therewith; and operations shall be considered to be continuously prosecuted if not more than ninety (90) days shall elapse between the completion or abandonment of one well and the beginning of operations for the drilling of a subsequent well. If after discovery of oil or gas on said land on acreage pooled therewith, the production thereof should be cease from any cause after the primary term, this lease should not terminate if Lessee commences additional drilling or re-working operations within ninety (90) days from date of cessation of production or from date of completion of dry hole. If oil or gas should be discovered and produced as a result of such operations at or after the expiration of the primary term of this lease, this lease should continue in force so long as oil or gas is produced from the leased premises or acreage pooled therewith.

2. This is a PAID-UP LEASE. In consideration of the down cash payment, Lessor agrees that Lessee shall not be obligated, except as otherwise provided herein, to commence or continue any operations during the primary term. Lessee may at any time or times during or after the primary term surrender this lease as to all or any portion of said land and as to any strata or stratum by delivering to Lessor or by filing for record a release or releases, and be relieved of all obligations thereafter accruing as to the acreage surrendered.

3. In consideration of the premises the said Lessee covenants and agrees:

1st. To deliver to the credit of Lessor, free of cost, in the pipe line to which Lessee may connect wells on said land, the equal fifteen percent (15.0%) part of all oil produced and saved from the leased premises.

2nd. To Pay Lessor fifteen percent (15.0%) of the gross proceeds, payable monthly, for the gas from each well where gas only is found, while the same is being sold or if used off the premises, or in the manufacture of gasoline a royalty of fifteen percent (15.0%) of the gross market value of the gas at the well, payable monthly .

3rd. To pay Lessor for gas produced from any oil well and sold a royalty of fifteen percent (15.0%) of the gross proceeds, at the mouth of the well, payable monthly or if used off the premises, or in the manufacture of gasoline a royalty of fifteen percent (15.0%) of the gross market value of the gas at the well, payable monthly.

All royalty interests shall be free of the cost of development, operations, transportation, compression, marketing, manufacturing and any and all other costs except applicable production, severance and other similar taxes.

4. Where gas from a well capable of producing gas is not sold or used, Lessee may pay or tender as royalty to the royalty owners Five Dollars per year per net acre retained hereunder, such payment or tender to be made on or before the anniversary date of this lease next ensuing after the expiration of 90 days from the date such well is shut in and thereafter on or before the anniversary date of this lease during the period such well is shut in. If such payment or tender is made it will be considered that gas is being produced within the meaning of this lease, provided, however, the maintenance of this oil and gas lease pursuant to the terms of this paragraph 4 are hereby limited such that this lease shall not be maintained solely by a well which is capable of producing oil or gas, but which is not being produced, for a period in excess of two (2) consecutive years after the later of (i) the end of the primary term, or (ii) the cessation of any other fact, action or condition which is otherwise maintaining this lease; provided, however, that the right to maintain this lease by virtue of the shut-in status of a well which is capable of producing oil or gas shall re-occur upon each occasion that a well is shut-in, but in each such case for a period not to exceed of six (6) consecutive months during the secondary term.

5. If said Lessor owns a less interest in the above described land than the entire and undivided fee simple estate therein, then the royalties (including any shut-in gas royalty) herein provided for shall be paid the Lessor only in the proportion which Lessor's interest bears to the whole and undivided fee.

6. Lessee shall have the right to use, free of cost, gas, oil and water produced on said land for Lessee's operation thereon, except water from the wells of the owner of the surface estate. Lessor hereby discloses, and Lessee by accepting this oil and gas lease acknowledges, that Lessor's interest in the described land is a severed mineral interest and accordingly Lessor does not represent, nor warrant, any ownership of the surface estate. Notwithstanding the foregoing, whatever rights and privileges to the use of the surface estate associated with ownership of the severed mineral interest owned by Lessor are, for and in the consideration described above, hereby granted, leased and let exclusively unto Lessee by this oil and gas lease, provided, however that Lessee shall bear the sole responsibility for the exercise and enforcement of these rights and privileges to the use of the surface estate.

7. When requested by Lessor or the owner of all or any part of the surface estate, Lessee shall bury Lessee's pipe line below plow depth.

8. No well should be drilled nearer than 200 feet to the house or barn now on said premises without written consent of Lessor and the owner of all or any part of the surface estate.

9. Lessee shall pay for damages caused by Lessee's operations to growing crops on said land.

10. Lessee shall have the right at any time to remove all machinery and fixtures placed on said premises, including the right to draw and remove casing.

11. The rights of Lessor and Lessee hereunder may be assigned in whole or part. No change in ownership of Lessor's interest (by assignment or otherwise) shall be binding on Lessee until Lessee has been furnished with notice, consisting of certified copies of all recorded instruments or documents and other information necessary to establish a complete chain of record title from Lessor, and then only with respect to payments thereafter made. No other kind of notice, whether actual or constructive, shall be binding on Lessee. No present or future division of Lessor's ownership as to different portions or parcels of said land shall operate to enlarge the obligations or diminish the rights of Lessee, and all Lessee's operations may be conducted without regard to any such division. If all or any part of this lease is assigned, no leasehold owner shall be liable for any act or omission of any other leasehold owner.

12. A. Lessee, at its options, is hereby given the right and power at any time and from time to time as a recurring right, either before or after production, as to all or any part of the land described herein and as to any one or more of the formation hereunder, to pool or unitize the leasehold estate and the mineral estate covered by this lease with other land, lease or leases for the production of oil and gas, or separately for the production of either, when in Lessee's judgment it is necessary or advisable to do so, and irrespective of whether authority similar to this exists with respect to such other land, lease or leases. Units pooled hereunder shall comply with the following limitations:

(a) Each pooled unit shall consist of an area as nearly as practicable in the configuration of a square or a rectangle surrounding the well, or in the case of horizontal or highly deviated wells, a rectangle surrounding the horizontal or deviated portion of the wellbore, limited in size as follows:

(i) For oil wells not drilled horizontally or highly deviated and for horizontally or highly deviated oil wells where the horizontal or highly deviated portion of the well bore is less than 500 feet or remains entirely within a governmental quarter/quarter section, 40 acres, plus a 10 % tolerance thereof;

(ii) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 500 feet and lying within two governmental quarter/quarter section but less than 1000 feet, 80 acres, plus a 10 % tolerance thereof;

(iii) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 1000 feet and lying within two

governmental quarter/quarter section but less than 2000 feet, 160 acres, plus a 10 % tolerance thereof;

(iv) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 2000 feet and lying within two governmental quarter/quarter section but less than 3000 feet, 320 acres, plus a 10 % tolerance thereof;

(v) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 3000 feet, 640 acres, plus a 10 % tolerance thereof;

(vi) For gas wells produced from depths from the surface to a depth of 2,500 feet subsurface, inclusive, 160 acres plus a 10 % tolerance thereof

(vii) For gas wells produced from depths below 2,500 feet subsurface, 640 acres, plus a tolerance of 10% thereof;

(viii) In the event that the governmental authority having jurisdiction prescribes or permits the creation of drilling or proration units having a larger area above specified for pooled units, then said pooled units shall conform substantially in size with said drilling or proration units prescribed or permitted by governmental regulations.

Likewise, units previously formed to include formations not producing oil or gas, may be reformed to exclude such non-producing formations. The forming or reforming or termination of any unit shall be accomplished by Lessee executing and filing of record in the county where the lands are located a declaration of such unitization or reformation, which declaration shall describe the unit and the formations and depth being pooled thereby and be effective upon the date the document is recorded. Lessee will within 30 days of such recording provide Lessor with a copy of the recorded document. Any unit may include land upon which a well has theretofore been completed or upon which operations for drilling have theretofore been commenced. Production, drilling or reworking operations or a well shut in for want of a market anywhere on a unit which includes all or a part of this lease shall be treated as if it were production, drilling or reworking operations or a well shut in for want of a market under the lease. In lieu of the royalties elsewhere herein specified, including shut-in gas royalties, Lessor shall receive on production from the unit so pooled royalties only on the portion of such production allocated to this lease; such allocation shall be that proportion of the unit production that the total number of surface acres covered by this lease and included in the units bears to the total number of surface acres in such unit.

12.B. In addition to the pooling authority provided in Paragraph 12.A, above, Lessee shall have the right to unitize, pool, or combine all or any part of the above described lands as to one or more of the formations thereunder with other lands in the same general area by entering into a cooperative or unit plan of development or operation approved by any governmental authority and, from time to time, with like approval, to modify, change or terminate any such plan or agreement and, in such event, the terms, conditions and provisions of this lease shall be deemed modified to conform to the terms, conditions, and provisions of such approved cooperative or unit plan of development or operation and, particularly, all drilling and development requirements of this lease, express or implied, shall be satisfied by compliance with the drilling and development requirements of such plan or agreement, and this lease shall not terminate or expire during the life of such plan or agreement. In the event that said above described lands or any part thereof, shall thereafter be operated under any such cooperative or unit plan of development or operation whereby the production therefrom is allocated to different portions of the land covered by said plan, then the production allocated to any particular tract of land shall, for the purpose of computing the royalties to be paid hereunder to Lessor, be regarded as having been produced from the particular tract of land to which it is allocated and not to any other tract of land; and the royalty payments to be made hereunder to Lessor shall be based upon production only as so allocated. Lessee shall provide Lessor with notice of its intent to form any such cooperative or unit plan of development or operation approved by any governmental authority in the same manner as required by the laws, rules or regulations for any other interested party. Failure to timely provide such notice shall terminate Lessees authority to commit Lessor's

mineral interests to said cooperative or unit plan of development or operation. After receipt of said timely notice and the request by Lessee to do so, Lessor agrees to execute such documents necessary to express Lessor's consent to any cooperative or unit plan of development or operation adopted by Lessee and approved by any governmental agency, provided that Lessee shall bear any and all costs associated with providing such documentation. If at the end of the Primary Term, or any time thereafter, all or any portion of the leased premises are within the boundaries of a plan or unit area pursuant to this Paragraph 12.B., but those leases premises are not participating in any production from said unit whereby the royalty owners would be receiving royalty payments, then Lessee shall pay or tender to the royalty owners Five Dollars per year per net acre retained under this lease, such payment or tender to be made on or before the anniversary date of this lease beginning at the earlier of end of the Primary Term or next ensuing after all or a portion of the leased premises are committed to said cooperative plan or unit and said payments shall thereafter continue on each next ensuing anniversary date of this lease until such time as that portion of the leased premises committed to such plan participate in actual production and the royalty payments are being made to the royalty owners.

12.C. Irrespective of the other provisions of this lease, it is agreed that should this lease be maintained in force solely by operations on or production from a pooled unit or units embracing land covered hereby and other land as provided in Paragraph 12.A, above, or the creation of a cooperative or unit plan of development or operation approved by any governmental authority as provided in Paragraph 12.B, above, such operations or production will maintain this lease in force only as to the acreage embraced in such unit or units or cooperative or unit plan or plans. This lease may be maintained as to acreage not included in such unit or units or cooperative or unit plan or plans in any manner provided for herein, provided that, if it be by shut in well payment, the shut in well payments shall be proportionately reduced to exclude the lands contained in the unit or units or cooperative or unit plan or plans.

13. All express or implied covenants of this lease shall be subject to all Federal and State Laws, Executive Orders, Rules or Regulations, and this lease shall not be terminated, in whole or in part, nor Lessee held liable in damages, for failure to comply therewith, if compliance is prevented by, or if such failure is the result of any such Law, Order, Rule or Regulation, provided that this provision shall not discharge the payment of any monies otherwise due under this oil and gas lease.

14. This lease is without warranty of any kind, including, but not limited to title. Lessor agrees that the Lessee shall have the right at any time to redeem for Lessor, by payment, any mortgages, taxes or other liens on the above described lands, in the event of default of payment by Lessor and be subrogated to the rights of the holder thereof, and the undersigned Lessor, for themselves and their heirs, successors and assigns, hereby surrender and release all right of dower and homestead in the premises described herein, insofar as said right of dower and homestead may in any way affect the purposes for which this lease is made, as recited herein.

15. Should any one or more of the parties herein above named as Lessor fail to execute this lease, it shall nevertheless be binding upon all such parties who do execute it as Lessor. The word "Lessor," as used in this lease, shall mean any one or more or all of the parties who execute this lease as Lessor. All the provisions of this lease shall be binding on the heirs, successors and assigns of Lessor and Lessee.

16. It is expressly understood and agreed that the word "gas" as used in this lease shall include, but not be limited to, gas from coal seams and that drilling operations shall include, but not be limited to the dewatering of such coal seams.

17. Lessee shall indemnify and hold harmless Lessor and its officers, directors, employees and agents from all claims, demands, losses and liabilities of every kind and character arising out of Lessee's performance or failure to act pursuant to the terms and conditions of this oil and gas lease or by the performance or failure to act by Lessee's employees, agents, contractors and subcontractors hereunder.

18. At the later of (i) one hundred eighty (180) days following the end of the primary term of this lease, or (ii) the conclusion of a Continuous Development Program (as hereinafter defined) this lease shall terminate as to all lands described herein not included in the "Well Tract" (as

hereinafter defined) surrounding each well capable of producing oil gas, sulphur, or other minerals.

(a) Each Well Tract shall consist of an area as nearly as practicable in the configuration of a square or a rectangle surrounding the well, or in the case of horizontal or highly deviated wells, a rectangle surrounding the horizontal or deviated portion of the wellbore, limited in size as follows:

(i) For oil wells not drilled horizontally or highly deviated and for horizontally or highly deviated oil wells where the horizontal or highly deviated portion of the well bore is less than 500 feet or remains entirely within a governmental quarter/quarter section, 40 acres, plus a 10 % tolerance thereof;

(ii) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 500 feet and lying within two governmental quarter/quarter section but less than 1000 feet, 80 acres, plus a 10 % tolerance thereof;

(iii) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 1000 feet and lying within two governmental quarter/quarter section but less than 2000 feet, 160 acres, plus a 10 % tolerance thereof;

(iv) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 2000 feet and lying within two governmental quarter/quarter section but less than 3000 feet, 320 acres, plus a 10 % tolerance thereof;

(v) For oil wells drilled horizontally or highly deviated with the horizontal or highly deviated portion of the well bore being greater than 3000 feet, 640 acres, plus a 10 % tolerance thereof;

(vi) For gas wells produced from depths from the surface to a depth of 2,500 feet subsurface, inclusive, 160 acres plus a 10 % tolerance thereof

(vii) For gas wells produced from depths below 2,500 feet subsurface, 640 acres, plus a tolerance of 10% thereof;

(viii) In the event that the governmental authority having jurisdiction prescribes or permits the creation of drilling or proration units having a larger area above specified for Well Tracts, then said Well Tracts shall conform substantially in size with said drilling or proration units prescribed or permitted by governmental regulations.

(b) For the purpose of this Paragraph 18 and the pooling provisions of Paragraph 12. A, a well drilled horizontally or highly deviated is one wherein the horizontal or highly deviated portion of the well bore enters the objective formation and thereafter maintains at an angle of 110 degrees or less from vertical portion of the well bore.

(c) It is understood that should all or any portion of the lands described herein pooled or unitized under the provisions of Paragraph 12.A or 12.B above, that land so pooled or unitized shall be considered as being within the "Well Tract" of said pooled unit or cooperative plan for so long as said lands remain within the pooled unit or cooperative plan.

(d) A "Continuous Development Program" for purposes of this paragraph shall consist of a period during which Lessee conducts operations for the drilling of a well on the leased premises, or lands pooled therewith, with no lapse of more than one hundred eighty (180) days between the completion or plugging and abandoning of one well and commencement of drilling operations on the next succeeding well, and with operations for drilling and completion or plugging and abandonment on each well being conducted with no cessation of

more than sixty (60) consecutive days. For the purposes of this paragraph, "completion" of a well shall be deemed the date on which completion report, Form 5, is filed with and pursuant to the Colorado Oil and Gas Conservation Commission.

(e) This provision affects the secondary term of this lease as set forth in the habendum clause, but it shall not alter the effect of any of the other provisions of this lease which relate to lease maintenance, either before or after a contraction of the lease premises under the terms of this paragraph, including, without limitation, the shut-in provisions, the savings clause and the force majeure clause.

19. Notwithstanding the termination of this lease for the purposes of mining, exploring by geophysical and other methods, and operating for and producing therefrom oil and all gas as to a portion of the Leased Premises pursuant to Paragraph 18 or pursuant to Paragraph 12.C, insofar as it is within the power of Lessor to grant same, Lessee shall nevertheless continue to have the right of ingress and egress, together with easements and rights-of-way for roads, pipelines and other facilities on, over and across all of the Leased Premises in order to continue to conduct its operations on all lands remaining subject to this lease for the purposes of mining, exploring by geophysical and other methods, and operating for and producing therefrom oil and all gas and for all purposes described herein, provided that said rights of ingress and egress shall be non-exclusive and Lessor shall have full right and authority to grant oil and gas leases to other parties and Lessor and such other parties shall have full rights to the concurrent use of all easements and rights-of-way for roads, pipelines and other facilities on, over and across all of the Leased Premises then existing or thereafter created.

IN WITNESS WHEREOF, this instrument is executed as of the date first above written.

Richard J. Rem
Title: President
Social Security or Tax ID Number: SS # 840-46-4328

ACKNOWLEDGMENT–CORPORATION

STATE OF _____

COUNTY OF _____

On this_____ day of_____, A.D. 2005, before me personally appeared Richard J. Rem, to me personally known, who, being by me duly sworn, did say that he is the President of Victor American Fuel Company and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said Richard J. Rem acknowledged said instrument to be free act and deed of said corporation.

WITNESS my hand and seal this _____ day of_____ A.D. 2005

[SEAL]

_____
Notary Public

My Commission Expires:_____ address: _____

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CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of MARIN } ss.

On MAY 20, 2005 before me, LUKE ERICKSON STODDARD
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")
personally appeared RICHARD J REM
Name(s) of Signer(s)

☒ personally known to me
☐ proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature of Notary Public

LUKE ERICKSON STODDARD
Commission # 1445494
Notary Public - California
Marin County
My Comm. Expires Jan 17, 2009

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

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APPENDIX D. SURFACE USE AGREEMENT

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

MEMORANDUM OF SURFACE USE AGREEMENT

WHEREAS, Victor American Fuel Company, as Lessor, has heretofore executed that certain Oil and Gas Lease dated effective May 1, 2005 (the "Lease"), to Lynn Properties covering 2,341.85 acres of land, more or less (the "Leased Premises"), a copy of which is recorded as Document No. 627253 in the records of Routt County, Colorado. The legal description of the Lease was later amended to cover a total of 2,910.38 acres by that certain document entitled "Change of Lease Description", a copy of which is recorded as Document No. 636519 in the records of Routt County, Colorado. Quicksilver Resources Inc., a Delaware corporation whose address is 801 Cherry Street, Suite 3700, Unit 19, Fort worth, Texas 76102 ("Quicksilver") and Sunterra Oil and Gas LP, a Delaware limited partnership, whose address is 14825 St. Mary's Lane, Houston, TX 77079 ("Sunterra") each own undivided interests in the Lease.

NOW, THEREFORE, the undersigned executes this instrument for the purpose of providing record notice to third parties of the existence of an agreement governing the use of the surface of the Leased Premises for operations under the Lease.

1. Pirtlaw Partners, Ltd. and Wolf Mountain Ranch, LLC ("Owners") own the surface estate in the Leased Premises. On February 3, 2011, Owners and Sunterra (which at that time owned the Lease) executed that certain Surface Use Agreement governing the operations that may be conducted on the Leased premises under the Lease.

2. Following its acquisition from Sunterra of the majority interest in the Lease, Quicksilver and Owners entered into the negotiation of a First Amended and Restated Surface Use Agreement which is intended to replace the Surface Use Agreement referred to in paragraph 1 above.

3. Owners and Quicksilver have agreed upon a final draft of the First Amended and Restated Surface Use Agreement and Quicksilver expects that instrument to be executed shortly, whereupon Quicksilver will file for record a Memorandum of that agreement. Until that time, the Surface Use Agreement referred to in paragraph 1 above remains in full force and effect.

IN WITNESS WHEREOF, this Memorandum of Agreement has been executed this 15 day of February, 2012.

QUICKSILVER RESOURCES INC.

By: Clay Blum KS MW
Clay Blum, VP - US Land

STATE OF TEXAS §
§
COUNTY OF TARRANT §

The foregoing instrument was acknowledged before me this 15 day of February, 2012, by Clay Blum, as VP – US Land on behalf of **Quicksilver Resources Inc.**, a Delaware corporation.

NOTARY PUBLIC STATE OF TEXAS
MIMI ELAINE KEENOM
My Commission Expires
March 13, 2013

Notary Public, State of Texas

APPENDIX E. RESOURCES REPORT

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

WILDLIFE AND BIOLOGICAL RESOURCES EVALUATION
QUICKSILVER OIL PAD SITE
Pirtlaw Partners LTD. #24-33
ROUTT COUNTY, COLORADO

Prepared for:
Quicksilver Resources Inc.
Steamboat Springs, Colorado, 80487
1169 Hilltop Parkway, Suite 204

Prepared by:
Olsson Associates
4690 Table Mountain Drive, Suite 200
Golden, CO 80403
and
Michael G. Figgs
LREP Inc.
P.O. Box 5
Allenspark, CO 80510

November 29, 2011

1.0 INTRODUCTION
1.1 Project Information

Olsson Associates (OA) has prepared a Wildlife and Biological Resources Evaluation for the proposed installation of the Pirtlaw 24-33 oil pad site east of Hayden, Routt County, Colorado, in mountain pastureland. The site is located in the SW ¼ Section 33, Township 7 North, Range 87 West, 6th Principal Meridian. The proposed oil pad site is approximately six miles west of Hayden, at an elevation of approximately 6,945 feet above mean sea level (msl). Access to the site is approximately 2.1 miles northwest along County Road 70 from Highway 70. The pad is accessed approximately 1.3 miles east on private access from County Road 70.

Information used in the preparation of this report was gathered by OA through existing data sources along with an onsite visit with the Colorado Division of Wildlife (CDOW) on September 9, 2011. Additionally, GIS GAP analysis information supplemented by additional GIS data sources were used as part of this review.

The purpose of the report was to review the wildlife and sensitive plant species that occupy, or may potentially occupy the project area at varying periods throughout the year, and to evaluate species that may potentially be impacted by project development. Factors considered include: 1) existing land management; 2) plants and wildlife with special designations by Federal and State agencies; 3) Colorado Oil and Gas Conservation Commission (COGCC) Sensitive Wildlife Habitat (SWH) and Restricted Surface Occupancy (RSO) and 4) existing vegetation communities. This report provides written documentation describing findings as well as recommended mitigation measures for potential development.

2.0 LANDSCAPE SETTING
2.1 Vegetation and Climate

The pad site and much of the access road are located in sagebrush shrubland that burned a few years ago. This area had also been brush-hogged before the fire and much of the sagebrush had been cleared. Vegetation occurs on a west-facing slope consisting of short vegetation dominated mostly by rabbitbrush (*Chrysothamnus* sp.), intermediate wheatgrass (*Thinopyrum intermedium*), and snowberry (*Symphoricarpos* sp.). Mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) is slowly recolonizing the area.

The climate near Hayden is considered semi-arid with a range of temperatures and precipitation. According to data collected by the Steamboat Springs weather station (057936), the average annual precipitation in the region averages 23.97 inches, and average daily temperatures range from a high of about 80 degrees F in the summer months to a low of about 4 degrees F during the winter months (Western Regional Climate Center 2011).

2.2 Soils

Mapped soil types published by the Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture (USDA), were reviewed to determine the soil types and natural vegetation characteristics of the project site and surrounding area (NRCS 2011).

The NCRS indicates that the soil type found at the project site is (10E) Bulkley Silty Clay 12 to 25 percent slopes. The NRCS provides the map unit description as:

The Bulkley Silty Clay makes up 100 percent of the map unit. Slopes are 12 to 25 percent. This component is on side slopes, base slopes, head slopes and nose slopes. The parent material consists of colluvium derived from sandstone and shale and/or slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is more than 80 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low to high. Depth to water table is more than 80 inches. This soil is not flooded. It is not ponded. Nonirrigated land capability classification is 6e. The ecological site is claypan (R034XY296CO). This soil does not meet hydric criteria.

2.3 Terrain

The project area lies along a west down-sloping mountain side dominated by rabbitbrush. The elevation at the proposed oil pad is approximately 6,945 feet above msl.

3.0 WILDLIFE AND PLANT EVALUATION

3.1 Evaluation Methods

A preliminary review of the project area was conducted as an aid to help determine the likelihood of the presence of wildlife and/or plant species that are threatened, endangered, or sensitive. Vegetation types were determined through GIS GAP analysis of vegetation communities and an onsite visit. Identification of sensitive wildlife species was aided by using Colorado Oil and Gas Conservation Commission (COGCC) shapefiles and data from the Natural Diversity Information Source (NDIS) by Colorado Division of Wildlife (Attachment A).

OA and representatives from CDOW conducted an onsite review of the area to identify and locate wildlife species, wildlife signs (tracks, fecal droppings, and vegetation disturbance), vegetative communities, and wildlife habitats. Photographs were taken during the onsite visit and data files were reviewed to describe the general project location, vegetation, terrain, and biological findings. Input on this document has also been received from Michael G. Figgs, LREP, Inc., who has completed the baseline ecological documentation for the six conservation easements on Wolf Mountain Ranch, including the Phase 2a conservation easement that includes the 24-33 pad site.

3.2 Background Information

Lists of Federally threatened, endangered, candidate, and proposed species (FWS 2010), and State of Colorado threatened, endangered, and special concern species (NDIS-CDOW 2011) were reviewed to determine which special status wildlife species could be present in the project area. Table 1 provides the United States Fish and Wildlife Service (FWS) list for threatened, endangered, candidate, and proposed species for Routt County.

Table 1
Federal Threatened, Endangered, Candidate, and Proposed Species Listed for Routt County, Colorado (FWS 2010)

Common Name	Scientific Name	Status	Impact Evaluation
Greater Sage Grouse	*Centrocercus urophasianus*	Candidate	D
Yellow-Billed Cuckoo	*Coccyzus americanus*	Candidate	A
Bonytail Chub	*Gila elegans*	Endangered	A
Colorado Pikeminnow	*Ptychocheilus lucius*	Endangered	A
Greenback Cutthroat Trout	*Oncorhynchus clarki ssp. stomias*	Threatened	A
Humpback Chub	*Gila cypha*	Endangered	A
Razorback Sucker	*Xyrauchen texanus*	Endangered	A
North American Wolverine	*Gulo gulo luscus*	Candidate	A

Impact Evaluation
A – Potential habitat is absent from the project area and/or it is out of the known range for the taxon and/or extirpated.
B – No wild population is known in Colorado.
C – The project is located within the range of the species, however due to conditions at the project site, the species would not occur in this location
D – Potential habitat is present, the species is known from the area, and there are no significant impacts and/or appropriate mitigation measures have been taken.

The NDIS was reviewed in reference to state-listed threatened, endangered, and species of special concern that were considered for the project area. Table 2 provides the listed state threatened and endangered species that are found in Routt County. Table 3 provides a list of state listed special status wildlife species that are found in Routt County.

Table 2 - State Listed Threatened or Endangered Species (DOW NDIS)

Common Name	Scientific Name	Status	Impact Evaluation
Boreal Toad	*Bufo boreas*	State Endangered	A
Canada Lynx	*Lynx canadensis*	State Endangered	A
Plains Sharp-tailed Grouse	*Tympanuchus phasianellus jamesii*	State Endangered	A
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	State Endangered	A
Whooping Crane	*Grus americana*	State Endangered	A
Wolverine	*Gulo gulo*	State Endangered	A
Bald Eagle	*Haliaeetus leucocephalus*	State Threatened	C
Northern River Otter	*Lutra canadensis*	State Threatened	A
Western Burrowing Owl	*Athene cunicularia*	State Threatened	A

Impact Evaluation
A – Potential habitat is absent from the project area and/or it is out of the known range for the taxon and/or extirpated.
B – No wild population is known in Colorado.
C – The project is located within the range of the species, however due to conditions at the project site, the species would not occur in this location.
D – Potential habitat is present, the species is known from the area, and there are no significant impacts and/or appropriate mitigation measures have been taken.

Table 3 –State Special Status Species potentially affected by the project (DOW NDIS)

Common Name	Scientific Name	Status	Impact Evaluation
Ferruginous Hawk	*Buteo regalis*	State Special Concern	C
Greater Sandhill Crane	*Grus canadensis tabida*	State Special Concern	A
Midget Faded Rattlesnake	*Crotalus viridis concolor*	State Special Concern	A
Northern Leopard Frog	*Rana pipiens*	State Special Concern	A
Northern Pocket Gopher	*Thomomys talpoides*	State Special Concern	C
Peregrine Falcon	*Falco peregrinus*	State Special Concern	C
Greater Sage Grouse	*Centrocercus urophasianus*	State Special Concern	D
Columbian Sharp-Tailed Grouse	*Tympanuchus phasianellus columbianus*	State Special Concern	D

Impact Evaluation

A – Potential habitat is absent from the project area and/or it is out of the known range for the taxon and/or extirpated.
B – No wild population is known in Colorado.
C – The project is located within the range of the species, however due to conditions at the project site, the species would not occur in this location.
D - Potential habitat is present, the species is known from the area, and there are no significant impacts and/or appropriate mitigation measures have been taken.

4.0 RESULTS OF EVALUATION

4.1 TESS Plant Species

A review of existing resources did not identify threatened, endangered, or sensitive species (TESS) near the area. The occurrence and distribution of TESS plants are strongly influenced by geologic formations and the resulting soil types present in an area. Individual plant populations are often scattered and are usually only comprised of a small number of individual plants. This is primarily a result of specific soil and moisture requirements of each species and the high variability in the distribution and surface exposure of the layers within the formation. The site is located on sagebrush pasture that was burned and brush-hogged in the recent past, and is currently managed for livestock production, therefore it is unlikely that TESS plants are present at the site.

4.2 Federally Threatened, Endangered, and Candidate Species

No Federally listed threatened, endangered, or candidate species were observed during the evaluation. According to NDIS data, the pad site is within the mapped winter range for the greater sage grouse (*Centrocercus urophasianus*; GRSG). No mapped greater sage grouse RSO or SWH occurs within the well pad site (COGCC 2011). Additionally, COGCC shows a GRSG production area mapped as SWH located about 0.6-mile to the northwest, and a historic lek site mapped as RSO located about 0.6 miles to the northwest (the actual historic lek site is located about 1.1 miles to the northwest). The access road runs through GRSG winter range, and skirts the edge of the mapped RSO.

4.3 State Listed Threatened, Endangered and Special Concern Wildlife Species

During the onsite evaluation, no State listed threatened, endangered, or special concern wildlife species were observed in the project area. According to COGCC and NDIS, no mapped bald eagle (*Haliaeetus leucocephalus*) nests occur within the well pad site. NDIS data shows two bald eagle nests mapped near the pad site, with one located about 1.7 miles to the southwest, and the other about 1.4 miles to the southwest. According to the COGCC, the pad site is about 1.7 miles northeast of a single bald eagle nest. A mapped bald eagle winter roost site is also located approximately 1.5 miles south of the pad site (NDIS and COGCC). Additionally, a golden eagle nest (*Aquila chrysaetos*) is mapped by COGCC as occurring 3.5 miles northeast of the pad site. Both species may utilize habitat within the pad area and along the access road, although the development area is not considered important habitat.

According to CDOW, the pad site is approximately 3.5 miles southwest of a peregrine falcon (*Falco peregrinus*) eyrie, and the Yampa River located approximately 1.25 miles southwest of the site could provide potential hunting habitat. The larger ponds on Wolf Mountain Ranch also provide potential hunting habitat. The eyrie was documented this past summer, and is not yet included in the COGCC database. This species may utilize habitat within the pad area and along the access road, although the development area is not considered important habitat.

According to NDIS data, the pad site is within the mapped winter range for the greater sage grouse. No mapped GRSG RSO or SWH occurs within the pad site. According to the COGCC, a GRSG production area mapped as SWH is located about 0.6 miles to the northwest, and a historic lek site mapped as RSO is located about 0.6 miles to the northwest (the actual lek site is about 1.1 miles to the northwest). The access road runs through GRSG winter range, and skirts the edge of mapped RSO.

According to NDIS data, the pad site is within the overall range for the Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*; CSTG). No mapped CSTG SWH or RSO occurs within the proposed well pad site or access road. Two CSTG production areas are located near the pad site, with one approximately 0.5 miles north of the pad site, and the other approximately 0.5 mile to the south. Two leks are associated with the CSTG production areas, with one lek located approximately 1.6 miles to the north, and the other lek approximately 1.8 miles to the south. A third production area is located to the east of the pad site, and is associated with a lek approximately 1.6 miles to the east. This lek site is located over the cliffs to the east, and down across the valley of Wolf Creek. The pad and access road should not impact this topographically isolated site.

4.4 Raptors

There are no active raptor nests documented in the vicinity of the pad site or near the access road leading to the site. Riparian habitat along the Yampa River east of the pad site has potential habitat to support raptors. A golden eagle nest and peregrine falcon eyrie are located about 3.5 miles northeast of the pad site. In addition, as stated above, two bald eagle nest sites are mapped near the pad site, both of which located approximately 1.4-mile 1.7-mile to the southwest. A bald eagle winter roost site is also located approximately 1.5 miles to the south (COGCC & NDIS). The cliffs of the Twentymile Sandstone Member of the Williams Fork Formation form prominent outcrops along the west side of Wolf Creek a little more than 0.5-mile to the east of the pad site, and could provide potential nesting habitat for peregrine falcons, prairie falcons, and golden eagles.

4.6 Terrestrial Species

4.6.1 American Elk and Mule Deer

Elk (*Cervus canadensis*) were observed near the pad site during the onsite visit.

Elk utilize the site for winter range and severe winter range in the project area. During the spring, elk follow the snow line to higher elevations. Elk rely primarily on available grasses for food. Areas of foothills grassland, mixed montane shrubland and scattered oakbrush provide necessary forage and production areas, as well as escape, thermal, and loafing cover for elk.

The project area is seasonally occupied by elk. The project area is within CDOW Game Management Unit (GMU) 131 and is mapped by the NDIS as an elk winter concentration area and severe elk winter range. Elk winter concentration areas are considered sensitive wildlife areas under Section 1200 of the COGCC Rules (COGCC 2009) and are defined as follows:

- "Winter Range" is defined as "that part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up."
- "Winter Concentration Area" is defined as "that part of the winter range where densities are at least 200% of the surrounding winter range density during the same period used to define winter range in 5 out of 10 winters."
- "Severe Winter Range" is defined as "that part of the winter range where 90% of the individuals are located when the annual snow-pack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten."

Mule deer (*Odocoileus hemionus*) are present on the project site on a year round basis. NDIS also maps the project area as summer range, the pad site and upper portion of the access road as winter range, and the lower portion of the access road as severe winter range.

- "Severe Winter Range" for mule deer is defined as "that part of the overall range where 90% of the individuals are located when the annual snow-pack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten."

The elements necessary to provide year-round habitat for these species (forage, water, and cover) are present in or near the project area.

4.6.2 Black Bear and Mountain Lion

No black bears (*Ursus americanus*) or mountain lions (*Puma concolor*) were observed during the onsite survey. Both species are known from Wolf Mountain Ranch and black bear are considered fairly common.

Mountain lions have large territories and are highly mobile as they search for food or new territories. Mountain lions typically follow migrating deer herds (their primary food source), preferring to hunt in rocky terrain near woodland habitats. Appropriate habitat conditions occur within or near the project area and mountain lions likely utilize the project area year-round.

Black bears are transient species in the project area due to the distribution of adequate food sources. Black bears are omnivorous and their diet depends largely on what foods are seasonally available, although their mainstay is vegetation. In spring, emerging grasses and succulent forbs are favored, whereas during summer and early fall, bears take advantage of a variety of berries and other fruits. In late fall, preferences are for berries and acorns, where available. When the opportunity is present, black bears eat a diversity of insects, including beetle larvae and social insects (ants, wasps, bees, termites, etc.), and they will prey upon a variety of mammals, including rodents, rabbits, and young or unwary ungulates. Black bear generally hibernate from mid-November through April or May depending on food availability and weather conditions.

4.6.3 Small Mammals

No small mammal species were observed during the onsite evaluation of the well pad site. Common small mammal species (small game, furbearers, non-game) that may be present include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), ground squirrel (*Spermophilus sp.*), cottontail (*Syvilagus sp.*), and least chipmunk (*Tamias minimus*).

4.6.4 Other Bird Species

The understory grasses within rabbitbrush and sagebrush next to the pad site could provide nesting and foraging habitat for various other migratory and non-migratory bird species, depending on the season.

4.6.5 Reptiles

No reptiles were documented during the onsite evaluation. The elevation of the well pad site is not optimal for reptile habitat occurring within the project area.

4.7 Aquatic Species

4.7.2 Fish

No fish were observed during the onsite evaluation. No water bodies are located within the vicinity of the Project.

4.7.2 Amphibians

No amphibians were observed during the onsite evaluation.

4.8 Waters of the United States

No jurisdictional Waters of the United States (WOUS) are located within the vicinity of the Project.

4.9. Noxious Weeds

Knapweed (*Centaurea sp.*) was observed along the access road leading the proposed well pad site. No other noxious weeds were observed in the vicinity of the Project.

5.0 AFFECTS TO TESS PLANT SPECIES

No TESS plants were observed during surveys, and there are no known populations of these plants nearby.

6.0 AFFECTS TO WILDLIFE

6.1 Wildlife Impact Assessment

The proposed project may affect winter wildlife habitat at the pad site. The primary potential impact to wildlife in the area will be due to increased human presence and noise in the area during construction, maintenance, and operation of the oil drilling site.

6.1.1 Terrestrial Species

6.1.1.1 Elk and Mule Deer

Additional human presence and activities during project development may create a disturbance for elk populations within and immediately adjacent to the project area. This disturbance may add stress to these species if operation occurs during the winter, and may cause avoidance of the area during construction.

6.1.1.2 Birds

Passerine Species: There is no expected impact to foraging and nesting habitat for passerine bird species based on COGCC mapping files.

Raptors: There are no active raptor nests documented within the vicinity of the Project, therefore there are no expected impacts to nesting raptors or raptor populations during project construction. The nearest mapped nest is a bald eagle nest located along the Yampa River approximately 1.4 miles southwest of the site. The golden eagle and peregrine falcon nest sites are about 3.5 miles to the northeast. All mapped nest sites are well beyond the recommended CDOW buffers, so there are no expected adverse impacts to these sites. The potential nesting habitat along the cliffs west of Wolf Creek, just over 0.5-mile to the east, is located outside the direct line-of-sight to the pad site. The recommended CDOW buffer will be met.

Grouse: The lower part of the access road skirts the southeast edge of the RSO buffer for the historic GRSG lek site. This lek is located approximately 0.1 miles east of County Road 70 on an adjacent ranch. The lower part of the access road that is on the edge of the RSO buffer uses existing ranch roads that already met oil field standards. No access road or pad construction activity will take place between March 15 and July 31. Accordingly, no significant impacts to the grouse lek or production area is expected.

The pad site and access road is located at least 0.5 miles outside of mapped RSO and SWA for the CSTG. Accordingly, no significant impacts to the mapped CSTG leks or production areas are expected.

Other Birds: Based on the location of the pad site next to the road, any expected impacts will likely be minimal, and compliance with the Migratory Bird Treaty Act (MBTA) will help to offset any potential impacts.

6.1.1.3 Black Bear and Mountain Lion

Due to the large home range of both black bear and mountain lion, and because of the extensive amount of available habitat for these species, no significant affects from this project are expected.

6.1.1.4 Small Mammals

The amount of available habitat for small mammals, including bats, should not be affected by the proposed project. Project development is not expected to affect small mammal populations.

6.1.1.5 Reptiles

Project development is not expected to affect reptile populations due to the available habitat surrounding the area of the pad site.

6.1.2 Aquatic Species

6.1.2.1 Fish

No impacts from the proposed project are expected due to the lack of existing water bodies with supporting habitat within the vicinity of the Project. However; appropriate application of storm water Best Management Practices (BMPs) and Spill Prevention Counter Control (SPCC) measures would virtually eliminate any potential impacts to fish and other aquatic species.

6.1.2.2 Amphibians

The amount of available habitat for amphibians will not be affected by the proposed project. Project development is not expected to affect amphibian populations. No impacts from the proposed project are expected and appropriate application of storm water Best Management Practices (BMPs) and Spill Prevention Control and Countermeasure (SPCC) measures would virtually eliminate any potential impacts to fish and other aquatic species.

7.0 MITIGATION RECOMMENDATIONS

The following recommendations for mitigation are presented for maintenance and improvement of wildlife habitat, quality, and prevention of human-caused impacts to resources.

7.1 Maintenance and Restoration of Habitat

Reclamation plans should target restoration of sagebrush shrubland with a diverse native grass and forb understory in support of GRSG and CSTG, which, according to CDOW, are the primary wildlife habitat conservation values of this area. OA recommendations include the preparation of a reclamation plan prior to construction, to salvage topsoil and prevent the spread of noxious weeds.

7.2 Planning for Sensitive Time Periods and Areas

7.2.1 Mule Deer and Elk

Disturbance associated with construction equipment and personnel may cause elk and mule deer to select habitats in more secluded areas away from the project area. Any construction and/or operational activities during the winter months may impact elk populations based on COGCC mapping and associated SWH regulatory guidance. According to the Colorado Oil and Gas Conservation Commission's amended rules, effective April 1, 2009, elk winter concentration areas and mule deer critical winter range are included in the rules as sensitive wildlife habitat (COGCC 2009).

Information obtained from the CDOW during the site visit indicates that the site is more heavily used in the spring beginning about March. Although mapping does not indicate this area as Elk production or an elk resident population inhabitant, CDOW site knowledge indicates otherwise. Based on the CDOW information, OA recommends development activities be completed by March 15th and that constant coordination with the CDOW is maintained to determine current use of the area by elk.

7.2.2 Migratory Birds

Flagging or some other form of bird-fight diverters should be applied to the support (guy) wires on the tower in order to prevent foraging birds from colliding with the wires.

In order to comply with the Migratory Bird Treaty Act (MBTA) by showing a good faith effort to reduce potential impacts on nesting birds, if any brush/tree clearing should become necessary, it should take place outside of the nesting seasons. Nesting season is generally considered between May 15 and July 31 in this area for most species. June 1 to July 15 is the peak period when most incubation and brood rearing takes place. If brush/tree clearing can occur prior to May 1, most affected birds will relocate to alternate nesting sites. After mid-to late-July, most fledging has occurred and brush/tree clearing impacts would be minimized.

7.2.3 Raptors and Grouse

All raptor nests documented within the vicinity of the Project are well beyond the recommended CDOW buffers, therefore no raptor nesting areas are expected to be disturbed. The Bald and Golden Eagle Protection Act (BGEPA) provides federal protection for both eagle species and project efforts will need to comply with the BGEPA.

The pad site is about 1.6 miles northwest of a historic GRSG lek, and about 1.8 miles north of a CSTG lek, and about 1.6 miles south of another CSTG lek (COGCC & NDIS). Mitigation measures taken to date and/or recommended are: 1) compliance with the RSO zones around known lek sites; 2), compliance with seasonal restrictions on construction activity from March 15 through July 31; 3) compliance with CDOW BMPs; 4) reduction of impacts to undocumented, but potential, lek sites and production areas through avoidance of well developed stands of sagebrush and avoidance of knolls, ridge lines and benches that could harbor lek sites; and 5) location of the pad and much of the access road in altered, open habitat where the sagebrush had been previously brush-hogged and/or burned.

7.2.4 Black Bears

Black bears will likely move through the general project area and could be attracted to human related food sources. In order to prevent human injury and/or the unwanted removal, injury, or destruction of bears, it is recommended that food/garbage storage and removal be done in a timely and secure manner so as to not habituate bears to human activities.

7.3 Other Mitigation Practices

7.3.1 Erosion

Efforts to control soil erosion within the project area should be implemented. Disturbed soils within the project area are susceptible to erosion and downstream water quality could be negatively affected by increased soil erosion. In addition to storm water management around the project site, other current factors (noxious weeds, livestock grazing, other oil & gas development) affecting soil erosion should be managed and remedial measures implemented.

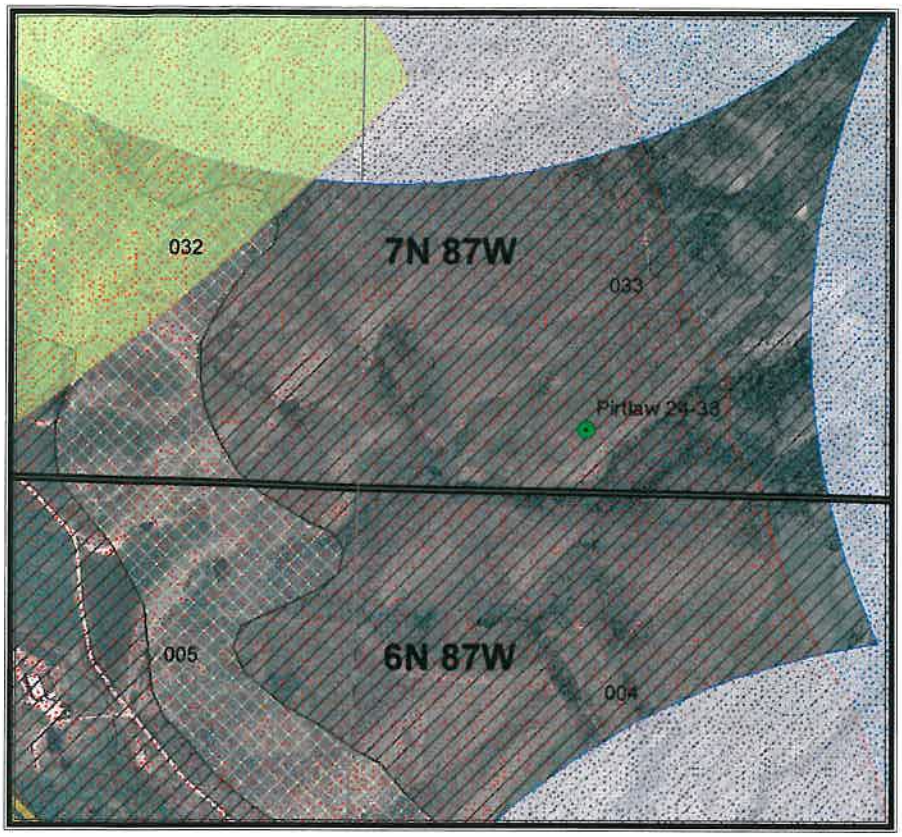
7.3.2 Weeds

Vegetation removal and soil disturbance during construction can create optimal conditions for the establishment of invasive, non-native species. Construction equipment traveling from weed-infested areas into weed-free areas could disperse noxious or invasive weed seeds and propagates, resulting in the establishment of these weeds in previously weed-free areas.

Several simple practices should be employed to prevent most weed infestations. The following practices should be adopted for any activity to reduce the costs of noxious weed control through prevention. The practices include:

- Prior to delivery to the site, equipment should be thoroughly cleaned of soils remaining from previous construction sites which may be contaminated with noxious weeds.
- If working in sites with weed-seed contaminated soil, equipment should be cleaned of potentially seed-bearing soils and vegetative debris at the infested area prior to moving to uncontaminated terrain.
- All maintenance vehicles should be regularly cleaned of soil.
- Avoid driving vehicles through areas where weed infestations exist.

ATTACHMENT A



(SWH)
Sensitive Wildlife Habitat

- Quicksilver Drill Locations
- Gr. Sage Grouse Production
- Columbian Sharp Tailed Grouse Production Areas
- Gunn. Sage Grouse Production Areas
- Lesser Prairie Chicken Production Areas
- Plains Sharp Tailed Grouse Production Areas
- Bald Eagle Active Nest Sites
- Bald Eagle Winter Night Roost Sites
- Golden Eagle Active Nest Sites
- BF Ferrets Release Sites
- ElkSevereWinterRange (09012010)
- Elk_WinterConcentrationArea (101708)
- MuleDeer_CriticalWinterRange (101708)

N

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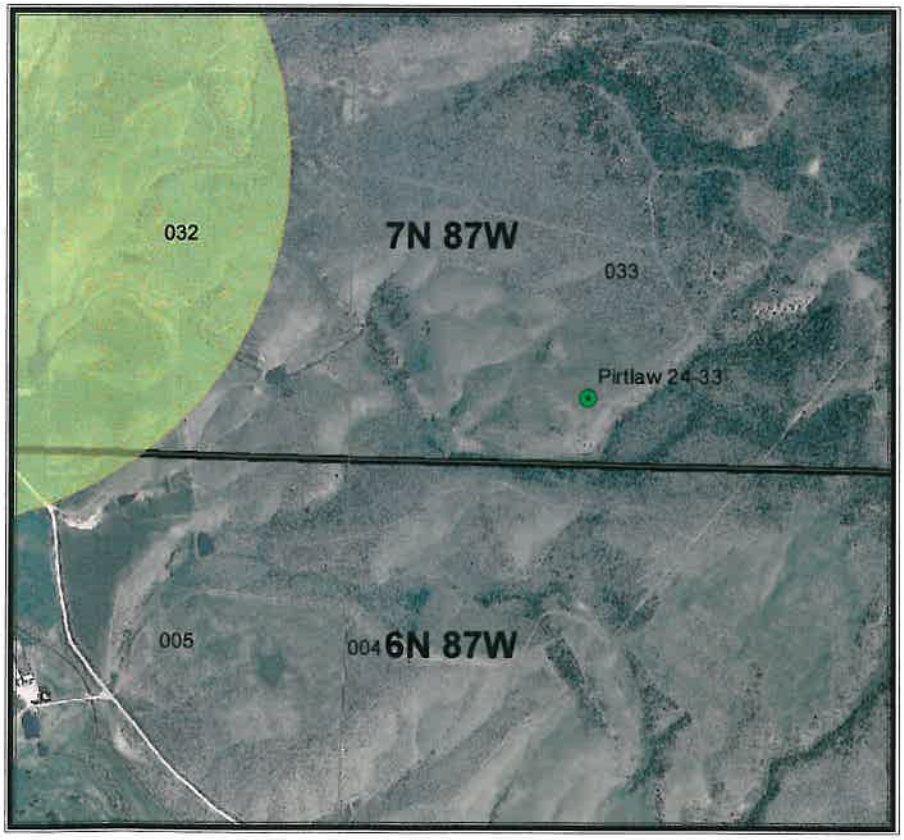
Miles



(RSO)
Restricted Surface Occupancy

- Quicksilver Drill Locations
- Gr. Sage Grouse Lek Sites
- Columbian Sharp Tailed Grouse Lek Sites
- Gunn Sage Grouse Lek Sites
- Lesser P. Chicken_Lek Sites
- Plains Sharp Tailed Grouse Lek Sites
- Bald Eagle Active Nest Sites
- Golden Eagle Active Nest Sites
- Ferruginous Hawk Active Nest Sites
- Peregrine Falcon Active Nest Sites
- N. Goshawk Active Nest Sites
- Prairie Falcon Active Nests
- Osprey Active Nest Sites
- Aquatic Designated Cutthroat Trout Habitat
- Aquatic Gold Medal Waters
- Bighorn Sheep Production Area

N

0.25 0.125 0 0.25

Miles

*Note: This figure is associated with a spreadsheet to assist with the identification of parcel stipulations and it is not a standalone figure. Elk, mule deer, and pronghorn sensitive wildlife habitat is excluded. Data was acquired through the COGCC (Dec. 2010) using shapefiles with designation having 101708.

PROJECT: Quicksilver Resources	Pirtlaw 24-33 Township 6 North - Range 87 West Quicksilver Resources Routt County	OLSSON ASSOCIATES 1111 Lincoln Mall Suite 111 P.O. Box 84606 Lincoln, NE 68501-4606 TEL 402.474.6311 FAX 402.474.5160 www.olssonassociates.com	FIGURE 1
DRAWN BY: HD			
DATE: 11/29/2011			

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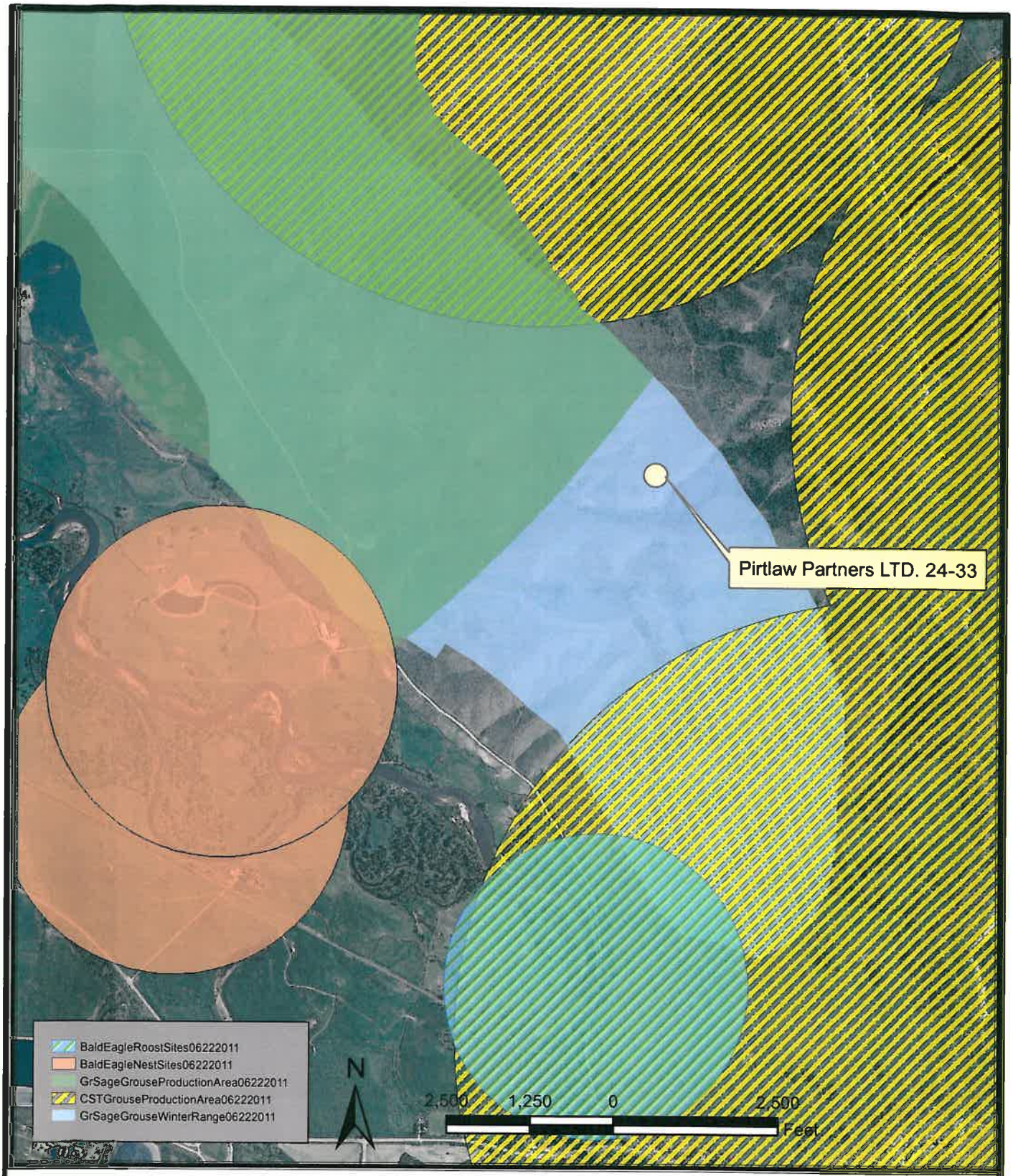


*Note: Data was acquired through the NDIS 2011.

PROJECT: Quicksilver Resources	Pirtlaw Partners 24-33 Township 7 North - Range 87 West Quicksilver Resources Routt County	OLSSON ASSOCIATES 1111 Lincoln Mall Suite 111 P.O. Box 84608 Lincoln, NE 68501-4608 TEL 402 474 6311 FAX 402 474 5160 www.olssonassoc.com	FIGURE 2
DRAWN BY: HD			
DATE: 11/29/2011			

APPENDIX F. DRILLING PLAN

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

DRILLING PLAN

Quicksilver Resources Inc. – Pirtlaw Partners Ltd. 24-33
Location- SE ¼ SW ½
Routt County, Colorado

Quicksilver Resources Inc. presents the following Drilling Plan for the Pirtlaw Partners Ltd. 24-33 well located 648 FNL, 654 FWL in Section 33, T7N, R87W, 6th P.M. Routt County, Colorado. The proposed well will be drilled to a TD of approximately 7800 ft.

In accordance with the requirements of Onshore Oil and Gas Order Number 1 (43 CFR 3162.3), the following detailed drilling plan is provided.

Geologic Prognosis

Prognosis Formation Tops	Graded GL: 6960 est	KB: 16 ft
Tops	**MD (ft)**	**TVD (ft)**
Mancos	3500	3500
Niobrara	6400	6400
Buck Peak	6425	6425
Tow Creek	6775	6775
Wolf Mountain	7085	7085
Carlile	7650	7650
TD	7800	7800

Estimated Depths and Names of Anticipated Oil and Gas Bearing Formations

Substance	Formation	Depth
Gas/coal	Mesaverde	0-3500
Oil/gas	Niobrara	6425-7665

Well Control Equipment

Quicksilver's minimum specifications for pressure control are as follows:

Depth Range	Well Control Equipment
0-1200' (surface interval)	
1200' – TD	11", 5000 psi ram type preventers with one set of blind rams, one set of pipe rams and a 5000 psi annular type preventer with choke manifold and rotating head
No abnormal temperatures or H_2S gas are anticipated. No over-pressured intervals are expected. Anticipated bottom hole pressure = 3400 psi	

Quicksilver will comply with all requirements pertaining to well control as listed in Onshore Oil and Gas Order No. 2 as well as Colorado Oil and Gas Conservation Commission Rules and Regulations. See Attachment 1 for a diagram of the blowout preventer and choke manifold.

Casing Program

CSG Type	CSG Size	Hole Size	WT/FT	Grade	Connection	CSG/LIN Top	Setting Depth
Conductor	16”	20”	--	--	--	--	40’
Surface String	9 5/8”	12 ¼”	36	j-55	Ltc	0	1200
1st String	7”	8 ¾”	26	n-80	ltc	0	6400
2nd String	4.5”	6 1/8”	13.5	l-80	Ltc	0	7800

9 5/8”, 36#, J55, LTC	Collapse	Burst	Tensile	ID	Make-Up Torque
100%	2020 psi	3520 psi	564,000 lb	8.921” 8.765” drift	Min – 3400 Opt – 4530 Max - 5660
80%	1616 psi	2816 psi	451,200 lb		

7”, 26#, N80, LTC	Collapse	Burst	Tensile	ID	Make-Up Torque
100%	5410 psi	7240 psi	604,000 lb	6.276” 6.151” drift	Min – 3890 Opt – 5190 Max - 6490
80%	4328 psi	5792 psi	483,200 lb		

4.5”, 13.5#, L80, LTC	Collapse	Burst	Tensile	ID	Make-Up Torque
100%	8540 psi	9020 psi	307,000 lb	3.920” 3.795” drift	Min – 2030 Opt – 2710 Max - 3390
80%	6832 psi	7216 psi	245,600 lb		

Cementing Program

Casing String:	**9 5/8 “, 36#, J55 Surface Casing**	
Slurry Design Basis:	100% excess top of cement is surface	
Fluids Sequence/Volume:	Spacer	20 bbl mudflush
	Lead Slurry	200 sks top of lead is surface 12.3lb.gal 2.24 yield
	Tail Slurry	195 sks top of tail is 500 feet 13.5lb.gal 1.72 yield
	Top Out if Required	150 sks 15.6 lb/gal 2.24 yield

Casing String:	**7 “, 26#, N80 Production Casing**	
Slurry Design Basis:	15% excess top of cement is surface	
Fluids Sequence/Volume:		
	Spacer	20 bbl tuned spacer
	Stage 1 Tail Slurry	465 sks top of lead is surface 12.2lb/gal 2.24 yield

	Stage 1 Tail Slurry	75 sks top of tail is 5900 feet, 14.2lb/gal 1.29 yield
	Displacement	Water displacement

Casing String:	**4 1/2 “, 13.5#, L80 Production Casing**	
Slurry Design Basis:	20% excess top of cement is 5400 feet (1000 feet inside intermediate casing)	
Fluids Sequence/Volume:	Spacer	20 bbls tuned spacer
	Tail Slurry	160 sks 13.5lb/gal 1.73 yield
	Displacement	Kcl water base displacement

Mud Program

Interval	Mud Description	Weight	Viscosity	Wtr Loss
Surface to 1200’	Freshwater, Gel	8.34	NC	NC
1200’ to TD’	Invert mud system	7.6-9.5	30	

Logging Program

Type Log Suite	Interval Top	Interval Bottom
Quad Combo	Base of Surface Casing	Intermediate TD
Quad Combo/OBMI	Base of Intermediate Casing	Production Hole TD

Directional Drilling Program

The proposed well is an exploratory well. Quicksilver is proposing vertical drilling.

Water Source

The freshwater required for the drilling operation (est. 500 barrels) will be stored in tanks from the Yampa River**.** Quicksilver’s designated contractor has obtained all necessary rights and permissions to procure the water.

Method of Hauling And Handling Water

All of the fluids generated as part of the drilling and completion operation will be contained in tanks as part of a closed loop system. Drill cuttings and drilling fluids will be contained in this system during drilling operations. At completion of drilling operations, some cuttings from the initial phase of drilling will be contained in a cuttings pit for burial or other appropriate disposal. Steel tanks will be used for storage of produced fluids from producing operations. Produced water will be hauled by truck to a commercial disposal facility if appropriate.

Sanitation Facilities

During all operations, portable, self-contained, chemical toilets will be provided for human waste disposal. The toilet holding tanks will be pumped weekly and the contents will be disposed in an approved sewage disposal facility. Disposal will be carried out in compliance with applicable State and local laws and regulations pertaining to disposal of human wastes.

Waste Disposal Plan

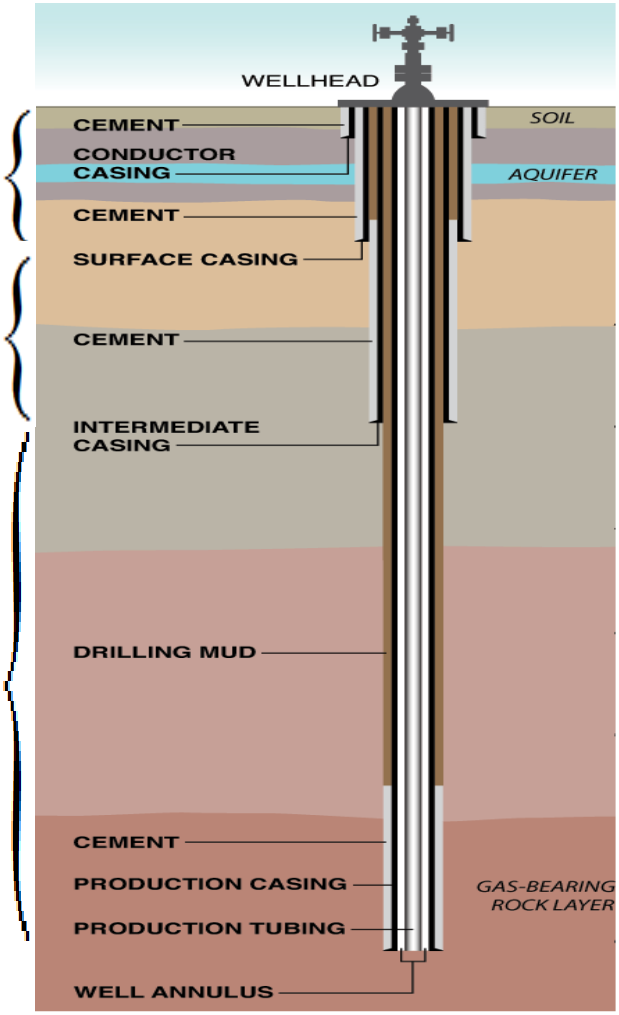
All garbage and non-flammable solid waste material will be contained in a portable dumpster or trash cage. The dumpster will be emptied, as needed, by hauling the accumulated trash to an approved solid waste disposal site. No trash will be placed in the any pit. Immediately after removal of the drilling rig, the location will be cleaned of any remaining debris and trash. This trash will be contained in a portable dumpster or trash cage and transported to an approved solid waste disposal site. No potentially adverse materials will be left on the location.

Casing Information

Surface Casing
Setting Depth: 0’ - 1200’

Intermediate Casing
Setting Depth: 0’ – 6400’

Production Casing
Setting Depth: 0’ - 7800’



APPENDIX G. TRAFFIC STUDY

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

Pirtlaw Partners Ltd. 24-33 Traffic Study
February 16, 2012

Introduction

The following traffic analysis summarizes traffic impacts associated with the Pirtlaw Partners Ltd. 24-33 pad site. The proposed drill site will be utilized by Quicksilver Resources Inc. (Quicksilver) for oil exploration and production. The proposed Pirtlaw Partners Ltd. 24-33 pad site will be located in Section 33, Township 7 North, Range 87 West of the 6th Prime Meridian. The pad site will be located approximately 6 miles northeast from the Town of Hayden.

Existing Traffic Network

The pad site will be accessed from U.S. Highway 40 heading north along County Road (CR) 70 to a private access road, which is primarily utilized for agricultural operations. An access road will be constructed to connect the site to the private roadway (see Figure 8 for further details). Adequate sight distance exists at the intersection of U.S. 40 and CR 70 and the private access road and CR 70 to accommodate the largest turning vehicles. Flaggers will be utilized along roadways during the transportation of overweight vehicles. Quicksilver will work with the Colorado Department of Transportation (CDOT), Routt County and property owners to mitigate traffic impacts in the surrounding area.

Traffic Phasing

The proposed activity will operator in the following phases:

Site Preparation and Construction – approx. 1-2 weeks
Rig Mobilization and De-Mobilization – approx. 2-4 days
Drilling (per well) – approx. 10-15 days
Well Completion and Fracing (per well) – approx. 1-2 weeks
Production – approx. 15-20 years
Final Reclamation – approx. 3-5 days

Based upon the anticipated arrival and departure times of the site's traffic, the operator's peak trip generation hour is expected to occur between 7:00-8:00 in the morning and 5:00-6:00 in the evening during normal operations.

Traffic Generation and Distribution

Trip generation is generally determined using rates found in the ITE *Trip Generation* manual. Rates from this publication are applied to values related to the size of the proposed site to estimate the trips expected to enter and exit the site. In this case, no rates are provided for facilities similar to this use. To estimate trips expected for this site, information was gathered regarding the expected traffic based on previous projects similar to this one. The following table summarizes the expected average and maximum trips for each phase.

Table 1: Trip Generation – Pirtlaw Partners Ltd. 24-33

QUICKSILVER RESOURCES INC. OIL WELL TRAFFIC SUMMARY TABLE APPROXIMATE VEHICLE TRAFFIC			
Phases	**Equipment Types**	**Timeline of Activity (Approx)**	**Total Vehicle Trips In & Out (Approx)**
#1. Lease Road & Pad Site Construction – Phase 1	Two Dozers, Trackhoe, Motor Grader, Light Duty Crew Pick-up Truck, Fuel/Service Truck (2 Ton), Dump Truck, Flatbed Tractor Trailer	**6 Days**	**18**
#1. Lease Road & Pad Site Construction – Phase 2	Dozers, Trackhoes, Motor Grader, Scraper, Light Duty Crew Pick-up Truck, Fuel/Service Truck (2 Ton), Dump Truck, Flatbed Tractor Trailer	**7 Days**	**70**
#2. Drilling – Phase 1	Tractor trailer trucks bringing in rig components, casing, cementing and service vehicles	**9 Days**	**30**
#2. Drilling – Phase 2	Tractor trailer trucks bringing in rig components		**200**
Service trucks to supply the drilling rig during operations.	Service vehicles include: Fuel trucks, trucks for frac fluid loading, drill pipe, crew trucks (pick-up type), cement trucks, dump trucks	**15 Days**	**168**
#3. Completions (Fracing)	Completions rig tractor trailer, Trailer mounted tanks, Fluid tanker trucks, Sand trucks, Control and data trucks, Workover rig tractor trailer	**19 Days**	**350**
#4. Setting of Surface Equipment	Tractor trailer trucks for oil and water tanks, Crane, Forklift, Backhoe, Light duty Pick-up trucks, Crew Work Trucks (1 Ton), Welding Trucks (2 Ton), Tractor Trailer flatbed pipe trucks	**10 Days**	**184**
#5. Production	Frac Fluid Hauler 18 Wheeler, Production Oil Hauler 18 Wheeler, Light Duty Pick-up	**7 Days**	**42**
	Total Activity (Approx)	**73 Days**	**1062 Trips**

Approximately 95% of traffic generated from the proposed activity will travel through Craig heading west along U.S. 40. The following trucks are typically utilized during drilling exploration and production: drill/workover rigs, light (pick-up) trucks, heavy trucks, trucks for frac fluid loading, and winch trucks. There may be 1-2 pickup trucks per week heading through Steamboat Springs along U.S. 40.

Traffic Projections

The Routt County Zoning Regulations and Master Plan anticipates that the surrounding area will consist of 35+ acre density in the future. Traffic volumes in the future will not significantly differ from the existing trip levels due to the anticipated low density. The additional trips generated from the proposed well site will increase traffic during the construction, drilling, and completion phases (approximately 2 months), but during the production phase (35 years), traffic will not substantially impact the existing roadways, generating approximately 2-4 trucks per day. Quicksilver will work with the County and surrounding property owners to mitigate the temporary increase in truck traffic.

Auxiliary Lane Analysis

As defined by the Colorado State Access Code, U.S 40 is classified as a Rural Highway (R-A). R-A Auxiliary lanes are required for left turns greater than 10 vehicles per hour (vph) and right turns greater than 25 vph in the peak hour. The peak hour will generate a maximum of 5-6 trucks. The proposed traffic does not meet the threshold for auxiliary turn lanes due to the low traffic volumes in the peak hour.

Dust and Noise Mitigation

The operator will work with the surrounding property owners to mitigate dust and noise generated from the anticipated traffic. Magnesium chloride will be utilized to control dust. The operator will work with CDOT, Routt County and surrounding property owners to mitigate truck traffic during operational hours and to utilize flaggers and traffic control during construction and overweight vehicle traffic.

Recommendations

Based on the expected trip generation rates discussed above, the increase in average daily traffic is not expected to be significant. The additional traffic from the proposed activity will not significantly increase the existing high levels of traffic along U.S. 40. Quicksilver is currently working with Routt County Road and Bridge to assess the impacts along CR 70. Based on the results of the analysis, Quicksilver will work with CDOT, Routt County Road and Bridge, and surrounding property owners to mitigate potential dust and noise associated with the Pirtlaw Partners Ltd. 24-33 pad site. All applicable hauling permits will be obtained before the commencement of construction. No roadway improvements or turn lanes are anticipated to be required to support this project.

Attachment A: Application Form

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

Routt County
Planning Department
P.O. Box 773749
Steamboat Springs, CO 80477
(970) 879-2704
fax (970) 879-3992

OIL, GAS, and COAL BED METHANE WELLS
Exploration and Production

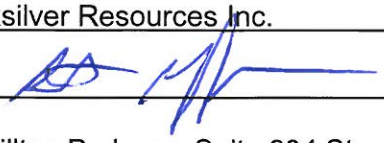
APPLICATION FORM

ACTIVITY # _____

PARCEL # 944061001

Petition: Pirtlaw Partners 24-33 Special Use Permit

Applicant's Name: Quicksilver Resources Inc.

Signature of Petitioner: 

Mailing Address: 1169 Hilltop Parkway, Suite 204 Steamboat Springs, CO 80407

Telephone: 970-817-6761 FAX: 970-879-5771

Petitioner's Email Address: jclifford@qrinc.com

Representative: Olsson Associates

Address: 826 21 ½ Rd. Grand Junction, CO 81505

Telephone: 970-263-7800 FAX: 970-263-7456

Representative's Email Address: ggriffin@oaconsulting.com

Type of Operation: Oil Exploration and Production Special Use Permit

General Location: Section 33, Township 7 North, Range 87 West of the 6th Prime Meridian; approximately 5.9 miles east from Hayden Colorado.

Acreage: Approximately 120 Acres

Address: 77019 CR 70, Hayden, CO

Legal Description: SE 1/4SW1/4, S1/2SE1/4 of Section 33, Township 7 North, Range 87 West, 6th P.M.

Primary Staff Contact: Judith R. Clifford, Quicksilver Resources Inc.
Grant C. Griffin, Olsson Associates

Attachment B: Traffic Assessment

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

QUICKSILVER RESOURCES INC.
Routt County Road & Bridge Traffic Permit Application
Pirtlaw Partners Ltd. 24-33 Drilling - Phase 1

VERTICAL WELL - Lease Road and Well Pad Construction

	Mobilize Heavy Equipment In/Out:					Avg. Days =	DAY 1		DAY 2		DAY 3		DAY 4		DAY 5		DAY 6	
DAY #:	ITEM:	VEHICLE TYPE:	AXLE:	LOAD WEIGHT:	TARE WEIGHT:	# OF TRIPS =	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
# 1.	Mobilize 2 Dozers- IN	Tractor & Trailer	5	75,000	26,800	Total Loads (2)	2	2										
# 2.	Mobilize 1 Trac-Hoe- IN	Tractor & Trailer	5	67,000	26,800	Total Loads (1)			1	1								
# 2.	Mobilize 1 Motor Grader - IN	Tractor & Trailer	5	48,000	26,800	Total Loads (1)			1	1								
# 3.	No Truck Traffic										0	0						
# 4.	Deliver Culverts	Tractor & Trailer	5	34,000	26,800	Total Trips (1)							1	1				
# 5.	De - Mobilize 2 Dozers- OUT	Tractor & Trailer	5	75,000	26,800	Total Loads (2)									2	2		
# 6.	De - Mobilize 1 Trac-Hoe- OUT	Tractor & Trailer	5	67,000	26,800	Total Loads (1)											1	1
# 6.	De - Mobilize 1 Motor Grader - OUT	Tractor & Trailer	5	48,000	26,800	Total Loads (1)											1	1
Total Lease Road & Pad Period Loads IN =	9					Total IN P/Day =	2		2		0		1		2		2	
Total Lease Road & Pad Period Loads OUT =	9					Total OUT P/Day =		2		2		0		1		2		2
Combined Total Loads IN & OUT =	18					TOTAL PER DAY =	4		4		0		2		4		4	
Note: No Heavy Load Permits Required only Wide Loads may be needed						Cumulative Totals =	4		8		8		10		**14**		**18**	
Note: Loads OUT typically "empty".						DAY =	**DAY 1**		**DAY 2**		**DAY 3**		**DAY 4**		**DAY 5**		**DAY 6**	

QUICKSILVER RESOURCES INC.
Routt County Road & Bridge Traffic Permit Application
Pirtlaw Partners Ltd. 24-33 Drilling - Phase 2

VERTICAL WELL - Drilling

DAY #:	ITEM:	VEHICLE TYPE:	AXLE:	LOAD WEIGHT:	TARE WEIGHT:	Avg. Days to Drill = / # OF ROUND TRIPS =	DAY 1		DAY 2		DAY 3		DAY 4		DAY 5		DAY 6		DAY 7		DAY 8		DAY 9	
							IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
# 1.	DRILLING RIG MOBE-IN	Tractor & Trailer	5	80,000	26,800	Total Loads (2)	2	1																
# 2.	DRILLING RIG MOBE-IN	Tractor & Trailer	5	80,000	26,800	Total Loads (2)			2	1														
# 3.	DRILLING RIG MOBE-IN	Tractor & Trailer	5	80,000	26,800	Total Loads (2)					2	1												
# 4.	CASING	Tractor & Trailer	5	80,000	26,800	Total Loads (2)							2	2										
# 5.	CEMENTERS	Tractor & Trailer	5	80,000	26,800	Total Loads (2)									2	2								
# 6.	CEMENTERS	Tractor & Trailer	5	80,000	26,800	Total Loads (2)											2	2						
# 7.	DRILLING RIG DEMOB-OUT	Tractor & Trailer	5	80,000	26,800	Total Loads (2)													1	2				
# 8.	DRILLING RIG DEMOB-OUT	Tractor & Trailer	5	80,000	26,800	Total Loads (2)															1	2		
# 9.	DRILLING RIG DEMOB-OUT	Tractor & Trailer	5	80,000	26,800	Total Loads (2)																	1	2
Total Drilling Period Loads IN =	15					Total IN P/Day =	2		2		2		2		2		2		1		1		1	
Total Drilling Period Loads OUT =	15					Total OUT P/Day =		1		1		1		2		2		2		2		2		2
Combined Total Loads IN & OUT =	30					TOTAL PER DAY =	3		3		3		4		4		4		3		3		3	
						Cumulative Totals =	3		6		9		13		17		21		24		27		30	
NOTE; Total loads calculated based on one way.						**DAY =**	**DAY 1**		**DAY 2**		**DAY 3**		**DAY 4**		**DAY 5**		**DAY 6**		**DAY 7**		**DAY 8**		**DAY 9**	

Attachment C: Vicinity Map and Maintenance Classification

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

QUICKSILVER RESOURCES, INC.

PIRTLAW PARTNERS, LTD. #24-33
SECTION 33, T7N R87W, 6th P.M.,
ROUTT COUNTY, COLORADO

PROCEED EASTERLY FROM HAYDEN, COLORADO 5.9 MILES ALONG US HIGHWAY 40 TO THE INTERSECTION WITH ROUTT COUNTY ROAD #70 (IMMEDIATELY AFTER CROSSING UNION PACIFIC RAILROAD), TURN LEFT OR NORTHWESTERLY AND PROCEED 2.1 MILES ALONG COUNTY ROAD #70 TO AN EXISTING SET OF CORRALS AND A PRIVATE GRAVEL DRIVE TO THE RIGHT, PROCEED 0.3 MILES ALONG THE PRIVATE DRIVE; TURN RIGHT AND FOLLOW THE FLAGGED ROUTE 1.0 MILES TO THE PROPOSED LOCATION.

TOTAL DISTANCE HAYDEN, COLORADO TO THE PROPOSED WELL LOCATION IS APPROXIMATELY 9.3 MILES.

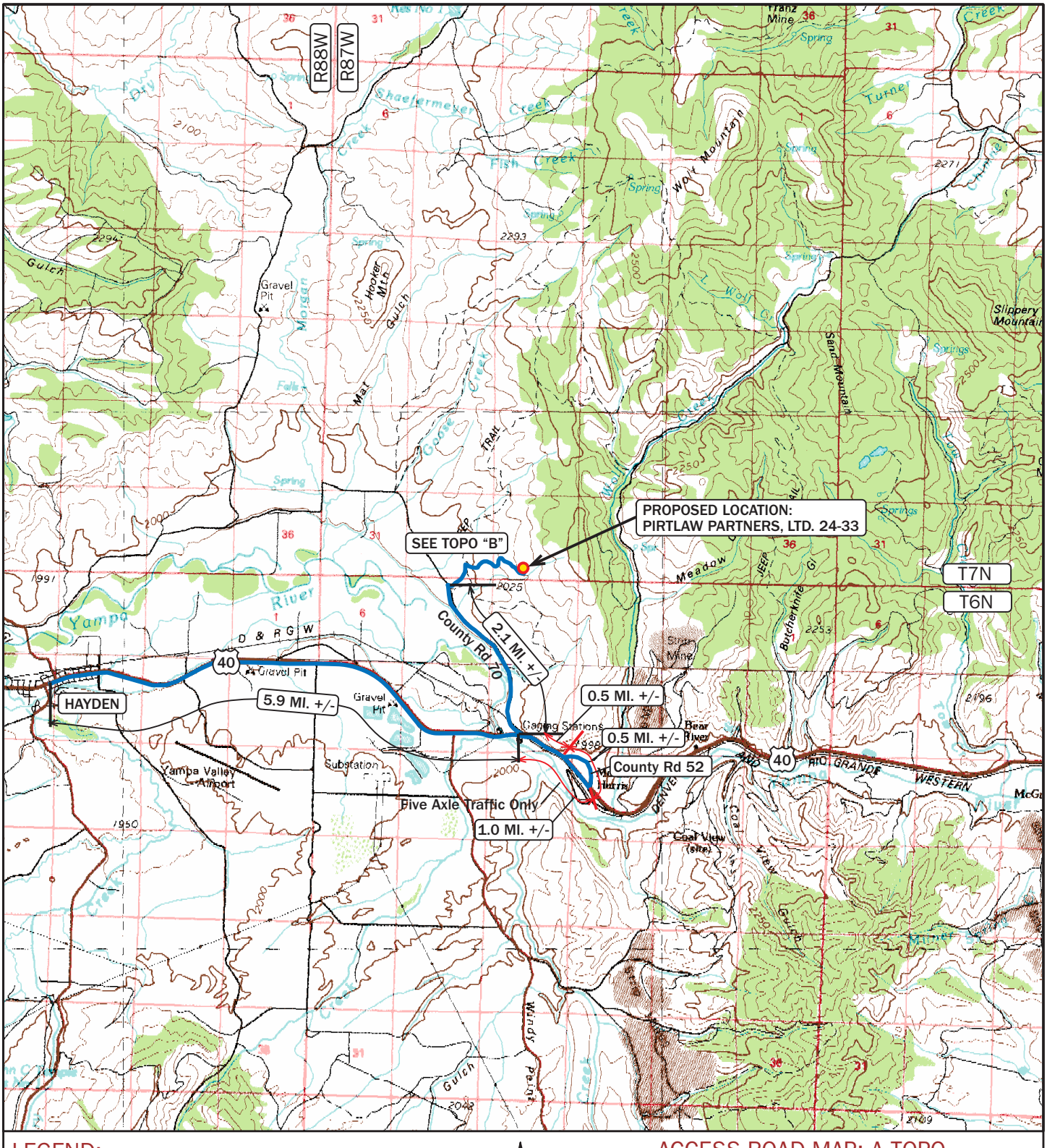
QUICKSILVER RESOURCES INC.

Five Axle Traffic Only

PIRTLAW PARTNERS, LTD. #24-33
SECTION 33, T7N R87W, 6TH P.M.,
ROUTT COUNTY, COLORADO

PROCEED EASTERLY FROM HAYDEN, COLORADO 6.9 MILES ALONG US HIGHWAY 40 TO THE INTERSECTION WITH ROUTT COUNTY ROAD #52, TURN LEFT OR NORTH AND PROCEED 0.5 MILES TO THE INTERSECTION OF US HIGHWAY 40 TURN RIGHT OR PROCEED WEST TOWARD HAYDEN .5 MILES TO ROUTT COUNTY ROAD #70 TURN RIGHT OR NORTHWESTERLY AND PROCEED 2.1 MILES ALONG COUNTY ROAD #70 TO AN EXISTING SET OF CORRALS AND A PRIVATE GRAVEL DRIVE TO THE RIGHT, PROCEED 0.3 MILES ALONGTHE PRIVATE DRIVE; TURN RIGHT AND FOLLOW THE FLAGGED ROUTE 1.0 MILES TO THE PROPOSED LOCATION.

TOTAL DISTANCE HAYDEN, COLORADO TO THE PROPOSED WELL LOCATION IS APPROXIMATELY 11.3 MILES.



LEGEND:

- Proposed Location

ACCESS ROAD MAP: A TOPO

N

0 1 2 MI

Quicksilver Resources, Inc.

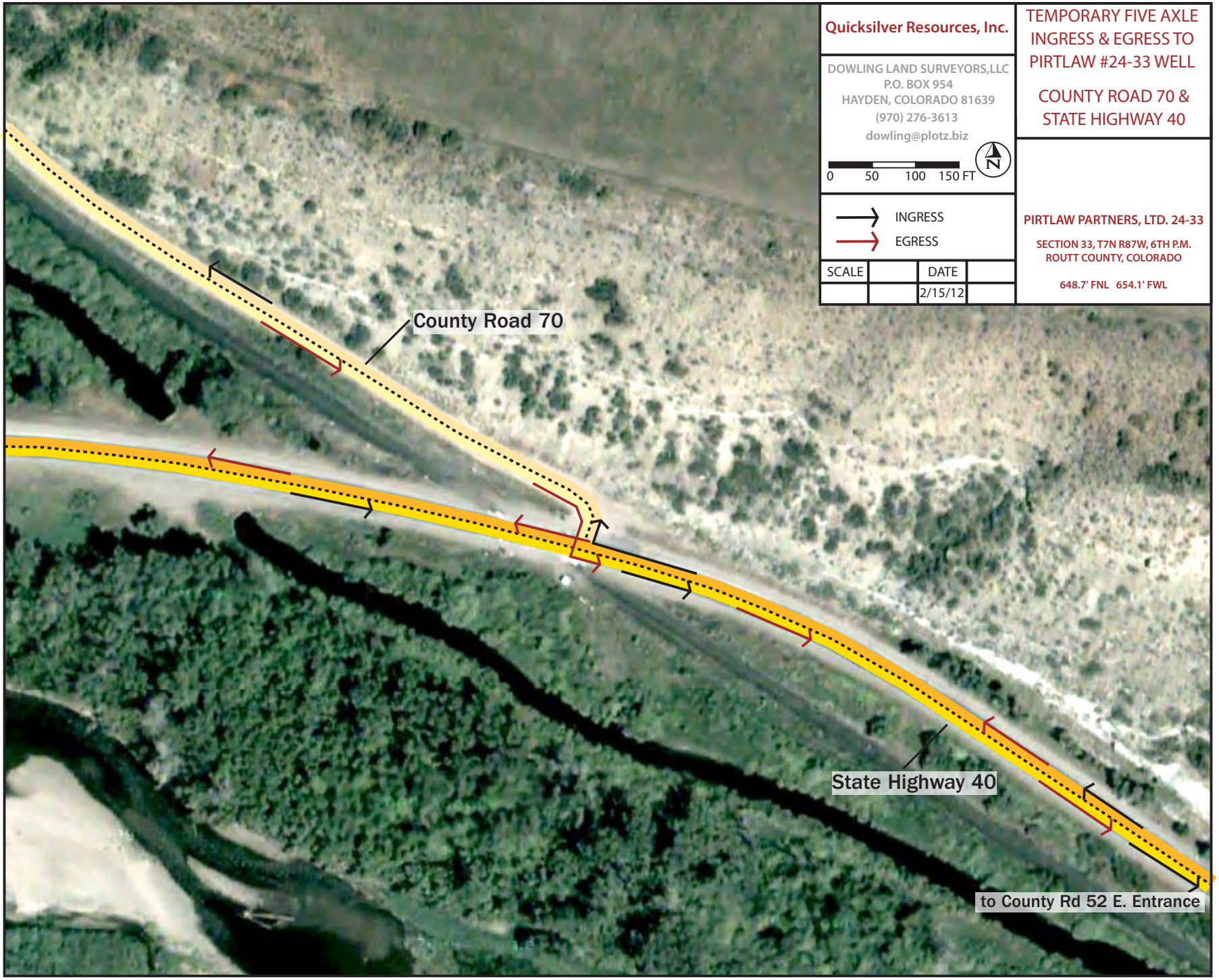
PIRTLAW PARTNERS, LTD. 24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

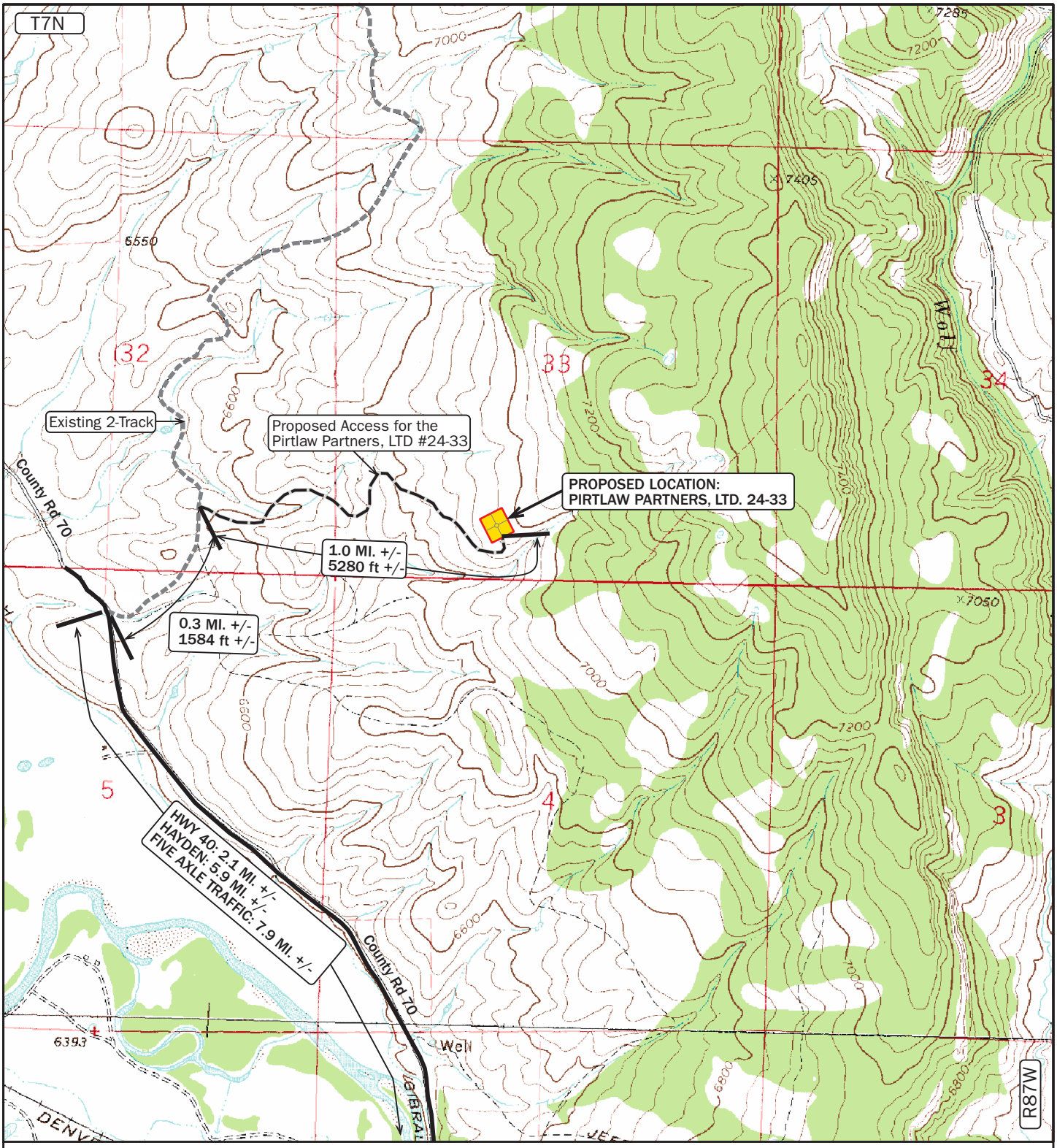
648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		02/16/12		FH11PG12

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz


Quicksilver Resources, Inc.
DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz
0 50 100 150 FT
N
INGRESS
EGRESS
SCALE
DATE
2/15/12
TEMPORARY FIVE AXLE INGRESS & EGRESS TO PIRTLAW #24-33 WELL
COUNTY ROAD 70 & STATE HIGHWAY 40
PIRTLAW PARTNERS, LTD. 24-33
SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO
648.7' FNL 654.1' FWL
County Road 70
State Highway 40
to County Rd 52 E. Entrance


County Road 52
County Road 52
State Highway 40
Quicksilver Resources, Inc.
DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz
0 100 200 300 FT
N
SCALE
DATE
2/15/12
TEMPORARY FIVE AXLE INGRESS & EGRESS TO PIRTLAW #24-33 WELL
COUNTY ROAD 52 & STATE HIGHWAY 40
PIRTLAW PARTNERS, LTD. 24-33
SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO
648.7' FNL 654.1' FWL



LEGEND:

- Existing County Road
- Existing 2-Track
- Proposed Access Road

ACCESS ROAD MAP: B TOPO

N

0 1000 2000 FT

Quicksilver Resources, Inc.

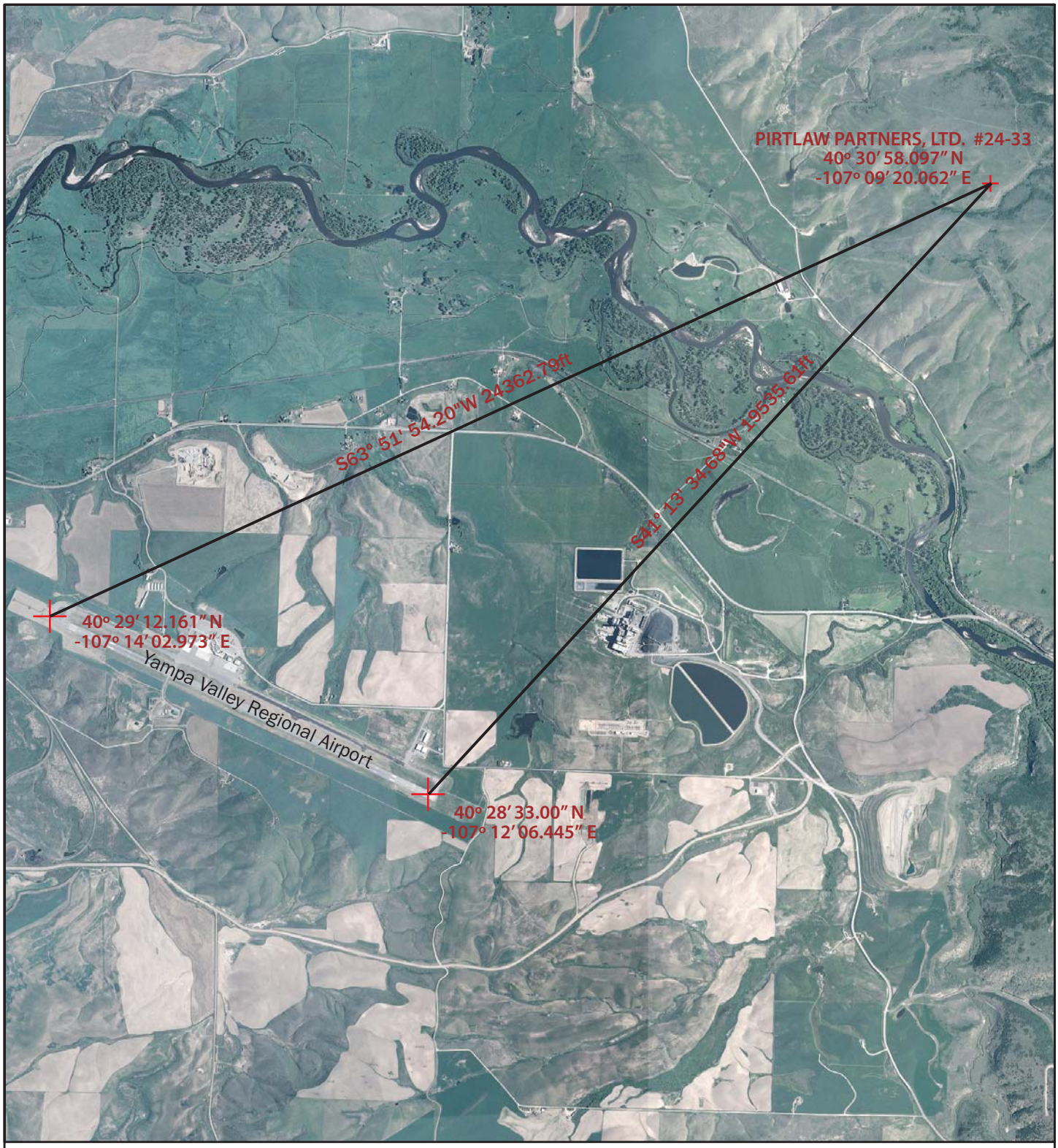
PIRTLAW PARTNERS, LTD. 24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		02/16/12		FH11PG13

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz



LEGEND:

YAMPA VALLEY REGIONAL AIRPORT TIES

N

0 1000 2000 FT

Quicksilver Resources, Inc.

SCALE	DRG	DATE		FILE
		9/09/11		FH11PG17

PIRTLAW PARTNERS, LTD. #24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
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dowling@plotz.biz

Minimal Maintenance Roads

Road #	Name	Estimated Miles Maintained
1W	CR 82 to Moffat County Line	9.6
2W	Bears Ears Road	8.0
3	Eagle County Line to Surface Change	1.0
3	Surface Change to CR 3B	7.3
3A	Beginning to CR 3	3.2
3B	Eagle County Line to CR 3	6.1
3C	Beginning to CR 3B	2.0
3W	Grizzly Park	4.2
4A	Cinder Pit to Rock Creek	0.8
4B	Eagle County Line to End	2.2
4W	CR 2W to End	1.4
5A	Kaiser's to CR 5	2.0
5B	CR 5A to End	1.1
6	CR 134 to State Highway 131	6.1
6A	End of Winter Maintenance to End	1.0
7	Rio Blanco County Line to Surface Change	3.8
9	Yampa Town Limits to Creek	0.8
13	End of Winter Maintenance to End	1.2
14C	CR 14E to End of Winter Maintenance	0.7
14E	CR 14C to CR 14B	1.0
14Z	CR 134 to CR 16	2.2
15	End to Eagle County Line	2.0
16	State Highway 34 to County Line	12.3
16	CR 134 to End of Winter Maintenance	6.9
16Y	CR 16C to End	1.9
16Z	CR 16 to End	6.0
18	Cattleguard below Dam to Northern Winter Closure Gate	10.6
18B	Rehder	0.2
182	Hereford Haven	0.8
19	Willcoxson's to CR 25	3.2
22	State Highway 131 to US 40	1.0
26K	CR 131 to End	0.6
24Z	CR 80 to End	0.6
27A	Seneca	2.0
29	Willow Creek Ranch to CR 37D	6.6
29	From 37D to Cross Mountain Ranch	2.4
29	CR 132A to CR 37D	4.0
29A	CR 29 to Gate	1.7
29Z	CR 76 to Gate	0.4
30Z	CR 29Z to Gate	0.9
32Z	CR 65 to End	2.2
33Z	CR 65 to Gate	0.8
34	Spring Creek	0.9
34Z	CR 65 to End	2.4

Amended 1/27/97

Road #	Name	Estimated Miles Maintained
76	CR 56 to Gate	2.2
76	Bus Stop to End	1.2
7A	CR 7 to End	0.5
80/82	CR 70 to End	28.6
80A	CR 80 to CR 74	4.0
83	Beginning to CR 16	6.1
129	CR R19 to 129B	10.2
129B	CR 129 to Wyoming State Line	1.6
129E	CR 129 to End	3.6
129F	CR 129 to End	2.5
129H	CR 129 to End	1.0
201	Fox Estates	0.3
443	CR 64 to End	3.8
J4	CR 64 to End	3.0
J4A	CR J4 to End	2.5
R1	CR 129 to Gate	1.6
R13	Hahn's Peak to End	4.7
R18	CR 129 to End	0.4
R19	CR 129 to CR 66	6.8
R21	CR 66 to End	2.7
R22	CR R19 to End	0.9
R23	CR 129 to End	1.4
R25	CR 62 to End	3.3
R26	CR R25 to End	2.0
R28	CR 38 to End	4.9
	Total Estimated Mileage for Minimal Roads	**338.5**

Amended 1/27/97

APPENDIX H. RECLAMATION PLAN

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

QUICKSILVER RESOURCES, INC.

MASTER RECLAMATION PLAN

AUGUST 2011

Table of Contents

1.0 INTRODUCTION

The Master Reclamation Plan (Plan) covers preliminary planning, pad construction, soil salvage, soil stockpiling, backfilling and grading, re-topsoiling, soil amendments/fertilization, seeding, seed mixtures, mulching, Best Management Practices (BMPs), fencing, weed control, revegetation inspections and revegetation monitoring. The Plan is intended to address Quicksilver Resources, Inc.'s (QRI) proposed oil and natural gas development activities in Routt County, Colorado.

As part of planning and permitting QRI's proposed oil and gas development operations, Natural Resource Conservation Service (NRCS) soils surveys are prepared for each subject area. Wildlife and vegetative survey reports are also prepared as part of this process. The soils and vegetation data and associated summaries typically accompany federal, state and local permitting submittals. This data and associated summaries provide valuable information on maintaining and enhancing successful future reclamation efforts.

2.0 RECLAMATION OBJECTIVES

The reclamation process has been divided into four major phases: 1) pre-disturbance planning and site preparation, 2) site stabilization during well construction, 3) interim reclamation and monitoring, and 4) final reclamation and success monitoring.

By minimizing the amount of land disturbed through pre-disturbance planning and initially preparing the site for construction activities with the understanding that the area would eventually be reclaimed (e.g., topsoil stripping and stockpiling for later use during site reconstruction, minimizing cut-and-fill slopes, and disturbing as small an area as possible), the acreage requiring disturbance would be reduced and reclamation success would be facilitated.

General reclamation objectives are:

- The primary reclamation objective is to target restoration of sagebrush shrubland with a diverse native grass and forb understory in support of greater sage grouse and Columbian sharp-tailed grouse, which, according to Colorado Parks & Wildlife (CPW), are the primary wildlife habitat conservation values of this area.

- The isolation and/or removal of all undesirable materials (e.g., poor-quality subsoil, contaminated soil, potentially hazardous materials) to protect the reclaimed landscape from contamination;

- Re-contouring and implementation of other soil conservation, surface manipulation and water management techniques to establish stable slopes, water courses, and drainage features to minimize erosion and sedimentation;

- Revegetation of reclaimed areas to stabilize soils and establish a plant community similar to pre-existing conditions without noxious weeds and is capable of supporting post disturbance land uses;

- Establishment of acceptable long-term visual aesthetics by minimizing visual contrasts.

Site stabilization during well construction consists of usable topsoil salvage and subsoil, vegetation of all topsoil and subsoil stockpiles, and immediate stabilization of disturbed areas that control erosion and provide protection to adjacent undisturbed areas from site activities. The vegetation mix used for all site stabilization is listed as the Native Seed Mix shown in Table 15.1. The purpose of this mix is to obtain a rapid revegetation that will minimize erosion. This seed is applied to all cut and fill areas, subsoil and topsoil stockpiles and any other areas not needed for well drilling. The seed is not applied to the pad area. Erosion will be considered controlled when water naturally infiltrates into the soil; gullying, head cutting, or slumping is not observed; and rills are less than 6 inches deep. Specific measures to attain these goals are discussed in Section 17.0 (BMPs).

Interim reclamation is the reclamation of those areas disturbed during well construction, but not needed during the production life of the well. Interim reclamation consist of final grading, relieving of compaction, subsoil and topsoil replacement, seeding, mulching and fence installation to prevent future activity on areas not needed for production. Interim reclamation may also include roads leading to well sites. Interim sites will be monitored for reclamation success on an annual basis. Subject to landowner approval, seeding will be done with the mix provided in Table 15.1. Interim reclamation shall occur no later than 3 months on crop land and 12 months on non-crop land and will last for the life of the well. Interim reclamation is done with the intent of final reclamation although certain sites may require re-contouring of the interim areas after the well has ended its useful life. An example of this is a pad that has cut/fill areas that are regraded and reclaimed after the well is finished.

Final reclamation includes the removal of all remaining equipment, tanks and structures at the site, final backfilling and full reclamation of those disturbed areas not reclaimed for interim reclamation. The same reclamation procedures described for interim reclamation would be employed. The seed mixes for final reclamation are the same as those for interim reclamation (Table 15.1). A non-producing well location and associated access road are examples of final reclamation sites. Upon project completion, all disturbed areas except roads to be retained for other land uses would be reclaimed as designated by the landowner.

Reclamation success monitoring involves assessing the status of reclaimed areas to ensure they meet desired site stability and productivity standards. Reclamation monitoring may be performed by a 3rd party consultant and would include an evaluation of plant cover, density, and diversity as well as erosion and weed control. Non-cropland vegetation would be expected to contain a diverse mixture of grasses, forbs, and shrubs as provided in Table 15.1.

3.0 AFFECTED COMMUNITIES/HABITAT

Within the currently proposed project area, four general plant communities have been identified. These plant communities include, big sagebrush, foothills grassland, reclaimed grassland, and mixed montane shrubland. The big sagebrush community contains sagebrush, saltbush, greasewood, and wheatgrass. Foothills grassland is comprised mostly of native grasses including Columbia needlegrass, western wheatgrass, Canada bluegrass, and bluebunch wheatgrass. Reclaimed grassland occurs in large patches of former sagebrush shrubland that were converted to wheat croplands, and then subsequently reclaimed to pasture grasses. Common grasses include smooth brome, intermediate wheatgrass, and slender wheatgrass. Montane shrubland is a tall shrubland dominated by Gambel oak, Saskatoon serviceberry and chokecherry.

4.0 PREDISTURBANCE INVENTORY AND SITE PLANNING

QRI personnel and their reclamation consultant will review locations of well pads, access roads, and ancillary facilities prior to actual construction activities. The following items will be evaluated and/or inventoried.

- Suitability of slopes steeper than 2:1 for construction activities with special erosion control and slope stability measures as needed.
- Evaluation of true riparian/wetland areas for exclusion from construction disturbance vs. fringe areas that can be properly reclaimed without long term damage to true wetlands and as agreed to by land owners.
- Identify an appropriate buffer from streams.
- Identify soil-mapping units of proposed disturbed area; collect one soil sample for every soil series of the proposed disturbed areas, and complete soil physical and chemical analysis for topsoil stripping, stockpiling and replacement recommendations. Utilize the appropriate equipment to facilitate review of soil profile(s) and collecting soil samples. A soil auger and/or additional test pits will be utilized every 1.5 acres to confirm if any additional soil mapping units exist on any given well site. If so, additional soil sampling will be completed. Collect soil samples in 6-inch lifts or by horizon as determined by a qualified soil scientist.
- Inventory any noxious weeds listed in the Colorado Noxious Weed Act (Colorado Department of Agriculture, 1996).
- Prepare a preliminary list of BMPs to be utilized during construction and as a part of final reclamation efforts. A list of actual BMPs may be better defined immediately prior to completion of construction activities.

- Prepare a preliminary sketch plan of fencing for proposed disturbance areas for rangelands.

- List fertilization, soil amendment, soil tillage, seed mixture, mulching methods (if deemed necessary by the reclamation consultant), and any other practices to be used within defined vegetation zones.

A description of revegetation and erosion control efforts is described in each the following sections of this Plan.

4.1 Wellpad and Facility Site Construction

Prior to construction, proposed pad and facility site locations would be surveyed and staked. Locations would be designed to parallel the contour with reserve pits on the uphill side of pads whenever possible. Well pads would be designed and constructed to disturb the smallest area necessary to provide for efficient and safe operations.

Excess cut material would be incorporated into fill slopes or placed in designated areas and stabilized. Backsloping would be necessary only in areas of steep terrain (ie…>3:1 slopes). This material shall be utilized during the reclamation process.

During construction, interceptor ditches would be installed above cuts and around reserve pits, as necessary. Collector ditches and sediment control structures constructed for a storm event may be required below fill areas. Smaller flows would be diverted and/or collected before being discharged from the disturbed area. Qualified personnel would supervise the installation of all erosion control structures, including berms, dikes and trenches.

4.2 Roads

New roads generally would follow natural contours and would be constructed in accordance with industry road standards. For roads on slopes of less that 15%, available strippable/useable topsoil would be stripped from the construction area and placed in windrows within the construction right-of-way (ROW) by side casting with a grader. Where roads must be constructed on slopes greater than 15%, and significant topsoil is present, topsoil would be transported to more level terrain for storage. After road construction, strippable/useable topsoil, if any, would be replaced on road out slopes, and these areas would be reseeded.

4.3 Pipelines

When constructing and reclaiming pipelines, existing crowned-and-ditched roads would be used for access, where practical, to minimize surface disturbance. Pipeline trenches would not be placed in access road borrow ditches unless other reasonable locations are unavailable. Gathering pipelines may be installed on the surface in areas where slopes are greater than 25% and/or where rock outcrops are crossed; when possible, they would be built perpendicular to the contour to minimize the area required for construction.

Vegetation would be scrapped or brush hogged from pipeline ROWs so that the root systems are left intact. Any removed vegetation would be spread over disturbed areas to provide protection, nutrient recycling and a natural seed source. If pipelines are trenched rather than plowed in, trenches would be excavated with a backhoe or similar equipment to minimize disturbance.

Frozen soils, vegetation, and snow would not be used to backfill pipeline trenches. This action would reduce trench compaction needs. In no event would backfill berms in excess of 6 inches in height be placed over backfilled trenches.

Construction of pipelines in Waters of the United States would comply with U.S. Army Corps of Engineers (COE) permit requirements. Silt fences or other sediment control devices would also be installed along channel banks where sedimentation is excessive and at the bases of slopes adjacent to wetland/riparian areas (as necessary to control sediment).

Temporary sediment barriers would remain in place until final revegetation measures have been successfully implemented.

5.0 SOILS OF THE PROJECT SITES

Mapped soil types published by the NRCS, U.S. Department of Agriculture (USDA), will be reviewed to determine the soil types and natural vegetation characteristics of the project site and surrounding area (NRCS 2011).

The NCRS indicates that the major soil type found in the project areas are generally deep soils derived from alluvial and eolian material. Restrictive features for plant growth result from slow permeability and high runoff characteristics.

5.1 Topsoil Salvage

QRI or one of their consultants will make all topsoil salvage recommendations prior to land disturbance. These recommendations will be based on review of soil mapping units of specific well sites and soil sampling within common soil mapping units and vegetation communities. Specifically, due to the common characteristics of soil properties that occur within the same soil mapping unit and vegetation communities it is not necessary to soil sample every proposed well site. If additional soil mapping units exist on any given well site, additional soil sampling will occur.

As a precursor to activities related to topsoil salvage soils will be ranked as good, fair, or poor. In no case will soils rated poor for topsoil salvage be used unless properly amended as determined by a qualified soil specialist (see soil amendment section for comprehensive discussion of proposed soil amendments).

The physical and chemical parameters proposed for use in determining topsoil quality will consist of the following: Soil texture, pH, Sodium Absorption Ratio (SAR), electrical conductivity, saturation percentage, Selenium, Nitrogen, Phosphorus, Potassium, cation exchange capacity, and organic matter content.

Any surplus topsoil material that is generated during the topsoil stripping operation will be stockpiled in a safe location on the property from which it was taken and utilized for other well site reclamation activities where a deficiency may exist. A deficiency in topsoil cover is defined as less than 3 inches of suitable un-amended topsoil.

Care will be taken to avoid stripping soils with coarse fragments greater than 35% in volume. Severe rooting restrictions may exist for herbaceous species in areas containing higher amounts of rock fragments. If high coarse fragments are encountered, QRI's reclamation consultant/soil specialist may recommend rock picking, rock screening, or import of topsoil material. Screened or picked rock material will be buried in cuts, or placed deep enough below the soil surface to avoid rooting restrictions for reclamation efforts.

Alternate site preparation procedures may be applied in some areas to facilitate reclamation; however, it is assumed that most, if not all, of these areas can be avoided. All activities within jurisdictional waters (wetlands and streams) would comply with COE permit stipulations. These stipulations would minimized impacts to jurisdictional waters and may include: grading activities would be limited to areas directly over pipeline trenches and road surface areas, and at least 12 inches of topsoil would be sidecast and replaced. Construction when the ground is frozen may be implemented as an alternative to minimize damage. Use of construction equipment would be limited, and if standing water or saturated soils are present, wide-track or balloon-tire construction equipment or normal construction equipment operated on equipment pads or geotextile fabric overlain with gravel fill may be used. Equipment pads would be removed immediately following the completion of construction activities. Trench spoil would be placed at least 10 feet from drainage channel banks, and dirt, rock fill, and brush riprap would not be used to stabilize ROWs.

5.2 Subsoil Handling

During the installation of well pad sites, subsoil materials will be utilized to construct well pads. Information collected during the pre-disturbance inventory and site-planning phase will be utilized to determine if special handling of poor quality subsoil materials should occur. This information will include physical and chemical analysis from soil lab results. Poor quality subsoil materials may consist of calcareous, alkaline, and high coarse fragments soils, etc. Deleterious subsoil materials will be kept lower in the profile of well pads so as not to interfere with plant growth. Adequate topsoil cover and/or use of soil amendments will also be utilized to ensure a proper growth medium for reclamation efforts.

6.0 STOCKPILING

6.1 Topsoil Stockpiling

Topsoil will be stockpiled in such a manner that it can be readily recovered for reclamation purposes. Topsoil stockpiles will be located away from natural

drainage courses. Stockpiles should be constructed with no greater than 3:1 side slopes and with a height of three to six feet where possible, given the flexibility needed in confined areas for stockpiles on drill sites. By constructing stockpiles in this manner, valuable soil fungi and bacteria will not be lost.

6.2 Pit Soil Stockpiling

Drilling pits are constructed by removing adequate subsoil and overburden materials to accommodate drilling fluids generated during the actual drilling process. The subsoil material will be stockpiled in an easily accessible area. Pit soils will be stockpiled in such a manner so as to avoid co-mingling with topsoil stockpiles.

7.0 TEMPORARY REVEGETATION EFFORTS

Topsoil stockpiles will be seeded immediately after placement with a quick germinating cover of grasses as presented in Table 15.1. Topsoil stockpiles will be dozer tracked on the contour to create cleat marks that will serve as erosion basins. Also, a continuous berm will be placed around any down slope sides of the topsoil stockpile to prevent addition runoff and potential erosion.

8.0 SOIL AMENDMENTS AND FERTILIZERS

8.1 Soil Amendments

At the advice of their reclamation consultant, QRI may elect to use one or more soil amendments to overcome poor chemical or physical conditions in existing surface soils. Poor soil conditions could include one or more of the following:

- High SAR values
- High electrical conductivity values
- High pH values
- Low nutrient content/low organic matter content.

The following amendments are listed for consideration. While these products have been proven beneficial on other projects, it is in QRI's best interest to test their performance on selective well sites before committing to a final program. QRI's reclamation consultant/soil specialist will determine the well sites that may benefit from soil amendments and their application rates. The following is a list of soil amendments and the minimum recommended application rates. One or more of the following amendments may be utilized where 12 inches of favorable growth media cannot be salvaged and replaced at each well site.

- Composted materials consisting of manure (cow or pig preferred), wood chips, etc.
  Apply at 75 - 125 cubic yards per acre. Biosolids.
  Apply at 75 - 125 cubic yards per acre.

- Biosol organic fertilizer (as supplied by Rocky Mountain Bio-products). Apply at 1,000 –1,400 pounds per acre.

- Humates consisting of humic and fulvic acids. Apply at 800 - 2,000 pounds per acre.

- Elemental Sulfur. Apply according to soil test recommendations.

These materials would be mixed with the existing soil material on site. Importation of good topsoil will also be considered. The quantity imported will depend on many factors, such as availability of the imported soil, the quality of the site soil, etc.

Compost, biosolids, and Biosol all provide macronutrients for plant growth and organic matter which helps create soil aggregation. Humate materials help create soil aggregation. Elemental sulfur helps displace sodium ions in the soil.

8.2 Fertilizers

Inorganic fertilizers will be applied to the soil surface as determined by soil test results indicating the need for nitrogen, phosphorous, or potassium fertilizers. Nitrogen fertilizer may not be added in many cases at the time of seeding because of its influence on rapid weed invasion at the expense of more desirable species. The revegetation specialist will make the final determination on the need for fertilizer applications. Any application of fertilizer will be followed by soil tillage to incorporate the material properly.

9.0 STABILIZATION AND INTERIM RECLAMATION

Stabilization and interim reclamation would occur on all areas where final reclamation cannot be applied, and on areas that may be re-disturbed during final reclamation. Disturbed areas subject to interim reclamation include road cut-and-fill areas and portions of each well pad and ancillary facility sites not needed for production-related activities. Interim reclamation measures would be applied only as needed, since final reclamation measures would be applied concurrently with the completion of most project construction activities (i.e., final reclamation measures would be applied on all areas that would likely remain undisturbed for the remainder of the LOW) (See Section 20.0)

Stabilization and interim reclamation objectives include:

- Stabilization of disturbed areas by providing wind and water erosion control to reduce soil loss and the chance of slope failure;

- Minimization of surface runoff to prevent the degradation of downstream receiving waters through the use of pollution control techniques (e.g., facility sites would be required to approach zero runoff from the location, using interception ditches, berms, or other structures to capture accidental spills);

- Establishment of non-intrusive plant communities to protect soil resources or;
- Establishment of agricultural production; and
- Minimization of visual impacts.

Upon completion of a specific development activity (e.g., road construction, well testing), the area to be reclaimed for the LOW would be delineated. For example, all road topsoil storage in out slope areas, as well as the potentially disturbed outer portions of road ROWs would be stabilized and reseeded until final road reclamation is initiated. Final reclamation practices would be applied on areas that would likely remain undisturbed for the remainder of the LOW.

Where possible, disturbed areas would be graded and contoured to slopes of 3:1 (horizontal: vertical) or less or as required to stabilize the area and provide a suitable seedbed. Well sites that need to be constructed on steeper slopes (>3:1) will be based on the ability to perform stable construction efforts as required. Contoured areas would be ripped, as necessary, to reduce soil compaction. Ripping in many areas may be conducted after topsoil replacement. Temporary erosion control measures (e.g., water bars, mulch application, and biodegradable netting installation) also would be applied as necessary.

To minimize sedimentation of drainage channels and wetlands during the interim period between construction activity and final reclamation, temporary erosion and sediment control measures would be applied in accordance with COE section 404 permit requirements. Silt fences or other sediment filtering devices such as weed-free straw bales would be installed at drainage channel banks where sedimentation is excessive and at the base of all slopes adjacent to wetland/riparian areas. Sediment filtering devices would be maintained in functional condition until revegetation/reclamation efforts yield a stable vegetation cover. To avoid the possibility of mulching materials entering waterways, loose mulch (i.e., mulch not crimped into the soil surface, tackified, or incorporated into erosion control blankets) would not be applied to drainage channel banks. Section 17.0 describes BMPs in more detail.

Seedbed preparation activities would include topsoil replacement and harrowing, disking, pitting, and/or ripping. After topsoil replacement and preparation, the area would be seeded at the first appropriate opportunity using a seed mixture developed to facilitate rapid establishment of vegetation and site stabilization (Table 15.1) or a seed mixture designed for interim or final reclamation (see Section 15.0), as appropriate. Landowner preferences will be honored in the development of seed mixes. Areas that have been seeded would be visually monitored for seedling establishment and the presence of erosional features and would be re-stabilized and reseeded, as necessary, until adequate vegetation establishment and site stability is achieved (see Section 21.0). In general, the

annual Reclamation Success Monitoring and Revegetation Inspection procedures would also be applied at interim reclamation sites.

10.0 SOIL REPLACEMENT

10.1 Topsoil and Pit Soil Replacement

Immediately after drilling operations and pit processing has occurred, QRI will rip the existing subsoil surface to a depth of approximately 18 inches (or that allowable if large rock fragments are present). Topsoil shall be replaced evenly over all disturbed areas using small dozers to prevent re-compaction of the growth medium. Topsoil will not be replaced in extremely wet or frozen conditions.

Thoroughly mixing pit contents with subsoil and covering processed pit materials with at least 3 feet of subsoil material and a final layer of topsoil will reclaim the pit area.

10.2 Wetland and Stream associated Soils

All operations within jurisdictional Waters of the United States would comply with COE permit stipulations.

11.0 FACILITY AND STRUCTURE REMOVAL

All oil and gas wells would be abandoned according to Colorado Oil and Gas Conservation Commission (COGCC) regulations. All aboveground well pad, pipeline, and water disposal facilities, including buildings, structures, tanks, reserve pits, flare pits, and associated hardware, would be closed or dismantled and removed from the site. These materials would be removed and likely would be salvaged and re-used or disposed of at approved sites.

Any concrete foundations, pads, or footings would be adequately broken up and covered or removed. All aggregate used for well pad, road, and/or ancillary facility site construction also would be removed or suitably buried.

Road reclamation would be conducted as deemed appropriate by COGCC and the surface landowners; some roads may remain after project completion. Road reclamation would include the removal of bridges, culverts, cattle guards, sediment control structures, and signs. Drainage-crossing side slopes would be reduced in order to minimize bank erosion and produce stable side slopes. In addition, road barriers or signs may be used to discourage travel on reclaimed road surfaces.

12.0 SURFACE PREPARATION

Surface preparation includes backfilling, grading, and ripping of compacted soils. In some areas subjected to interim reclamation (See Section 7.0), topsoil removal and short-term storage may also be required.

12.1 Backfilling and Grading

After facilities and equipment have been removed, reclamation of pads would be conducted as deemed appropriate by QRI in conjunction with surface landowners, and some pads may remain after project completion. Final reclamation would be conducted in a manner to minimize any additional disturbance of native or previously reclaimed areas. Grading would be conducted as necessary to provide a surface suitable for the replacement of a uniform depth of topsoil intended to promote cohesion between subsoil and topsoil layers while reducing wind erosion, and facilitating the capture of moisture.

Specialized grading techniques would be applied as necessary and may include slope rounding, bench grading, stair-step grading, and/or contour furrowing. Equipment selection would be determined on a site-specific basis, depending upon the material to be graded, the size of the area, on-site operating conditions, and equipment availability.

No visible soil berm (i.e., in excess of 3 inches) would be allowed above pipeline trenches. QRI-provided reclamation specialists would ensure that backfilling and grading operations are conducted so as to provide a landscape suitable for successful reclamation. Ripping of the subsoil material will occur to a depth of 16 inches (where the nature of the material permits) to relieve compaction of the subsoil and provide better rooting medium for later plant growth. No heavy equipment will be moved over the prepared surface once it has been ripped. Small dozers will be used to replace subsoil and topsoil.

13.0 SEEDBED PREPARATION/SOIL TILLAGE

If the re-topsoiled surface is not loose and friable after topsoil application, soil tillage will be performed. Acceptable methods of soil tillage will consist of disking, chisel plowing, or harrowing to a depth of 4 inches. No more than 10% of the reclaimed area will contain rocks greater than 8” in diameter. The only exception to this condition will be in-situ soils that naturally contain greater amounts of rock material. Also, as previously stated in the topsoil stripping section, no more than 35 – 40% coarse fragments of any size will be allowed on the soil surface, to avoid impacting revegetation success. Larger volumes of coarse fragment will either be screened or picked prior to seeding operations. Rock material will be buried in cut slope areas or buried under the well pad a minimum of 3 feet below the final soil surface so a not to interfere with the rooting depth of desirable vegetation species.

14.0 SEEDING METHODS

14.1 Seeding Times

Seeding shall be completed at any time of year except during ground freeze conditions and except from May 31 to August 15.

14.2 Seeding Methods

Drill seeding shall be utilized on slopes of 3:1 or flatter. The drill seeder shall be capable of handling a variety of different seed textures. Drill rows shall be no greater than 12 inches on center. All drilling shall be completed on the parallel to the contour of the land where practical. Seed will be drilled to a depth of 0.25 to 0.50 inches.

Steeper slope areas will be broadcast seeded or seeded with other methods. Broadcast seeding will be accomplished with hand held spreaders, ATV mounted, or tractor mounted and will be capable of spreading seed uniformly. All seed will be raked or harrowed to lightly cover seed with soil.

15.0 SEED MIXTURES

Table 15.1 has been created in consultation with the surface owner, CPW and The Nature Conservancy. This seed mix is targeted at restoring sagebrush shrubland and optimizing the habitat for greater sage grouse and Columbian sharp-tailed grouse per CPW BMPs, and consistent with COGCC Rule 1203.a,(9).

TABLE 1
Native Seed Mix
Pirtlaw Partners Ltd. Project Site #24-33

Scientific Name	Common Name	Variety	Seed/lb	Seeding Rate[#] (lbs/acre)	Seed/ft²
Shrubs					
Artemsia tridentata ssp. vaseyana	Mountain big sagebrush		1,970,000	0.1	5
Chrysothamnus viscidiflorus	Low rabbitbrush		737,000	0.25	4
Ericameria nauseosus	Rubber rabbitbrush		652,500	0.25	4
Symphoricarpos rotundifolia	Roundleaf snowberry		75,000	1.0	2
		Total Shrubs		**1.6**	**15**
Grasses					
Achnatherum columbiana	Columbia needlegrass		150,000	2	7
Achnatherum hymenoides	Indian ricegrass	Nezpar	141,000	2	6
Elymus elymoides	Bottlebrush squirreltail	Sand Hollow	192,000	1	5
Leymus cinereus	Basin wildrye	Mangar	130,000	2	6
Koeleria cristata	Junegrass		2,315,400	0.1	5
Pascopyrum smithii	Western wheatgrass	Rosanna	110,000	3	8
Poa fendleriana	Muttongrass	Lodorm	2,000,000	0.1	5
Pseudoroegneria spicata	Bluebunch wheatgrass	Secar	140,000	3	10
		Total Grasses		**13.2**	**52**
Forbs					
Artemisia ludoviciana	Prairie sage		3,750,000	0.1	9
Erigeron speciosus	Aspen fleabane		1,600,000	0.1	4
Heliomeris multiflora	Showy goldeneye		1,055,000	0.1	2
Lupinus argenteus	Silverleaf lupine		18,300	1	0.5
Mahonia repens	Creeping barberry		54,000	0.5	1
Wyethia amplexicaulus	Mule's ear		24,625	1	0.5
		Total Forbs		**2.8**	**17**
		Grand Total		**17.6**	**84**

[#]Drill Seed Rate; double for broadcast methods

16.0 MULCHING AND EROSION CONTROL BLANKETS

16.1 Mulch

Mulching with either certified weed-free hay at 1.5 tons per acre or cereal grain straw at 2.0 tons per acre would be applied on all reclaimed sites. Mulch material will be crimped into the soil surface unless the slopes are steeper than 3H: 1V, in which case the mulch will be applied by broadcast methods. Hydro mulching using wood fiber at 1.5 tons per acre with an environmentally friendly tackifier may also be used.

16.2 Erosion Control Blanket

Erosion Control Blankets (ECBs) will only be utilized as necessary. ECBs will consist of excelsior material, straw blankets, or straw /coconut blankets. Because of the rocky nature of soils occurring in the project areas, a Bonded Fiber Matrix (BFM) may be recommended for use. BFMs contain long fibers of hydro mulch with heavy guar tackifiers. BFM cures to appear like a hard foam insulation that adheres to the soil surface better than ECBs.

17.0 BEST MANAGEMENT PRACTICES

BMPs are anticipated for use on the various future well sites associated with the 10-acre well density. Generally accepted and proven BMP efforts are listed and described below.

17.1 Sediment Basins

Sediment basins are ponds created by excavation that are usually temporary in design and are intended to collect and store sediment form sites that are cleared and/or graded during construction. Frequently these sites are left exposed for extended periods of time before either permanent vegetation is re-established or permanent drainage structure is completed. Basin construction is intended to trap sediment before it leaves the disturbed site. Since sediment basins are temporary, they must be maintained until the disturbance area is permanently stabilized.

17.2 Straw Bale Dikes

Straw bale dikes intercept and detain small amounts of sediment transported by sheet and rill type runoff. The dikes trap sediment by ponding water and allowing sediment to settle out. Straw bale dikes also slow runoff velocities acting to reduce sheet, rill and gully erosion. Straw bale dikes may also be used when installed to reduce erosion and sedimentations around the disturbance area perimeter. All straw bales will consist of certified weed-free materials.

17.3 Silt Fence

Silt fence is a temporary polypropylene sediment barrier placed on the slope contour to trap sediment by ponding water behind it and allowing sediment to settle out. Silt fence can effectively trap sheet and rill erosion within small drainage areas and on slopes with gradients up to 2:1. Silt fence is most cost effective when used for sediment and erosion control around the perimeter of a disturbance area.

17.4 Continuous Berms

A continuous berm is a temporary diversion or sediment barrier constructed with infill material and used to divert and intercept sheet runoff. Continuous berms are useful for erosion and sediment control around the perimeter of construction sites. The berms detain and pond sediment laden storm water resulting in sediment deposition.

17.5 Rock Check Dams

Check dams are rock dams constructed across drainage ways to dissipate the energy of flowing water and reduce gully erosion. They are temporary stabilization structures that are used until the drainage way is permanently stabilized. Check dams are used in ephemeral streams to reduce flow velocities, trap and store larger-sized sediment and provide stabilized drops.

18.0 FENCING

18.1 Installation

Barbed wire fence will be erected around the largest possible portion of the well site for interim reclamation. Adequate access must be left open to the actual wellhead and ancillary facilities.

A take down gate may be installed in the fenced enclosure area for herbicide application vehicles if the revegetated area is large enough to warrant this feature.

T-posts will be placed every 16 feet with line braces installed for every 1,300 feet of run. Steel corner sets will be placed on every corner and either compacted in-place or cemented in.

18.2 Maintenance

Fences will be inspected on a regular basis and repaired as needed to exclude cattle from entering the reclaimed area. Fences will be kept in-place as necessary to allow vegetation in reclaimed areas to reach a self-sustaining cover.

19.0 WEED CONTROL PLAN

The Colorado Noxious Weed Management Act (Colorado Department of Agriculture – 1996) provides for control of noxious weeds on all unincorporated lands within the project area. QRI has developed a weed management plan that complies with state and local policies.

19.1 Post Revegetation Weed Inspections

A reclamation/revegetation specialist will conduct a Reclamation Success Monitoring and Revegetation Inspection annually, after green up of vegetation. If during these inspections it is determined that the noxious weed species presence and densities represent a threat to the revegetated areas or surrounding lands, mechanical or chemical control measures will be employed.

19.2 Weed Control Implementation

During the first growing season of native grasses, forbs, and shrubs use of chemical herbicides will not be feasible. Until newly reseeded species reach a height of 3-6 inches they are susceptible to damage from herbicides. Therefore, mechanical weed control is proposed for the first growing season if re-seeded species are not determined to be mature enough to withstand herbicide spray. Bush Hog mowers, weedeaters, and/or hand pulling of weeds will be employed as mechanical control devices.

During subsequent years herbicide applications will be utilized when weed densities are determined to pose a threat to revegetation success or spread to surrounding lands.

The county weed management specialist will be consulted to determine what chemical herbicides will be the most beneficial for controlling noxious weeds. It is anticipated that an aggressive revegetation and weed management program will result in weed control, only needing to be performed during the first three years after re-seeding efforts.

20.0 FINAL RECLAMATION

Final reclamation would be completed as soon as practical, but within 3 months on crop land and 12 months on non-crop land after plugging a well. Permanent reclamation objectives include all those listed for interim reclamation (See Section 9.0), plus the following:

- The re-establishment of desirable self-sustaining vegetation communities that approximate pre-disturbance parameters for cover, density and diversity, as measured at adjacent undisturbed areas;

- The development of stable landforms that meet future land uses including livestock grazing, wildlife habitat, and mineral exploration; and

- Establish conditions for the eventual restoration of the visual ascetics consistent with the existing landscape surrounding the site.

21.0 RECLAMATION SUCCESS MONITORING AND REVEGETATION INSPECTIONS

21.1 Inspections

On an annual basis, a revegetation/reclamation specialist will inspect each disturbed location. Observations will be made for weed species presence, fence damage, erosion occurrences, and bare ground resulting from lack of germination and fill-in of native seeded species. Evaluation of the vegetation will include estimates of species type, diversity, and ground cover.

Reclamation success monitoring will commence during the 1st growing season and continue until interim and final reclamation and revegetation efforts meet or exceed 80% of the desirable plant cover found on the reference area(s). Reference areas will generally be adjacent areas that best represent the original well site before disturbance.

Cover data will be collected by establishing fixed locations at each reclaimed area and the surrounding reference area. During each inspection, a qualified vegetation specialist will visually inspect the reclaimed and reference areas and take pictures at each fixed location to establish an ongoing record of the reclamation progress. These pictures will be taken using set procedures for consistency. The specialist will then estimate the percent live cover of the reclaimed area and make a comparison to the reference area(s). A detailed report of this data as well as other inspection data, such as presence of noxious weeds, erosion, fence status, grazing, etc. will be incorporated into the annual inspection report for the disturbed areas.

21.2 Remediation

Observations of any problems will result in additional revegetation/reclamation efforts. Erosional features will be repaired by filling-in wash outs greater than 6 inches deep and re-grading. Larger areas exhibiting revegetation failure will be re-tilled and seeded as described above in corresponding sections of this Plan.

APPENDIX I. COGCC FORM 2 AND 2A

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

FORM 2A Rev 04/01

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80205 Phone: (303) 894-2100 Fax: (303) 894-2109

Oil and Gas Location Assessment

DE	ET	OE	ES

Document Number: 400217163

☒ New Location ☐ Amend Existing Location Location#: _____

Submit original plus one copy. This form is to be submitted to the COGCC prior to any ground disturbance activity associated with oil and gas development operations. This Assessment may be approved as a standalone application or submitted as an informational report accompanying an Application for Permit-To-Drill, Form 2. Approval of this Assessment will allow for the construction of the below specified location; however, it does not supersede any land use rules applied by the local land use authority. This form may serve as notice to land owners and other interested parties, please see the COGCC web site at http://colorado.gov/cogcc/ for all accompanying information pertinent to this Oil and Gas Location Assessment.

Location ID:

Expiration Date:

☒ This location assessment is included as part of a permit application.

1. CONSULTATION

☐ This location is included in a Comprehensive Drilling Plan. CDP # _____

☒ This location is in a sensitive wildlife habitat area.

☐ This location is in a wildlife restricted surface occupancy area.

☐ This location includes a Rule 306.d.(1)A.ii. variance request.

2. Operator

Operator Number: 10255

Name: QUICKSILVER RESOURCES INC

Address: 801 CHERRY ST - #3700 UNIT 19

City: FT WORTH State: TX Zip: 76102

3. Contact Information

Name: Pamela Osburn

Phone: (817) 665-4918

Fax: (817) 665-5009

email: posburn@qrinc.com

4. Location Identification:

Name: PIRTLAW PARTNERS Ltd Number: 24-33

County: ROUTT

QuarterQuarter: SE SW Section: 33 Township: 7N Range: 87W Meridian: 6 Ground Elevation: 6945

Define a single point as a location reference for the facility location. This point should be used as the point of measurement in the drawings to be submitted with this application. When the location is to be used as a well site then the point shall be a well location.

Footage at surface: 645 feet FSL , from North or South section line, and 1963 feet FWL , from East or West section line.

Latitude: 40.516138 Longitude: -107.155573 PDOP Reading: 1.8 Date of Measurement: 08/25/2011

Instrument Operator's Name: Dowling Land Surveyors

5. Facilities (Indicate the number of each type of oil and gas facility planned on location):

Special Purpose Pits:		Drilling Pits:	1	Wells:	1	Production Pits:		Dehydrator Units:	
Condensate Tanks:	2	Water Tanks:	1	Separators:	2	Electric Motors:		Multi-Well Pits:	
Gas or Diesel Motors:	1	Cavity Pumps:		LACT Unit:		Pump Jacks:	1	Pigging Station:	
Electric Generators:		Gas Pipeline:		Oil Pipeline		Water Pipeline:		Flare:	
Gas Compressors:				VOC Combustor:		Oil Tanks:	2	Fuel Tanks:	

Other: 1 HEATER TREATER

6. Construction:

Date planned to commence construction: 01/30/2012 Size of disturbed area during construction in acres: 3.16

Estimated date that interim reclamation will begin: 01/30/2013 Size of location after interim reclamation in acres: 1.00

Estimated post-construction ground elevation: 6944 Will a closed loop system be used for drilling fluids: Yes [X]

Will salt sections be encountered during drilling: Yes [ ] No [X] Is H2S anticipated? Yes [ ] No [X]

Will salt (>15,000 ppm TDS Cl) or oil based muds be used: Yes [X] No [ ]

Mud disposal: Offsite [X] Onsite [ ] Method: Land Farming [ ] Land Spreading [ ] Disposal Facility [X]

Other:

7. Surface Owner:

Name: Pirtlaw Partners Ltd Phone: 713-525-5260

Address: 1929 Allen Pkwy Fax:

Address: Email:

City: Houston State: TX Zip: 77019 Date of Rule 306 surface owner consultation: 02/03/2011

Surface Owner: [X] Fee [ ] State [ ] Federal [ ] Indian

Mineral Owner: [X] Fee [ ] State [ ] Federal [ ] Indian

The surface owner is: [ ] the mineral owner [ ] committed to an oil and gas lease [ ] is the executer of the oil and gas lease [ ] the applicant

The right to construct the location is granted by: [ ] oil and gas lease [X] Surface Use Agreement [ ] Right of Way [ ] applicant is owner

Surface damage assurance if no agreement is in place: [ ] $2000 [ ] $5000 [ ] Blanket Surety ID

8. Reclamation Financial Assurance:

[ ] Well Surety ID: 20080107 [ ] Gas Facility Surety ID: [ ] Waste Mgnt. Surety ID:

9. Cultural:

Is the location in a high density area (Rule 603.b.): Yes [ ] No [X]

Distance, in feet, to nearest building: 5380 , public road: 4850 , above ground utilit: 690

, railroad: 5280 , property line: 646

10. Current Land Use (Check all that apply):

Crop Land: [ ] Irrigated [ ] Dry land [ ] Improved Pasture [ ] Hay Meadow [ ] CRP

Non-Crop Land: [X] Rangeland [ ] Timber [ ] Recreational [ ] Other (describe):

Subdivided: [ ] Industrial [ ] Commercial [ ] Residential

11. Future Land Use (Check all that apply):

Crop Land: [ ] Irrigated [ ] Dry land [ ] Improved Pasture [ ] Hay Meadow [ ] CRP

Non-Crop Land: [X] Rangeland [ ] Timber [ ] Recreational [ ] Other (describe):

Subdivided: [ ] Industrial [ ] Commercial [ ] Residential

12. Soils:

List all soil map units that occur within the proposed location. Attach the National Resource Conservation Service (NRCS) report showing the "Map Unit Description" report listing the soil typical vertical profile. This data is to used when segregating topsoil.

The required information can be obtained from the NRCS web site at http://soildatamart.nrcs.usda.gov/ or from the COGCC web site GIS Online map page found at http://colorado.gov/cogcc. Instructions are provided within the COGCC web site help section.

NRCS Map Unit Name: 10E - Bulkley Silty Clay 12 to 25 percent slopes

NRCS Map Unit Name:

NRCS Map Unit Name:

13. Plant Community:

Complete this section only if any portion of the disturbed area of the location's current land use is on non-crop land.

Are noxious weeds present: Yes [X] No [ ]

Plant species from: [ ] NRCS or, [X] field observation Date of observation: 09/09/2011

List individual species: Rabbitbrush, Intermediate Wheatgrass, Snowberry

Check all plant communities that exist in the disturbed area.

- [ ] Disturbed Grassland (Cactus, Yucca, Cheatgrass, Rye)
- [X] Native Grassland (Bluestem, Grama, Wheatgrass, Buffalograss, Fescue, Oatgrass, Brome)
- [X] Shrub Land (Mahogany, Oak, Sage, Serviceberry, Chokecherry)
- [ ] Plains Riparian (Cottonwood, Willow, Aspen, Maple, Poplar, Russian Olive, Tamarisk)
- [ ] Mountain Riparian (Cottonwood, Willow, Blue Spruce)
- [ ] Forest Land (Spruce, Fir, Ponderosa Pine, Lodgepole Pine, Juniper, Pinyon, Aspen)
- [ ] Wetlands Aquatic (Bullrush, Sedge, Cattail, Arrowhead)
- [ ] Alpine (above timberline)
- [ ] Other (describe):

14. Water Resources:

Rule 901.e. may require a sensitive area determination be performed. If this determination is performed the data is to be submitted with the Form 2A.

Is this a sensitive area: [X] No [ ] Yes Was a Rule 901.e. Sensitive Areas Determination performed: [ ] No [X] Yes

Distance (in feet) to nearest surface water: 812 , water well: 2500 , depth to ground water: 100

Is the location in a riparian area: [X] No [ ] Yes Was an Army Corps of Engineers Section 404 permit filed [X] No [ ] Yes

Is the location within a Rule 317B Surface Water Suppl Area buffer zone:

[X] No [ ] 0-300 ft. zone [ ] 301-500 ft. zone [ ] 501-2640 ft. zone

If the location is within a Rule 317B Surface Water Supply Area buffer have all public water supply systems within 15 miles been notified: [ ] No [ ] Yes

15. Comments:

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct and complete.

Signed: Date: 10/31/2011 Email: ggriffin@oaconsulting.com

Print Name: Grant C. Griffin Title: Project Scientist

Based on the information provided herein, this Application for Permit-to-Drill complies with COGCC Rules and applicable orders and is hereby approved.

COGCC Approved: _____ **Director of COGCC** Date: _____

CONDITIONS OF APPROVAL, IF ANY:

All representations, stipulations and conditions of approval stated in this Form 2A for this location shall constitute representations, stipulations and conditions of approval for any and all subsequent operations on the location unless this Form 2A is modified by Sundry Notice, Form 4 or an Amended Form 2A.

Attachment Check List

Att Doc Num	Name
400217163	FORM 2A SUBMITTED
400219109	NRCS MAP UNIT DESC
400219110	LOCATION DRAWING
400219111	WELL LOCATION PLAT
400219112	HYDROLOGY MAP
400219113	REFERENCE AREA MAP
400219114	ACCESS ROAD MAP
400219116	CONST. LAYOUT DRAWINGS
400219117	LOCATION PICTURES
400219118	DOW CONSULTATION
400219636	PROPOSED BMPs
400219781	SURFACE AGRMT/SURETY

Total Attach: 12 Files

General Comments

User Group	Comment	Comment Date
Permit	Operator corrected SHL and surface and mineral info. Form has passed completeness.	11/2/2011 1:47:18 PM
Permit	Returned to draft. SHL needs to be from section lines. Surface and mineral owner info missing.	11/1/2011 6:44:19 AM

Total: 2 comment(s)

BMP

Type	Comment
Site Specific	Wattle, Earthen Berm, Diversion Ditch, Rock Sock Check Dam, Sediment Trap, Rock Armour, Cut and Fill Slope

Total: 1 comment(s)

FORM 2 Rev 12/05

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80205 Phone: (303) 894-2100 Fax: (303) 894-2109

DE	ET	OE	ES

Document Number: 400220246

PluggingBond SuretyID 20080107

APPLICATION FOR PERMIT TO:

1. [X] Drill, [ ] Deepen, [ ] Re-enter, [ ] Recomplete and Operate

2. TYPE OF WELL
OIL [X] GAS [ ] COALBED [ ] OTHER ____
SINGLE ZONE [X] MULTIPLE [ ] COMMINGLE [ ]
Refiling [ ] Sidetrack [ ]

3. Name of Operator: QUICKSILVER RESOURCES INC 4. COGCC Operator Number: 10255

5. Address: 801 CHERRY ST - #3700 UNIT 19
City: FT WORTH State: TX Zip: 76102

6. Contact Name: Pamela Osburn Phone: (817)665-4918 Fax: (817)665-5009
Email: posburn@qrinc.com

7. Well Name: PIRTLAW PARTNERS Ltd Well Number: 24-33

8. Unit Name (if appl): ____ Unit Number: ____

9. Proposed Total Measured Depth: 7800

WELL LOCATION INFORMATION

10. QtrQtr: SE SW Sec: 33 Twp: 7N Rng: 87W Meridian: 6
Latitude: 40.516138 Longitude: -107.155573

		FNL/FSL		FEL/FWL
Footage at Surface:	645 feet	FSL	1963 feet	FWL

11. Field Name: WILDCAT Field Number: 99999

12. Ground Elevation: 6945 13. County: ROUTT

14. GPS Data:
Date of Measurement: 08/25/2011 PDOP Reading: 1.8 Instrument Operator's Name: DOWLING LAND SURVEYORS

15. If well is [ ] Directional [ ] Horizontal (highly deviated) **submit deviated drilling plan.**

Footage at Top of Prod Zone:	FNL/FSL		FEL/FWL		Bottom Hole:	FNL/FSL		FEL/FWL	
Sec:	Twp:	Rng:			Sec:	Twp:	Rng:		

16. Is location in a high density area? (Rule 603b)? [ ] Yes [X] No

17. Distance to the nearest building, public road, above ground utility or railroad: 4850 ft

18. Distance to nearest property line: 646 ft 19. Distance to nearest well permitted/completed in the same formation(BHL): 4000 ft

20. LEASE, SPACING AND POOLING INFORMATION

Objective Formation(s)	Formation Code	Spacing Order Number(s)	Unit Acreage Assigned to Well	Unit Configuration (N/2, SE/4, etc.)
NIOBRARA	NBRR			

21. Mineral Ownership: [X] Fee [ ] State [ ] Federal [ ] Indian Lease #: ____

22. Surface Ownership: [X] Fee [ ] State [ ] Federal [ ] Indian

23. Is the Surface Owner also the Mineral Owner? [ ] Yes [X] No Surface Surety ID#:

23a. If 23 is Yes: Is the Surface Owner(s) signature on the lease? [ ] Yes [ ] No

23b. If 23 is No: [X] Surface Owners Agreement Attached or [ ] $25,000 Blanket Surface Bond [ ] $2,000 Surface Bond [ ] $5,000 Surface Bond

24. Using standard QtrQtr, Sec, Twp, Rng format enter entire mineral lease description upon which this proposed wellsite is located (attach separate sheet/map if you prefer):

SEE ATTACHED MINERAL LEASES

25. Distance to Nearest Mineral Lease Line: 649 ft 26. Total Acres in Lease: 2910

DRILLING PLANS AND PROCEDURES

27. Is H2S anticipated? ☐ Yes ☒ No If Yes, attach contingency plan.

28. Will salt sections be encountered during drilling? ☐ Yes ☒ No

29. Will salt (>15,000 ppm TDS CL) or oil based muds be used during drilling? ☒ Yes ☐ No

30. If questions 28 or 29 are yes, is this location in a sensitive area (Rule 901.e)? ☐ Yes ☒ No

31. Mud disposal: ☒ Offsite ☐ Onsite **If 28, 29, or 30 are "Yes" a pit permit may be required.**

Method: ☐ Land Farming ☐ Land Spreading ☒ Disposal Facility Other:

Note: The use of an earthen pit for Recompletion fluids requires a pit permit (Rule 905b). If air/gas drilling, notify local fire officials.

Casing Type	Size of Hole	Size of Casing	Wt/Ft	Csg/Liner Top	Setting Depth	Sacks Cmt	Cmt Btm	Cmt Top
CONDUCTOR	20	16		0	40			
SURF	12+1/4	9+5/8	36	0	1,200	545	1,200	0
1ST	8+3/4	7	26	0	6,400	540	6,400	0
2ND	6+1/8	4+1/2	13.5	0	7,800	160	7,800	5,400

32. BOP Equipment Type: ☒ Annular Preventer ☒ Double Ram ☒ Rotating Head ☐ None

33. Comments

34. Location ID:

35. Is this application in a Comprehensive Drilling Plan ? ☐ Yes ☐ No

36. Is this application part of submitted Oil and Gas Location Assessment ? ☒ Yes ☐ No

I hereby certify all statements made in this form are, to the best of my knowledge, true, correct, and complete.

Signed: Print Name: Pamela S. Osburn

Title: Sr. Regulatory Analyst Date: 11/2/2011 Email: posburn@qrinc.com

Based on the information provided herein, this Application for Permit-to-Drill complies with COGCC Rules and applicable orders and is hereby approved.

COGCC Approved: **Director of COGCC** Date:

API NUMBER

05

Permit Number: Expiration Date:

CONDITIONS OF APPROVAL, IF ANY:

All representations, stipulations and conditions of approval stated in the Form 2A for this location shall constitute representations, stipulations and conditions of approval for this Form 2 Permit-to-Drill and are enforceable to the same extent as all other representations, stipulations and conditions of approval stated in this Permit-to-Drill.

(1)COMPLIANCE WITH THE MOST CURRENT REVISION OF THE NORTHWEST COLORADO NOTIFICATION POLICY IS REQUIRED.

THE MOISTURE CONTENT OF ANY DRILL CUTTINGS IN A CUTTINGS PIT, TRENCH, OR PILE SHALL BE AS LOW AS PRACTICABLE TO PREVENT ACCUMULATION OF LIQUIDS GREATER THAN DE-MINIMIS AMOUNTS. AT THE TIME OF CLOSURE, THE DRILL CUTTINGS MUST ALSO MEET THE APPLICABLE STANDARDS OF TABLE 910-1.

39
NO PORTION OF ANY PIT THAT WILL BE USED TO HOLD LIQUIDS SHALL BE CONSTRUCTED ON FILL MATERIAL, UNLESS THE PIT AND FILL SLOPE ARE DESIGNED AND CERTIFIED BY A PROFESSIONAL ENGINEER, SUBJECT TO REVIEW AND APPROVAL BY THE DIRECTOR PRIOR TO CONSTRUCTION OF THE PIT. THE CONSTRUCTION AND LINING OF THE PIT SHALL BE SUPERVISED BY A PROFESSIONAL ENGINEER OR THEIR AGENT. THE ENTIRE BASE OF THE PIT MUST BE IN CUT.

6) THE SURFACE CASING IS MORE THAN 50' BELOW THE DEPTH OF THE DEEPEST WATER WELL WITHIN 1 -MILE OF THE SURFACE LOCATION WHEN CORRECTED FOR ELEVATION DIFFERENCES. THE DEEPEST WATER WELL WITHIN 1-MILE IS 350 FEET DEEP.

Attachment Check List

Att Doc Num	Name
400220246	FORM 2 SUBMITTED
400220265	PLAT
400220267	SURFACE AGRMT/SURETY
400220269	LEGAL/LEASE DESCRIPTION

Total Attach: 4 Files

General Comments

User Group	Comment	Comment Date
Permit	Operator corrected SHL. Form has passed completeness.	11/2/2011 1:59:14 PM
Permit	Returned to draft. SHL does not match plat.	11/2/2011 1:51:19 PM

Total: 2 comment(s)

BMP

Type	Comment

Total: 0 comment(s)

APPENDIX J. FEDERAL AVIATION ADMIN.

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2011-ANM-2558-OE

Issued Date: 10/26/2011

Cindy Keister
Quicksilver Resources Inc
777 W. Rosedale St.
Fort Worth, TX 76104

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Drilling Rig Pirtlaw Partners Ltd 24-33 - DHS Rig #6
Location:	Hayden, CO
Latitude:	40-30-58.10N NAD 83
Longitude:	107-09-20.06W
Heights:	6944 feet site elevation (SE)
	165 feet above ground level (AGL)
	7109 feet above mean sea level (AMSL)

This aeronautical study revealed that the temporary structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is (are) met:
As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, flags/red lights - Chapters 3(Marked),4,5(Red),&12.

Any height exceeding 165 feet above ground level (7109 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 04/13/2013 unless extended, revised or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates and heights. Any changes in coordinates and/or heights will void this determination. Any future construction or alteration, including increase to heights, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of a structure. However, this equipment shall not exceed the overall heights as

indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination did not include an evaluation of the permanent structure associated with the use of this temporary structure. If the permanent structure will exceed Title 14 of the Code of Federal Regulations, part 77.9, a separate aeronautical study and FAA determination is required.

This determination concerns the effect of this temporary structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Airman (NOTAM).

If you have any questions, please contact our office at (310) 725-6591. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2011-ANM-2558-OE

Signature Control No: 151146169-152577886 (TMP)
Tameria Burch
Technician

APPENDIX K. EMERGENCY RESPONSE PLAN

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

A hardcopy version of the Quicksilver Resources, Inc. Emergency Response Plan has been provided to the Routt County Planning.

Document provided to Routt County Planning Department on: 09/09/2011

A digital copy of the document is included with the electronic version of the application submittal.

Document Change Log:

Any changes and/or updates to the Emergency Response Plan are noted below.

No changes have been made to the document as of the date of this submittal (September 2011).

Change Date	Description of Change
None	None

Site Specific

Emergency Response Plan

"Life Safety is our #1 Priority"

WHAT TO DO AT THE SCENE OF AN EMERGENCY

In an emergency, four priorities shall be maintained:

- *Protection of Life*
- *Protection of Property*
- *Protection of Environment*
- *Preservation of Evidence*

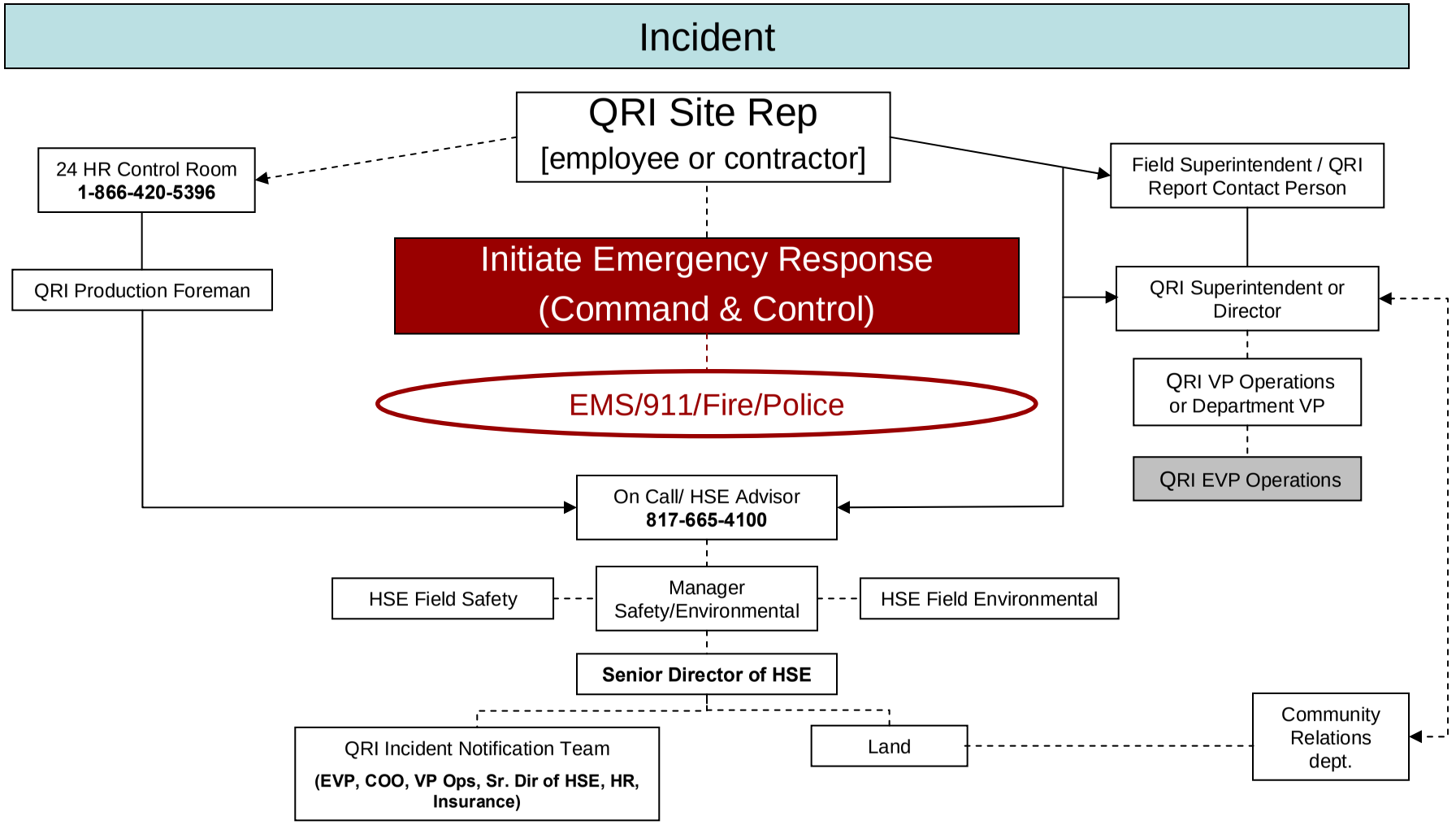
1. Remain calm. Assess the situation (determine the problem, extent and action required).
2. Evacuate and call for help (raise the alarm) and notify Supervisor.
3. Call emergency services, as required.
4. If applicable, administer first aid.
5. If safe to do so, and within your capability, take corrective action to control the source of the emergency.
6. Senior employee on site to provide information to the Incident Commander.
7. Declare the "All-Clear" message when the situation has been resolved.

HSE On Call 1-817-665-4100

Emergency 1-866-420-5396

Revision Date: 5/25/2011

Incident Reporting Structure
(Field)



Legend:

---------- If required based on Incident type, severity and potential.

⟷ Two-way communication

Examples of emergency contacts if no local emergency response system is available.

QRI Drug & Alcohol

- QRI has the right to invoke Drug & Alcohol testing

FIRST RESPONSE SAFETY

QUICKSILVER RESOURCES INC.

Incident Responder
QRI personnel (operator/site consultant/etc)
Responding to incident
Do Not Panic
[Immediate notification required]

STEP **1**

Initial Emergency Response
- Evacuate from any hazardous area
- Sound alarm / call **Emergency Services and Provide**
  - Location
  - Brief description of incident: who, what, when
  - Number of injured personnel
  - Current status of emergency
- Assess current hazards
- If life safety is assured, take immediate actions to gain control, shut down, isolate, depressurize or contain incident following safe work procedures

Initial Rescue Operations
(IF SAFE TO DO)
- Ensure Safety
- Put on personal protective equipment
- Move victim(s) to safe area
- Administer medical aid
- Confirm emergency services have been dispatched (if not already on scene)

Secure the Area
- Establish perimeters for the on-site hazardous area
- Ensure all personnel are accounted for
- Mobilize additional personnel / resources as necessary
- Isolate hazard area and restrict entry
- Establish barriers/roadblocks using available resources

Communication / Reportable Incidents
- Maintain communication with Emergency Services
  - Contact QRI as per protocols
  - Confirm alert level
  - Assist with additional resources
  - Alert & coordinate with other QRI departments

STEP **2**

Contact QRI Supervisor / Department Head

STEP **2A**

Contact QRI Corporate HSE
Dept. **1-817-665-4100**
HSE Corporate will follow these protocols:
1. Dispatch Safety Advisors if necessary
2. Notify other departments if necessary
3. Notify regulatory bodies if necessary

STEP **3**

Contact Regulatory Agencies
If the incident is reportable, ensure that all the proper regulatory agencies are notified. Notification to regulatory agencies will be made with guidance from QRI HSE.

STEP **4**

Initial Incident Report
Initial incident reports with as much information & detail possible (who, what, when, where) – including names, contract company names, and all persons contacted with time. Complete & submit to HSE within 24 hours.

STEP **5**

Follow-up
Debrief crews.
Work through incident management process.

STEP **5A**

Complete Incident Investigation and Regulatory Follow-up

“Life Safety is our #1 Priority”

1	**Level 1 Emergency**: a **LOW EMERGENCY**, where immediate control of the hazard is becoming progressively more complex because of the deteriorating conditions. Control and relief systems functioning correctly. The types of events that could be described as Level 1 Emergencies are those which cause minor property or equipment damage that are non disruptive to operations, and the safety risk to personnel, property or environment is contained essentially on site with possible impact off site, with minor or short term effect. The following are example of a Level 1 Emergency: • Minor spill or fire contained to property boundaries. (any spill or lease; or in excess of 10 gal on lease; or any release from a pipeline; or any release that my have an adverse affect, shall be reported to the QRI HSE, as soon as possible. • Property damage, theft or vandalism, under $10k. • Vehicular collision, no injuries, minor damage. • Odor complaint. • Uncontrolled flow to surface that is stopped quickly. • Down-hole mechanical problems during servicing of well. • Significant controlled well kick. • Significant continuous gas cut, mud and significant loss of circulation. • Any abnormal drilling completion, servicing, or testing problem with the potential to affect well control.
ALERT	An incident has occurred that has been immediately controlled through standard operating procedures and is now progressing towards a resolution and return to normal operations. There is no impact on the public or the environment off of the site.

CRITERIA

- First Responders
- Senior Employee at scene of incident/accident
- Site Representative

INCIDENT COMMANDER

INCIDENT

- o Assess situation and sound the alarm.
- o Call local emergency services (as necessary):
  - < Ambulance
  - < Fire Department
  - < Local Police
- o Remedial Action
- o Initiate Emergency Response plan.

WHAT TO DO AT THE SCENE OF AN EMERGENCY

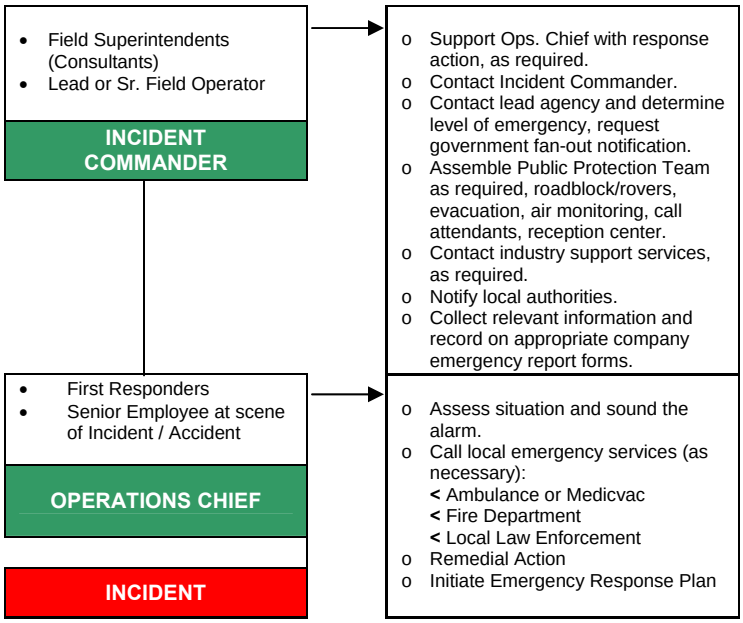
In an emergency, four priorities shall be maintained:

*** Protection of Life** ***Protection of Environment**
***Protection of Property** ***Preservation of Evidence**

1. **Remain calm. Assess the situation (determine the problem, extent and action required).**
2. **Evacuate and call for help (raise the alarm) and notify Supervisor.**
3. **Call emergency services, as required.**
4. **If applicable, administer first aid.**
5. **If safe to do so, and within your capability, take corrective action to control the source of the emergency.**
6. **Senior employee on site to provide information to the Incident Commander.**
7. **Declare the "all-Clear" message when the situation has been resolved.**

2	**Level 2 Emergency:** a MEDIUM EMERGENCY, which is disruptive but not extensive, and forces a portion of the Company operation to be temporarily suspended or shut-down. Impact to the public and workers safety on-site with possible impact off-site. Impact to environment on-site with some off-site minor or short term. Events or conditions which describe Level 2 Emergencies are incidents that have the potential to endanger the safety of personnel or the public outside of the boundaries of Company property, moderate environmental impact, media interest and would require the notification of government and external support services (regulatory / government agencies, police or others). There is a potential for multi-agency response (operator, municipal, provincial or federal). The following examples constitute a Level 2 Emergency: • Fire or explosions which have the potential to endanger the safety of personnel, reach outside of property, or cause damage to property and equipment. • Spill or hazardous product release which has the potential to cause harm to personnel or the environment that reaches outside of property. Spills that reach surface waters must be reportable QRI HSE immediately. • Weather conditions which could cause damage to property or equipment, or which could threaten the safety of personnel. • Vehicular collision resulting in injury and/or large amount of damage to property or others. • H_2S release of small volume which cannot be controlled. • Loss of control of circulation equipment while attempting to control a kick. • Property or equipment damage which is disruptive to operations. • Serious injury.

CRITERIA



WHAT TO DO AT THE SCENE OF AN EMERGENCY

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***Protection of Property** ***Preservation of Evidence**

1. **Remain calm. Assess the situation (determine the problem, extent and action required).**
2. **Evacuate and call for help (raise the alarm) and notify Supervisor.**
3. **Call emergency services, as required.**
4. **If applicable, administer first aid.**
5. **If safe to do so, and within your capability, take corrective action to control the source of the emergency.**
6. **Senior employee on site to provide information to the Incident Commander.**
7. **Declare the "all-Clear" message when the situation has been resolved.**

For further information refer to Section 2 – Emergency Levels

For further information refer to Section 3 – Roles and Responsibilities

3	**Level 3 Emergency**: a HIGH EMERGENCY that forces the indefinite shut down of Company operations. Imminent control of the hazard is not possible. Safe operating control has been lost, fatality, serious injury, or major loss has occurred, public safety is jeopardized extensive damage to Company property or equipment. Environmental impact on-site, with significant off-site and long term. There is significant media interest with immediate government involvement and support services required. Immediate multi-agency response (operator, municipal, state or federal). Significant incremental resources required. The following examples constitute a level 3 Emergency: o Fatality. o Major Fire or explosion. o Uncontrolled spill or hazardous product release. o Spill in major waterway. o Well blow-out. o Uncontrolled release of H^2S / CO_2 levels exceeding evacuation criteria.

CRITERIA

- **COO**
- **Drilling Completions Manager**
- **Facilities & Production Manager**
- **Community & Regulator Affairs Manager**
- **CFO**
- **V.P. Operations**
- **QEOC Manager**

QRI EMERGENCY OPERATIONS COMMITTEE

- o Assemble and notify, as required:
  - < President & Senior Management
  - < Legal Counsel
  - < Partners
- o Ensure internal and external approval is received before resuming operations where serious injury or death has occurred.

- **Field Superintendents**
- **Operation Coordinators**

INCIDENT COMMANDER

- o Support Operations Chief with response duties as required.
- o Verify with Operations Chief that the regulatory and government agencies have been notified:
  - < State Q&G Agency
  - < State ENV Agency
  - < EPA
  - < BLM
  - < NRC
  - < OSHA
- o Ensure all necessary notifications have been made and assist, as required.

- Field Superintendents (Consultants)
- Lead or Senior Field Operator

OPERATIONS CHIEF

- o Support Operations Chief with response action, as required.
- o Contact Incident Commander.
- o Contact lead agency and determine level of emergency, request government fan-out notification.
- o Assemble Public Protection Team as required, roadblock/rovers, evacuation, air monitoring, call attendants, and reception center.
- o Contact industry support services, as required.
- o Notify local authorities.
- o Collect relevant information and record on appropriate company emergency report forms.

- First Responders
- Senior Employee at scene of Incident / Accident

SITE MANAGER

- o Assess situation and sound the alarm.
- o Call local emergency services (as necessary):
  - < Ambulance or Medicvac
  - < Fire Department
  - < Local Law Enforcement
- o Remedial Action
- o Initiate Emergency Response Plan

INCIDENT

WHAT TO DO AT THE SCENE OF AN EMERGENCY

In an emergency, four priorities shall be maintained:

*** Protection of Life** ***Protection of Environment**
***Protection of Property** ***Preservation of Evidence**

1. **Remain calm. Assess the situation (determine the problem, extent and action required).**
2. **Evacuate and call for help (raise the alarm) and notify Supervisor.**
3. **Call emergency services, as required.**
4. **If applicable, administer first aid.**
5. **If safe to do so, and within your capability, take corrective action to control the source of the emergency.**
6. **Senior employee on site to provide information to the Incident Commander.**
7. **Declare the "all-Clear" message when the situation has been resolved.**

Driving directions:

Starting from the east side of Hayden, Colorado (E. Jefferson Ave and Shelton Street/Co Rd 183)

- Drive East on Highway 40 approximately 5.2 miles. Make a sharp turn North immediately after crossing the Yampa River onto County Road 70.
- Drive north on County Road 70 approximately 1.0 miles and look for access gate on the east side of the road. The access road is labeled, gated and locked.
- Drive uphill approximately 1.3 mile to the pad site.

Colorado Emergency Contacts for Routt County and Moffat County:

Moffat County

- Sheriff- Moffat County
  - Tim Jantz, Sheriff
  - 800 W. 1st St., Ste. 100
    Craig, CO 81625
  - Phone: 970-824-4495
  - Fax: 970-824-9780
- Local Police
  - Walter K Vanatta
  - 800 West First Street, Suite #300
    Craig, Colorado 81625
  - Administration Phone: 970-826-2360
- Fire Station
  - 419 Yampa Avenue
    Craig, CO 81625-2609
  - Phone: (970) 824-5914
- The Memorial Hospital
  - 750 Hospital Loop
    Craig, CO 81625
  - Phone: (970) 824-9411
- LEPC
  - Tom Soos
  - 221 S Victory Way #130
    Craig, CO 81625
  - Phone: 970-629-5102
- Craig Medical Flight Transport
  - Phone: 888-303-9112

Routt County

- Routt County Sheriff's Office
  - P.O. Box 773087
    2025 Shield Drive,
    Steamboat Springs, Colorado 80477
  - Phone: 970-879-1090

- Police Department
    - 840 Yampa Avenue
      Steamboat Spgs, CO 80487
    - Phone: (970) 879-1144
- Fire Station
    - 2600 Pine Grove Road
      Steamboat Spgs, CO 80487
    - Phone: (970) 879-6126
- Yampa Valley Medical Center
    - 1024 Central Park Drive,
      Steamboat Springs, CO 80487
    - Phone: 970-879-1322
- LEPC
    - Routt
    - Bob Struble
    - Box 773598
      Steamboat Springs, CO 80477
    - Phone:970-870-5551
- Steamboat Springs Air Ambulance
    - Phone: 888-303-9112

FIRE RESPONSE / EMERGENCY CONTACT

Per industry standards, Quicksilver Resources equips all field vehicles with appropriately sized and classified fire extinguishers. Except for manned facilities, fire extinguishers are not kept on location.

Location signage will include: No Smoking, Warning - Authorized Personnel Only and Emergency Contact Information.

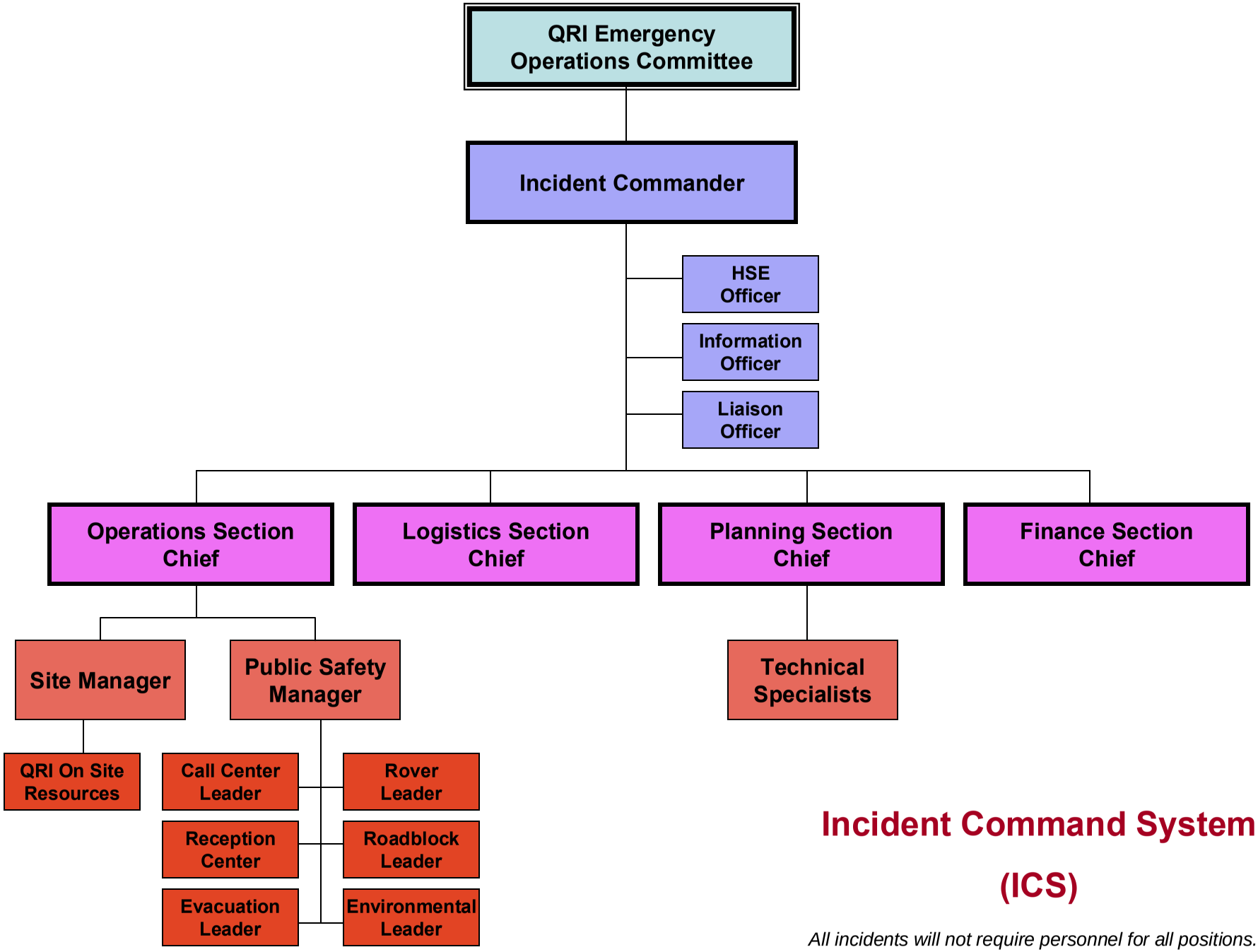
QUICKSILVER RESOURCES

Telephone Emergency: 817-665-4100

Updated: 5/26/2011 8:38

Name	Office #	Cell #
Corporate- Operations/Production		
Stan Page	**817-665-5480**	**817-917-9494**
Production/Operations- Colorado		
Scott Latka	**817-665-5000**	**307-262-6743**
Corporate- Drilling		
Joe Farley	**817-665-4881**	**682-225-7111**
Dennis Barrett	**817-665-4983**	**817-897-1423**
Ryan Hord	**817-665-5551**	**682-459-7971**
Hudson Wiley	**817-665-4033**	**817-564-2177**
Drilling (Colorado Field)		
Bryan Larson	**817-876-8969, 780-886-8969**	
Earl McCarty		**817-507-8658**
Brock Potts		**817-319-9514**
Steve Potts		**903-348-5844**
Al Davison		**403-382-5799**
Corporate- Completions		
Joe Farley	**817-665-4881**	**682-225-7111**
Carl Bowers	**817-665-4013**	**817-964-7371**
James Segars	**817-665-5478**	**817-372-5467**
Completions (Colorado Field)		
Corporate- Workover		
Joe Farley	**817-665-4881**	**682-225-7111**
Rodney Hicks	**817-665-5510**	**903-922-0422**
Workover (Colorado Field)		
Steve Ordway	**817-665-1229**	**817-894-7874**
Facilities		
Harry Browne	**817-665-4834**	**817-682-1918**
Corporate- HSE		
Keith Mouser	**817-665-4199**	**682-429-9784**
Gary Burnett	**817-665-4190**	**817-201-0030**
Todd Hutson	**817-665-5434**	**817-422-2883**
James Woodall	**817-665-4981**	**817-821-5352**
Sierra Mulvey	**817-665-4956**	**618-567-4562**
Maggie Aclin	**817-665-4975**	***817-343-5270***

Name	Office #	Cell #
HSE (Field)		
HSE On-Call Rep	**us-hse@qrinc.com**	**817-665-4100**
Alan Jenkins	**817-665-4036**	**817-964-5655**
David Chavira	**817-665-5585**	**817-240-5609**
Dawn Mitchell	**817-665-4043**	**817-213-7134**
Jared Black	**817-665-5431**	**817-709-9572**
Community Relations		
Stephen Lindsey	**817-665-4934**	**682-225-4030**
Judy Raab	**817-665-4933**	**817-296-9347**
Corporate Projects		
Daniel Mondragon	**817-665-5429**	**817-851-1918**
Surface Land		
Clay Blum	**817-665-4936**	**817-291-0648**
Brenda Murphy	**817-665-4937**	**817-718-1689**
Regulatory		
Cindy Keister	**817-665-5572**	**682-429-3861**
Purchasing / MSA		
Jim Glynn	**817-665-4028**	**817-709-4396**
Marketing		
John Hinton	**817-665-4990**	**817-524-5564**
Beth Conrad	**817-665-5388**	**682-225-6093**
IT Department		
Dan Kunko	**817-665-4940**	**817-455-8713**
HR Department		
Rena Mundy	**817-665-4035**	**817-228-0568**



Incident Command System (ICS)

All incidents will not require personnel for all positions.

Report incidents immediately to HSE 24 hr on-call # 817-665-4100

Submit written incident report within 24 hrs US-HSE@QRINC.COM

This Quick Response Guide is provided as a supplement to the Quicksilver Emergency Response Plan (ERP). All employees and contractors should be familiar with the ERP and trained to fulfill any roles they may be assigned. This guide does not replace the ERP nor the requirement for adequate training.

QUICKSILVER RESOURCES

First Responder's Guide

"Life Safety is our #1 Priority"

WHAT TO DO AT THE SCENE OF AN EMERGENCY

In an emergency, four priorities shall be maintained:

- *Protection of Life*
- *Protection of Environment*
- *Protection of Property*
- *Preservation of Evidence*

1. Remain calm. Assess the situation (determine the problem, extent and action required).
2. Evacuate and call for help (raise the alarm) and notify Supervisor.
3. Call emergency services, as required.
4. If applicable, administer first aid.
5. If safe to do so, and within your capability, take corrective action to control the source of the emergency.
6. Senior employee on site to provide information to the Incident Commander.
7. Declare the "All-Clear" message when the situation has been resolved.

911 or Local Emergency Number or QRI Corporate Emergency Number

1-866-420-5396

What Is An Emergency?

An emergency is an unexpected or unplanned event that demands immediate attention and has, or could result in:

- Harm to people
- Damage to property or the environment
- Loss of process or profit

If your training and experience indicates that a state of emergency exists, do not hesitate to initiate these Emergency Response Procedures immediately.

You must:

• Evaluate and Evaluate	Assess the situation, ensure there are no continuing hazards to yourself or others.
• Sound the Alarm	Alert other personnel of the situation, immediately notify your supervisor and a Quicksilver supervisor.
• Get Help	Enlist the aid of others.
• Give Help	Only when and if it is safe to do so, initiate rescue operations.
• Secure the Area	Control on-going hazards and limit access to the area.

LIFE SAFETY IS YOUR FIRST PRIORITY

Emergency Response Principles

Quicksilver Emergency Management Principles are to:

- Protect lives (personnel, responders, public).
- Effectively rescue and treat casualties.
- Minimize environmental impacts.
- Minimize damage to company, public, and private property.
- Effectively use the combined resources of Quicksilver, mutual aid partners, the government and other external services.
- Provide factual information to news media and other stakeholders on a timely basis.
- Preserve records and evidence for use in post-incident investigations.
- Protect shareholder value.

Heart Attack

Warning Signals

- Persistent heavy pressure or squeezing pain in chest which may move to arms or jaw.
- Shortness of breath, pale skin, sweating and weakness.
- Nausea and/or vomiting.
- Abdominal discomfort with indigestion and belching.
- Apprehension or fright.

Actions

- Seek immediate medical attention using the Emergency Procedures in front of the booklet.
- Place victim in position of comfort.
- Reassure that help is on the way.
- Loosen constricting clothing.
- Keep victim quiet but avoid physical restraint.

Unresponsiveness

1. Check for unresponsiveness:
   - Tap or gently shake victim. Shout-“Are you OK?”
   - Send someone to phone or phone for help yourself.
   - If a head or neck injury is suspected, only move the victim if absolutely necessary.
2. If no response-roll victim towards you onto their back.
3. Open the airway by tilting the head backward or if you suspect a head or neck injury, by lifting the jaw.
4. Check for breathing:

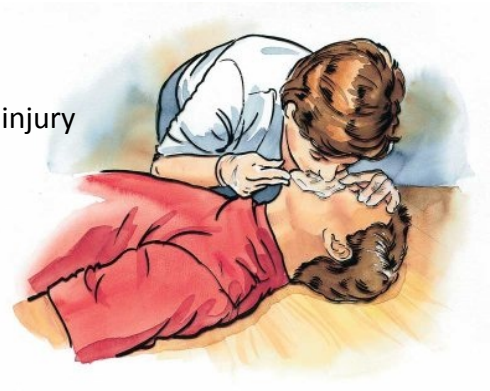
   - Look for chest movement
   - Listen for breathing; and
   - Feel for breath on your cheek.

5. If victim is not breathing see ABC’s of CPR.
6. If victim is breathing but injuries are apparent:
   DO NOT MOVE VICTIM.
7. If victim is unresponsive and breathing with no head or neck injuries, put victim in the recovery position pictured.

ABC's of CPR

To perform CPR properly you MUST have classroom instruction.

Do not move the neck if you suspect head or neck. Otherwise:



A. Airway

Open the airway by tilting the head backward. If there is a head or neck injury suspected, open the airway by lifting the jaw and DO NOT move the neck.

B. Rescue Breathing

1. Look for chest movement.
2. Listen for breathing.
3. Feel for breath on your cheek.
4. If not breathing begin rescue breathing immediately:
   - Keep head back.
   - Pinch nose shut.
   - Place moth over victims-if victim is an infant place over both nose and mouth. Mouth-to-nose breathing can be used if unable to cover the infant's nose and mouth.
   - Give 2 slow breaths-the correct amount of air for each breath is the amount that causes the chest to rise.
   - Continue with 1 breath every 5 seconds-1 every 3 seconds for an infant or child.
5. If air does not enter victim's chest-refer to choking.

UNRESPONSIVENESS ABC'S OF CPR

C. Circulation (CPR)

1. Look for visible signs of circulation (no longer than 10 seconds). Look for any response to rescue breaths such as coughing, movement, or normal breathing.
2. If signs of circulation are present---continue rescue breathing.
3. If no signs of circulation are present---begin chest compressions.
   - Place victim face up on a hard, flat surface.
   - Place both hands—one on top of the other—in the center of the chest, right between the nipples.

Adult press straight down to compress chest 1 ½”- 2” at a rate of 100 times per minute. After every 15 compressions give 2 slow breaths. Repeat sequence 4 times and reassess looking for signs of circulation.

Child (1-8 yrs.) compress chest 1”- 1 ½” with heel of one hand 100 times per minute. After every 5 compressions give 1 breath. Repeat sequence 20 times and reassess looking for evidence of circulation.

If no signs of circulation—resume CPR.
If signs of circulation are present---check breathing.

Infant CPR (1 year or less)

1. Look for visible signs of circulation (no longer than 10 seconds). Look for any response to rescue breaths such as coughing, movement, or normal breathing.
2. If signs of circulation are present—continue rescue breathing. Place mouth over infant's nose and mouth and use small breaths. Mouth-to-nose breathing can be used if unable to cover the infant's nose and mouth.
3. If no signs of circulation are present –begin chest compressions:
   - Place middle and ring fingers on the breastbone, 1 finger-width below an imaginary line between the nipples.
   - Compress chest ½"-1" at a rate of 100 times per minute.
     After every 5 compressions give 1 ventilation.
     Repeat sequence 20 times and reassess looking for evidence of circulation.

If no signs of circulation---resume CPR.

If signs of circulation are present----check breathing.

Choking

1. If victim can speak or cough:
   - Reassure and encourage coughing to force out the obstruction.
   - Never hit on the back.
   - If coughing persists seek immediate medical attention referring to *Emergency Procedures.*
2. If victim cannot speak or cough but is conscious: Ask, "Are you choking?" If yes:
   - From behind, slip your arms around victim's waist.
   - Make a fist with one hand & grasp with other hand. Place above navel.
   - Press into abdomen with a quick upward thrust.
   - Repeat until object if expelled or victim's becomes unresponsive.
3. If victim becomes unresponsive:
   - Send for help or phone for help yourself.
   - With victim's face up, open airway and attempt to ventilate. If air does not enter victim's chest, begin CPR (refer to ABC's of CPR).

   Remember to open the airway wide when giving 2 slow breaths. Look for a foreign object and remove if seen. Blind finger sweeps should not be performed.
   - Rep eat CPR sequence until airway is cleared or medical personnel arrive.

4. If victim is found unresponsive:
   - Send for help or phone for help yourself.
   - With victim's face up, open airway and attempt to ventilate. If air does not enter victim's chest, begin CPR (refer to ABC's of CPR.)

   Remember to open the airway wide when giving 2 slow breaths. Look for a foreign object and remove if seen. Blind finger sweeps should not be performed
   - Rep eat CPR sequence until airway is cleared or medical personnel arrive.

Poisoning

Poisons can enter the body by swallowing, by inhalation, by absorption through the skin, and through snake or insect bites.

Treatment

- Remove victim from exposure.
- Determine level of consciousness (see Unresponsiveness).
- Check victim's airway, breathing and circulation (see ABC's of CPR).
- Do not give anything to drink until instructed to do so.
- Phone the nearest poison control center; 911 or _____ with the following Information:
  - Your name, address, phone #
  - Victim's name and age
  - What poison is suspected
  - When the poison was taken
  - What symptoms occurred
  - What steps you have taken

Follow the instructions given by the poison center. If a phone is not available, follow first aid instructions on the label of the container.

Bleeding

Internal Bleeding

A victim can lose large amounts of blood before the condition is recognized.

Signs and Symptoms

- Bruises or abrasions of the skin over the chest or abdomen.
- Edema or swelling.
- Black-brown vomit that resembles coffee grounds.
- Black, tarry bowel movements.
- Coughed-up blood that is either bright red or contains dark lumps of blood.
- Anxiety or restlessness.
- Nausea and vomiting.
- Altered level of consciousness.

Treatment

- Seek immediate medical attention using the *Emergency Procedures* in the front of this booklet.
- Lay victim down and elevate legs 12” if not injured.
- Cover the victim with a light blanket and offer reassurance.
- Do not give the victim anything to eat or drink.

External Bleeding (Latex gloves should be worn.)

1. Apply direct pressure
   - Place sterile dressings or clean cloth over wound.
   - Apply firm steady pressure with your hand over cloth. If cloth is not available, have victim apply pressure over wound with his or her own hand.
   - Use your bare hand only if absolutely necessary.
2. Elevate body part
   - If an extremity is bleeding and a broken bone is not suspected—elevate the part above the level of the heart.
3. Apply pressure bandage
   - It maintains pressure and holds dressings in place.
   - If blood soaks through, apply additional dressings on top of old dressings. Bandage more firmly.
   - If bleeding cannot be controlled—seek immediate medical attention using the *Emergency Procedures* in the front of this booklet.

Impaled Object

- Do not remove the object.
- Prevent movement by stabilizing object with bulky dressings.
- Control any bleeding by bandaging the dressings in place around the object.
- Seek immediate medical attention using the *Emergency Procedures* in the front of this booklet.

Nose Bleeds

- Seat victim with head tilted forward.
- Pinch nostrils firmly for at least ten minutes.
- Avoid nose blowing.
- If bleeding persists, seek medical attention.

Bone and Joint Injuries

1. Help victim find a comfortable position. If a head or neck injury is suspected do not move victim.
2. Seek medical attention:
   - If you suspect head, neck or back injury.
   - If walking or breathing is difficult.
   - If there are multiple injuries.
3. Suspect a broken bone if extremity is swollen, deformed or movement is painful.
4. Immobilize
   - Bone Injuries: splint the joint above & below the injured bone.
   - Joint Injuries: splint the bone above & below the injured joint.

   Splint all extremity injuries in the position found.

   Note:
   - If there is no open injury to the skin: apply cold pack over the injury. Do not apply directly to skin.
   - If the extremity is splinted and movement does not increase discomfort, elevate body part.

Burns

Ensure there is no further danger and stop the burning process.

First Degree Burns (Reddened areas of skin and extremely painful)

Second Degree Burns (Reddened areas of skin and extremely painful)

Third Degree Burns (White, charred, dry, leathery appearance with little or no pain)

Seek medical attention when:

- Burns are to the face, eyes, ears, hands, feet or genital area.
- More than 10% of body surface is burned (palm of hand = approx. 1%).
- There are third degree burns.

- Victim is under 14 or over 65
- The victim has any serious underlying medical condition.
- Electricity was the cause of burn.

Treatment

- Cool burned area with cool but not cold water until the burning or pain stops.
- If a large area of the body is burned, do to attempt to cool as it may lower body temperature.
- Remove or cut away loose clothing.
- Remove jewelry.
- Cover burn with sterile, dry, non-stick dressings and loosely bandage.
- Cover victim with clean sheet or blanket to keep warm.
- Elevate burned area if possible.

Chemical Burns

Chemicals will continue to burn as long as in contact with skin.

- Ensure it is safe to brush off dry chemicals.
- Remove off dry chemicals.
- Remove contaminated clothing.
- Wash area with soap and water.
- Repeat procedure.
- Change clothes completely.
- Cover lightly with clean dressing.

Electrical Burns

Never touch a victim of an electrical accident until you are sure the power is off.

- Look for both an entrance and exit wound.
- Cover with moist sterile dressings.

REMEMBER

Never breathe on, cough on, or touch burns. **Never** open blisters. **Never** tear away clothing stuck to burns. **Never** apply medications, ointments or greasy substances to burn area.

Fever

Average Temperature: 98.6 °F (37 °C)
Fever is a much more important indicator of severity of illness in an infant or child than in an adult.

Treatment

- Keep victim cool but not chilled.
- Increase intake of fluids.
- Give fever reducing medication if necessary. Never give ASA(acetylsalicylic acid) or aspirin products to an infant or child. Use acetaminophen instead.
- Sponging, using only tepid or lukewarm water, is effective when medication is not working, or when an infant if under 6 months old. Or to make an infant or child more comfortable.

Do not "starve" a fever, force rest, overdress, or give an enema to a person with a fever.

Seek medical attention when

- Infant is under 2 months old.
- Fever is over 105°F (40°C).
- Infant has difficulty breathing.
- Infant has a convulsion.
- You suspect heatstroke.

Seizures

Seizure activity is a result of a temporary brain dysfunction. Generalized seizures can be characterized by a loss of consciousness and often uncontrollable muscle movement which is also called a convulsion. A seizure may be caused by injury, disease, fever, infection or unknown reasons.

Treatment

Treatment is aimed at maintaining an airway and preventing injury to the victim.

- Place victim on floor or ground and clear away anything that might cause injury.
- Loosen any restrictive clothing.
- Never attempt to restrain victim or place anything in the mouth of a convulsing person.
- Seek immediate medical attention using *Emergency Procedures* in front of this booklet.
- Following the seizure, threat the victim as in the *Unresponsiveness* section.

Diabetic Emergency

A diabetic emergency is brought about by decreased insulin production or an inability of the body to use insulin properly.
Diabetic emergencies are caused by an imbalance in a person's sugar and insulin levels.
Hyperglycemia: too much sugar in the body.
Hypoglycemia: too little sugar in the body.
Either condition can be life threatening if not treated properly.

Signs and Symptoms

You do not have to be able to tell the difference between hypoglycemia and hyperglycemia—the first aid treatment is the same. The person may present some of the following signs and symptoms:

- Feeling or look of illness
- Fever
- Change in the level of consciousness—dizziness, confusion, drowsiness or unconsciousness
- Pale sweaty appearance
- Rapid respirations
- Rapid pulse
- Irritability
- Abdominal pain, nausea and vomiting

Treatment

- Seek immediate medical attention using the *Emergency Procedures* in the front of this booklet.
- If the victim is conscious, assist them in drinking something sweet. For example, a drink sweetened with extra sugar or honey.

Note

- Never give anything by mouth to an unconscious victim.
- When in doubt, give sugar. Do not give insulin.

You will not harm a hyperglycemic victim by giving sugar, but you may save the life of a hypoglycemic victim.

Animal Bites

Bites from dogs, cats, foxes, skunks, bats, etc.

All animal bites should be taken seriously. Only a physician can assess the danger of tetanus or rabies. A complete description of the animal including location of the encounter should be given to police.

Treatment

- Control bleeding
- Wash wound with mild soap and water
- Cover the sterile dressings and bandage
- Seek medical attention

Snake Bites & Spider Bites

Treatment

- Have victim lie down and stay calm and quiet.
- Flush bite area with warm soapy water.
- Keep limb below level of heart.
- Apply a cold compress.
- Seek immediate medical attention using the *Emergency Procedures* in front of this booklet.
- If it is safe to, kill the snake or spider and take it to the hospital for identification. Use extreme caution and do not become a victim yourself. Get a description of the snake or spider if possible.

Tick Bites

Ticks are small insects that burrow into the skin and can cause serious diseases.
The head of a tick tenaciously resists removal.

- Do not try and remove ticks with unprotected fingers.
- Do not cover the tick with heavy oil, petroleum jelly or nail polish.
- Do not try to burn the tick off with an intense heat source.
- Remove tick with tweezers grasping it as close to the skin as possible. Pull slowly. If tweezers are not available, use plastic wrap or glove.
- Wash the area thoroughly with soap and water.
- After exposure to a tick, if victim develops fever with chills, headache or muscle aches—seek immediate medical attention.
- If possible, place the removed tick in a jar and take it to the hospital for disease testing.

Insect Stings

Insects stings can be very serious if an allergic reaction develops.
Be on the lookout for generalized swelling around the eye lids, lips or tongue, generalized itching, hives, flushing, confusion or convulsions.
These reactions require immediate medical attention. Use the *Emergency Procedure* in front of this booklet.

Treatment for stings—in the absence of an allergic reaction

- If present, remove stinger by scraping it lightly back and forth. Do not squeeze or use tweezers.
- Be extra vigilant for allergic reactions after stinger is removed. Some stingers release venom upon removal.
- Wash the wound thoroughly with warm soapy water.
- Apply an ice or cold pack over the area to reduce pain and swelling. Never apply ice directly to skin.
- If suffering multiple stings, stir a box of baking soda into a tepid bath and soak.
- A soothing lotion such as calamine can be applied to reduce itching.

Eye Injuries

1. Eye wounds (All injuries to the eyeball are serious)
   - Never apply direct pressure on the eyeball.
   - Cover both eyes with a sterile dressing and bandage lightly.
   - Seek immediate medical attention.

2. Chemical burns of the eye (Chemical burns of the eye are often the most serious eye injuries)
   - Flush eye with clean running water for at least 15-30 minutes.
   - Contact lenses must be removed or flushed out because they will trap chemicals.
   - If only one eye is affected, flush away from the unaffected eye.
   - Continue flushing until medical help arrives.

3. Foreign objects in the eye
   - Never try to remove embedded particles or rub the eye.
   - Instruct the victim to blink several times causing a flow of tears that may wash out the particle.
   - If this does not work, flush the eye with clean water.
   - If unable to clear eye of particle or if any irritation persists seek medical attention.

Heat Injuries

Heat Stroke

High body temperature with the inability to sweat may be fatal.

Treatment

- Remove victim to cool area.
- Decrease body temperature by sponging with cool water and applying cool packs to the neck, armpits and groin
- Seek immediate medical attention using *Emergency Procedures* in front of booklet.

Heat Exhaustion

Exertion or exposure to hot humid environments with loss of body fluids.

Treatment

- Remove victim to cool area.
- If conscious, give fluids to drink.
- Loosen constrictive clothing and apply cool wet cloths to skin.
- If victim's condition does not improve or worsen, seek immediate medical attention.

Heat injuries appear similar except:

Heat Stroke:	High body temperature Hot, flushed, dry skin
Heat Exhaustion:	Normal body temperature Wet, clammy skin

Cold Injuries

Hypothermia

Loss of body heat.

Treatment

- Get out of the cold.
- Remove wet clothing and dry the victim.
- Wrap in blankets or dress in warm clothing.
- Warm victim by using your own body heat. If isolated, use vehicle heater or make a fire.
- If conscious, give victim warm non-alcoholic drinks.
- Seek medical attention.

Frostbite (freezing of tissue)

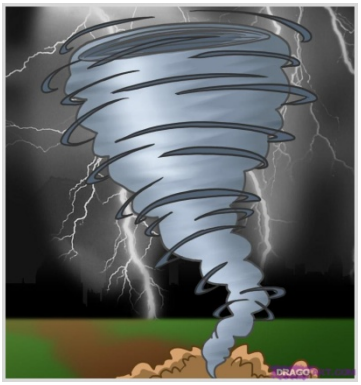
The affected area turns white and sense of feeling is lost.

Treatment

- Get out of the cold.
- Place body part in warm water 105 °F (40°C) and warm until part is red & warm. If a thermometer is not available, consider the water too hot if it is uncomfortable to touch.
- Place dressings between fingers and toes prior to bandaging.
- Cover affected area with dry sterile dressings.
- Do not break blisters.

Tornado

A tornado is nature's most violent form of storm activity Producing spiraling winds between 75-300 miles per hour, the forward motion of the funnel may be quite erratic at a forward speed of 30-70 miles per hour. It is recognizable by a funnel cloud hanging from the base of a dark, ominous looking storm cloud.



Tornado Watches and Warnings

1. A severe thunderstorm warning may include the phrase "severe thunderstorms can produce tornados." This does not mean there will be a tornado, but a tornado could develop.
2. A tornado watch means that the conditions are right for a tornado. This is a "watch" only. Stay alert and listen to your radio.
3. A tornado warning means that a tornado has touched down or spotted. Take precautions immediately and listen to your radio for updates.

Remember—a watch is an advisory only. Nothing may happen but a watch could develop into a warning. Stay alert! Listen to your radio.

Remember—a warning means that the event is imminent. Take precautions and listen to your radio.

Before a Tornado

- Know your facility's disaster plan.
- Know the location of designated shelter areas.
- Have an emergency kit containing high energy food, liquids, changes of clothing, blankets, medication, first aid supplies, a battery powered radio, flashlights and batteries.
- Practice disaster drills.
- Know the location of main electrical panels, gas and water valves. Know how to turn them off.
- Establish a prearranged meeting place where you can meet family members after the disaster.
- The Red Cross will set up a Registration/Inquiry service following a major disaster.

Shelter

- The designated shelter site is an ideal storage place for your emergency kit.
- It is wise to select shelter options in advance.
- A suitable shelter must be easily accessible and offer protection from flying glass, debris and furniture.
- Seek refuge near the basement wall in the most sheltered and deepest part of the basement.
- In facilities without basements, take cover in the smallest room that has stout walls, or under heavy furniture. You may also use a tipped over upholstered couch or chair.
- Trailers or mobile homes should be abandoned in favor of a pre-selected shelter—even a ditch in the open is preferable.
- Avoid large halls, auditoriums, cafeterias, arenas or any facility with large roof spans. Seek an inner hallway, washroom or closet.

When a Severe Tornado Storm Threatens

- During heavy storms activity, use a battery powered radio as a source of information or advice.
- Check access to designated shelter area and emergency kits.
- Secure anything that might be torn loose or blown away.
- Listen to your supervisors and authorities.
- Avoid travel.
- If the storm approaches severe proportions, go to a designated shelter area.
- If driving, try to find a place to pull off the road such as a rest stop and wait for the storm to pass.
- If caught away from your home or office, seek shelter in a sturdy facility. Go to an interior hallway or washroom on the lower floor away from windows.

After a Tornado Impact

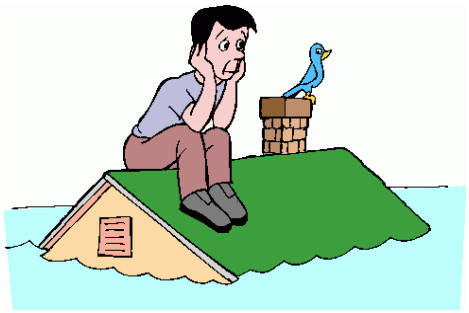
- Listen to your radio for information and follow instructions.
- Unless requested or qualified to give help, stay away from the affected area.
- Activate your pre-planned meeting arrangements.
- Avoid using the telephone except for emergencies.

TORNADO

Floods

Preparation

- Have material such as sandbags, plywood, plastic sheeting and lumber for diking. and protecting your property. Use only on the advice of your local emergency officials.
- Consider auxiliary electrical supplies for any essential services.
- Keep vehicle fueled.
- Keep a stock of non-perishable food items and water.
- Keep a battery powered radio, flashlight and extra batteries.
- Know potential danger areas in your local community.
- Listen to the radio for information and updates.



When You Receive Flood Warnings

- Store drinking water in clean bathtubs and containers.
- Remove valuables from basements and lower floors.
- Turn off power and gas.
- Grease machinery that cannot be moved.
- Plug basement outlets—sewer drains, toilet bowls, laundry outlets, etc. Plugs should be held in place with sandbags or with braces.
- Move to a safe area before you are isolated by flood water. Advice evacuation center or police of you whereabouts.

During the Flood

- Do not put yourself or those with you in danger by attempting to cross any flowing stream in a flood on foot or by driving over a flooded road.
- If your car stalls in a flooded area, abandon it immediately.
- If you are advised by the authorities or supervisors to evacuate, then do so. Ignoring such a warning could jeopardize you, your colleagues and rescuers.

After the Flood

- Do not use food that has come into contact with flood water.
- Check with local health authorities on drinking water purity.
- Wells should be pumped out and the water tested before drinking.
- Necessary medical, welfare and other services are available at established local evacuation centers.
- Do not handle live electrical equipment in wet areas.
- Use flashlights—not lanterns or torches—to examine facilities. Flammables may be inside.
- Report broken utility lines to appropriate authorities.

Do not visit the disaster area.

Power Failure

Electricity is such a dependable source of power we tend to forget that in many emergencies, power may be lost.

Power failures may last for a few minutes, several hours, or several days.

Regardless of the cause or duration, the results are the same: no lights, heat or refrigeration.

Anticipate a Power Failure

- Consider installing an auxiliary heater that does not require electricity.
- Do not burn open flame grills or use kerosene heaters inside due to risk of carbon monoxide poisoning.
- With an electric water system, store gallons of boiled water.
- Ensure you have extra supplies of warm clothing and blankets.

What to do in a Power Failure

- Remain calm and in place.
- Turn off any appliances and equipment.
- Many facilities have emergency lighting or alternate power sources (generators) which can supply electricity when normal power is lost.
- Be familiar with the locations of emergency lighting in your facility.
- Know the location of your Emergency Kit, flashlight and batteries. Avoid using candles—they can create a serious fire hazard.
- If available, turn on a battery powered radio to find out what is happening in your area.
- Follow the directions of supervisors and emergency authorities.
- Determine whether the phone system is operational.
- Report power failures to your local power company.

Earthquake

What is an Earthquake?

An earthquake is a vibration of a portion of the earth's crust, caused by the splitting or faulting of a mass of rock or other disturbances.
An earthquake can be severe and devastating or it may only be a mild shaking causing little or no damage. The shaking may last only a minute or two, but there may be a number of aftershocks that can occur over several days, weeks or months.

What Happens?

- Everything shakes and there is a lot of noise.
- Things may fall and break.
- The motion may be severe enough to throw a standing person to the ground.
- L ights, telephones, heat or air conditioning may stop working.

Biggest Dangers

- Falling objects such as pictures, ceiling tiles, fixtures or glass.
- Fires from broken natural gas lines or electrical short circuits.
- Electrical shock hazards.

Preparation

- Prepare a survival kit.
- Identify a shelter area.
- Practice disaster drills.
- Know location of main electrical panels, gas and water valves and how to turn them off.
- Know what procedures your office has in place.

During an Earthquake

- Do not run outside.
- Take cover underneath a desk or a piece of heavy furniture and hold on to it. If it moves, move with it.
- Face away from windows.
- If outside, stay in an open area. Do not enter a building.
- If in a vehicle—stop and remain in place until the shaking stops. Do not stop near trees, on or under bridges or power lines.

After an Earthquake

- Listen to your radio or television for information and instructions.
- Unless asked or qualified to give help, stay away from the affected areas.
- Do not use elevators.
- Activate your pre-planned meeting arrangements.
- Avoid using the telephone except for emergencies.

Severe Weather Travel

Travelling in severe weather conditions can be very hazardous.

Survival Kits

An Emergency Survival Kit should always be taken when travelling long distances or if There is the possibility of inclement winter weather.

- Matches, candles, tin can (for heat)
- Tissue
- Food Rations (granola/chocolate bars)
- Ground Sheet
- Maps
- Blankets
- Change of clothes
- Warm hat, mittens and socks
- Fire starter

Before Leaving

Always let a colleague or supervisor know you are leaving and give them the following information:

- Where you are going and what route you are taking.
- Any difficulties you expect.
- How long you expect to be away and when you expect to return.

When Travelling

- Start with a full tank of gas.
- Have a current road map.
- Drive defensively and with caution.
- Adjust your speed to road conditions.
- If the going gets rough—do not press on—turn back or seek refuge.
- Keep on the main roads.
- Keep your radio tuned to a local station for weather warnings.

When you arrive at your destination notify someone to let them know that you have arrived.

If You Get Stuck or Stalled

- It is very important that you stay in the car, keeping dry, warm and protected from the weather.
- Stay calm and relaxed.
- Avoid exposure or over exertion.
- Keep fresh air I the car by opening a window approximately ½” (1cm) on the side away from the wind.
- Ensure the exhaust pipe is not blocked by snow.
- Run your engine sparingly.
- Light a candle to provide warmth.
- Set out warning lights or flares. Keep watch for traffic or searchers.

If You Become Aware of a Co-worker Failure to Return on Time, Immediately:

- Notify your supervisor.
- Tell the police of the circumstances, departure time, and anticipated route. Request that they follow up.
- Give them any information regarding the reason for travel and destination.

Confined Space Rescue

Evacuate

- Evacuate the area and direct others to safety.

Sound the Alarm

- Start with a full tank of gas

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Advise the responding agency that is a confined space rescue emergency.
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions. Do not become a victim, numerous potential rescuers have been overcome and killed while attempting a spontaneous confined space rescue.
- Treat the atmosphere of the confined space as toxic until you can confirm otherwise.
- Attempt to communicate with the victim without entering the confined space.
- Confirm all sources of energy (i.e. electricity, steam, gas, process fluids) are isolated from the confined space.

Initiate Rescue Operations (if trained in entry rescue operation)

- Don Personal protective equipment (may include SCBA).
- Do an air quality assessment.
- Only enter the area if it is proven to be safe and secure and back-up has arrived.
- When it is confirmed safe to do so, remove any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

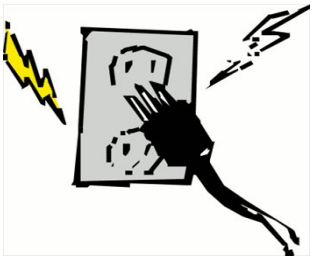
Secure the Area

- Control on-going hazards and limit/restrict access to the area.

Follow-up

- Ensure regulatory/government agencies have been notified as required.
- Complete an Incident Report.

Electrical Contact



Evacuate

- Evacuate away from the electrical contact and direct others to safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- If wires are down, notify the power provider and request assistance.
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Treat all electrical equipment and lines as live until you can confirm otherwise.
- Inspect the scene from a safe distance.

Secure the Area

- Control on-going hazards and limit/restrict access to the area.
- If possible, isolate and lock-out the electrical source following established safe work procedures.

Initiate Rescue Operations (as required)

- Never approach a casualty of an electrical incident until you can determine that the electrical source is isolated.
- When it is confirmed safe to do so, remove any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

Follow-up

- Ensure the appropriate regulatory and government agencies have been notified as required.
- Complete an Incident Report.

Failure / Collapse of Structures or Equipment

Evacuate

- Evacuate the area and direct others to safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Advise the responding agencies that this is a structural collapse and heavy rescue assistance may be required.
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Inspect the scene from a safe distance; use binoculars if practical.
- Check for toxic gases or explosive vapors. Human sense of sight or smell should not be trusted to determine hazards.
- Be aware of physical hazards such as falling debris, secondary structural failures, impaired access/ egress, fire, or explosions.
- Ensure all sources of ignition are eliminated.

Initiate Rescue Operations (as required)

- When an only if it is safe to do so, rescue any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

Secure the Area

- Control on-going hazards and limit/restrict access to the area.

Protect the Public

- Refer to site specific *Emergency Response Plan*.

Follow-up

- Ensure the appropriate regulatory and government agencies have been notified as required.
- Complete an Incident Report.

Fire / Explosion

Evacuate

- Evacuate the area and direct others to safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Inspect the scene from a safe distance; use binoculars if practical.
- Use appropriate monitoring and safety equipment and confirm its operation prior to entering or approaching the scene.
- Check for toxic gases or explosive vapors. Human sense of sight or smell should not be trusted to determine hazards.
- Ensure all sources of ignition are eliminated.
- Attempt to identify on-going fuel sources.
- For fires involving flame impingement on pressurized vessels, assess the potential for a BLEVE (Boiling Liquid Expanding Vapour Explosion).
- Be aware of physical hazards such as falling debris, structural failures, secondary fires or explosions, and access or egress.

Initiate Rescue Operations (as required)

- Don personal protective equipment.
- When an only if it is safe to do so, rescue any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

Secure the Area

- Control on-going hazards and limit/restrict access to the area.

Initiate Control & Containment Operations

- If life safety is assured, take immediate action to gain control, shut down, isolate or contain sources of fuel.
- Do not attempt to fight a fire unless you are familiar with the available fire- fighting equipment, understand the hazards and have back-up.
- For small fire management, attempt to extinguish using hand held extinguishers. Understand that a standard 30 lb. fire extinguisher discharges in approximately 35 seconds and has an effective range of only 9ft – 12ft.
- Do not fight electrical fires with water.
- For large files, ESD the facility and retreat to a safe area.

Protect the Public

- Refer to Public Protection Procedures for air monitoring, sheltering and evacuation information.
- Ensure public emergency response personnel understand and are trained to deal with the hazards Present at the facility prior to allowing them to enter a hazardous area.

Follow-up

- Ensure the appropriate regulatory and government agencies have been notified as required.
- Complete an Incident Report.

Gas Release

Evacuate

- Evacuate the area and direct others to safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Inspect the scene from a safe distance; use binoculars if practical.
- Use appropriate monitoring and safety equipment and confirm its operation prior to entering the scene.
- Check for toxic gases or explosive vapors. Human sense of sight or smell should not be trusted to determine hazards.
- Ensure all sources of ignition are eliminated.

Initiate Rescue Operations (as required)

- Don personal protective equipment.
- When an only if it is safe to do so, rescue any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

Secure the Area

- Control on-going hazards and limit/restrict access to the area.

Initiate Control & Containment Operations

- If life safety is assured, take immediate actions to remotely gain control, shut in, isolate, depressure or contain the gas flow following established safe work procedures.

Protect the Public

- Refer to site specific *Emergency Response Plan for Public Protection* procedures.
- Refer to the site specific *Emergency Response Plan for Ignition Criteria and Procedures* should ignition be a favorable control option.

Follow-up

- Ensure the appropriate regulatory and government agencies have been notified as required.
- Complete an Incident Report.

Injuries to Personnel

Serious incidents include:

- Fatalities.
- Injuries that are likely to result in a worker being admitted to hospital.

Evacuate

- Evacuate the area and direct others to safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Notify your supervisor, local control room and local office.

Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Inspect the scene from a safe distance; use binoculars if practical.

Initiate Rescue Operations (as required)

- Don personal protective equipment.
- When an only if it is safe to do so, rescue any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.
- Avoid disturbing areas not directly impacted by rescue activities.

Secure the Area

- Limit or restrict access to the area.
- The scene must be reserved to allow regulatory investigations to occur.
- Do not resume work until authorized to do so.

In the Event of a Fatality:

- The local police and OSHA must be notified immediately. See the site *Emergency Response Plan* for other immediate notifications.
- Do not disturb the body or its surroundings.
- Preserve the dignity of the deceased by coverings the body.
- Release the name of the deceased only to essential personnel (i.e. the police).
- Consult with Quicksilver Human Resources and/or the Emergency Management Team prior to attempting next-of-kin notification.

Quicksilver's Employee Assistance Program can be accessed to assist and support employees who have witnessed or otherwise been affected by a fatal accident.

Suspicious Package

Evacuate

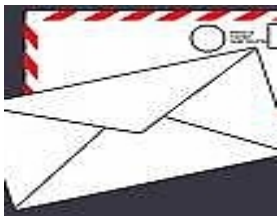
- Evacuate the area and direct others to safety.
- Do not handle or open any suspicious package.
- Do not approach any suspicious object.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire Department/ Police).
- Notify your supervisor, local control room and local office.



Assess Hazards

- Assume danger; resist the urge to rush in. Ensure others know and are aware of your actions and intentions.
- Be aware of letter and package bomb indicators (see diagram).
- Wash your hands if you have come in contact with a suspicious package/object.

Secure the Area

- Limit or restrict access to the area.
- Do not place the package or object in water or a confined space.
- Ventilate the area if possible.
- Wait for professional assistance, do not attempt to remove, inspect or defuse the package on your own.

Follow-up

- Ensure the appropriate regulatory and government agencies have been notified as required.
- Ensure Quicksilver HSE has been notified.
- Complete an Incident Report.

Threatening Phone Call

- Listen and remain calm.
- Do not interrupt the caller.
- Attempt to keep the caller talking.
- Attempt to ask questions.
- Record as much information as possible (use the form following this section).
- Signal someone to call for help (Police).
- Do not hang up or disconnect your phone, even after the caller hangs up.
- Notify Quicksilver Safety Hotline (817) 665-4100 and request immediate assistance.
- Notify your supervisor.
- Complete an Incident Report.

Threatening Telephone Call / Bomb Threat Record

THREATENING TELEPHONE CALL / BOMB THREAT CALL RECORD

DATE _____
TIME _____
CALLER'S SEX ☐ MALE ☐ FEMALE
APPROXIMATE AGE _____
ACCENT _____

- Listen and remain calm
- Do not interrupt caller
- Attempt to keep caller talking
- Attempt to ask questions below
- Record as much information as you can while call is in progress
- **Signal someone to call individuals indicated at bottom of page**
- **Give him/her this information**
- **Do not hang up or disconnect your phone** even after the caller hangs up

THREAT (*Exact Wording)*

IF BOMB THREAT:

QUESTIONS WHEN WILL THE BOMB GO OFF? (*date and time)*_____

WHERE IS IT LOCATED? _____

WHAT DOES IT LOOK LIKE? _____

WHY DID YOU PLACE IT? _____

DID CALLER REVEAL ANY IDENTIFYING PARTICULARS? (*i.e. nickname, familiarity with staff, etc.)*
DID CALLER APPEAR FAMILIAR WITH BUILDING /FACILITY BY DESCRIPTION OF BOMB LOCATION?

VOICE:	**SPEECH:**	**LANGUAGE:**	**MANNER:**	**BACKGROUND:**
☐ Loud	☐ Fast	☐ Excellent	☐ Calm	☐ Office Machines
☐ Soft	☐ Slow	☐ Good	☐ Angry	☐ Factory Machines
☐ High Pitched	☐ Distinct	☐ Fair	☐ Rational	☐ Street Traffic
☐ Deep	☐ Distorted	☐ Foul	☐ Irrational	☐ Airplanes
☐ Raspy	☐ Stutter	☐ Use of certain words or phrases	☐ Incoherent	☐ Trains
☐ Pleasant	☐ Nasal	_____	☐ Deliberate	☐ Animals
☐ Intoxicated	☐ Slurred	_____	☐ Emotional	☐ Party Atmosphere
☐ _____	☐ _____	_____	☐ Laughing	☐ Music
			☐ _____	☐ Voices
				☐ Quiet
				☐ _____

REMARKS:

_____
_____
_____

Others Advised

☐ Quicksilver HSE Time:_____

☐ Your Supervisor Time:_____

☐ Police, RCMP, or Sheriff Time: _____

SUSPICIOUS PACKAGE THREATENING PHONE CALL THREAT CALL RECORD

Workplace Violence

Workplace violence is defined as: “the threatened, attempted or actual conduct of a person that causes, or is likely to cause, physical injury”.

A threat includes any statement, written or verbal, which is uttered to intimidate any individual: this includes an indication of what may be done to hurt or punish someone. It also includes any action, sign or gesture that indicates possible harm or unpleasantness to another individual and/or that individual’s family or property.

Remain calm

- Try not to further agitate the individual.

Protect yourself and others

- Try not to further agitate the individual.

Call for help

- Request assistance from others.
- Notify your supervisor immediately.
- If at any time you feel physically threatened do to hesitate to request emergency assistance from the police.

Notify your Supervisor and Quicksilver Safety Hotline (817) 665-4100

Complete an Incident Report

Spills

Evacuate

- Protect life safety.

Sound the Alarm

- Alert other personnel.

Call for help

- Request assistance as appropriate from local emergency response services (EMS/Fire/Police).
- Contact QRI HSE.
- Notify your supervisor, local control room and local office.

Assess Hazards

- Inspect the scene from a safe distance; use binoculars if practical.
- Use appropriate monitoring and safety equipment and confirm its operations prior to entering the scene.
- Ensure all sources of ignition are eliminated.

Initiate Rescue Operations (as required and if needed)

- Don personal protective equipment.
- When and only if it is safe to do so, rescue any victims to a safe area and administer first aid.
- Confirm emergency services have been dispatched.

Secure the Area

- Control on-going hazards and limit/restrict access to the area.

Initiate Control & Containment Operations

- Determine the potential hazards and containments of the spilled substance and take the appropriate personal safety precautions (refer to the spilled product's Material Safety Data Sheet (MSDS)). Determine the source of the spill and prevent further loss of product, and if life safety is assured, immediately contain and secure the spill.
- Monitor to insure that no toxic or combustible vapors are present prior to and during cleanup.
- Determine the potential hazards or local conditions such as inclement weather, steep banks, water bodies, visibility, etc. Take all necessary precautions minimize hazards and ensure responders are fully aware of the potential risks.
- If the spill is not contained initiate containment measures such as; dikes, bell holes and trenches, to limit the area affected. Recover as much of the product as possible using equipment such as vacuum trucks, and skimmers.

Protect the Public

- Refer to Public Protection Procedures for air monitoring, sheltering and evacuation information in the site specific Emergency Response Plan.

Follow-up

- Confirm that the appropriate regulatory agencies are notified as required.
- Complete an Incident Report.

Initiate Remediation

- Spill remediation must begin immediately to minimize the long-term effects of contamination of the ecosystem.
- Consult with your HSE Advisor to determine the most effective remediation measures.

QUICKSILVER RESOURCES

Active ICS Plan

"Life Safety is our #1 Priority"

WHAT TO DO AT THE SCENE OF AN EMERGENCY

In an emergency, four priorities shall be maintained:

- *Protection of Life*
- *Protection of Environment*
- *Protection of Property*
- *Preservation of Evidence*

1. Remain calm. Assess the situation (determine the problem, extent and action required).
2. Evacuate and call for help (raise the alarm) and notify Supervisor.
3. Call emergency services, as required.
4. If applicable, administer first aid.
5. If safe to do so, and within your capability, take corrective action to control the source of the emergency.
6. Senior employee on site to provide information to the Incident Commander.
7. Declare the "All-Clear" message when the situation has been resolved.

911 or Local Emergency Number or QRI Corporate Emergency Number 1-866-420-5396

LIFE SAFETY IS OUR #1 PRIORITY

First Response Safety

Evacuate
- Evacuate the area and direct others to safety.

Sound the Alarm
- Alert other personnel.

Call for help
- Notify the local control room, local office, or the on-call supervisor.
- Activate the Site Specific Emergency Response Plan.

Assess Hazards
- Resist the urge to rush in; others cannot be helped if you are injured.
- Ensure your actions/intentions are known by others.

Initiate Rescue operations
- Only when safe to do so.
- Don personal protective equipment.
- Rescue victim to safe area.
- Revive victim.
- Administer first aid, maintain on going care; and
- Confirm emergency services have been dispatched.

Secure the Area
- Control on-going hazards and limit/restrict access to the area.

Emergency Operations Committee
- Support the Incident Commander by providing guidance and resources.
- Ensures continuity of operations in other areas of Quicksilver.

Confers with
- Incident Commander

Initial Actions
- Assemble in the Quicksilver Emergency Operations Center.
- Obtain a situation report from the Incident Commander.
- Evaluate impact of event on overall QRI Operations.
- Contact regulatory bodies.

Responsibilities
- In consultation with the Incident Commander develop and implement a comprehensive response plan.
- Identify and source all resources required by the Incident Commander (financial, physical, etc.).
- In consultation with the Incident Commander, declare emergency termination.

Post Incident
- Participate in the recovery operation and in the post-incident investigation.

Incident Commander
- Quicksilver Representative in charge of incident.
- Responsible for overall incident management, including the safety and health of all personnel and public.
- Initiates the Emergency Response Plan.

Confers with
- Direct reports
- Quicksilver Emergency Operations Committee

Gives direction to
- Operations Chief, Logistics Chief, Planning Chief, Finance Chief
- Incident Command Staff

Initial Actions
- Assess the situation and develop a preliminary response strategy.
- Appoint a Public Safety Manager and direct him/her to secure the site.
- Determine the initial Emergency Level (Alert, 1, 2, 3 – see Emergency Response Plan).

Responsibilities

- Ensure Responder life safety at all times.
- Maintain communication with the Operations Chief and the Emergency Operations Committee.
- Assess the situation and confirm the Emergency Level (Alert, 1, 2, 3) as required.
- If life safety is assured, and risk has been assessed, direct the Operations Chief to take immediate action to contain the incident.
- In consultation with the Operations Chief and Emergency Operations Committee, develop and implement a comprehensive response plan.
- Obtain a regular status report from the Operations Chief.
- Make a decision on ignition if required (refer to the Site Specific Emergency Response Plan).
- Fill the role of the Media Spokesperson until Public Affairs (Calgary) has appointed a spokesperson.
- Proactively appoint Command Staff functions to meet the needs of the particular situation while maintaining an effective span of control of 5:1.
- Document activities and encourage others to use the Event and Call Log in the Site Specific Emergency Response Plan.
- Confer with key government agency representatives.
- In consultation with the Emergency Operations Committee, coordinate notification of the next-of-kin.
- Ensure that personnel and Incident Command Staff are relieved as required (including yourself).

Post Incident

- Implement recovery efforts.
- Conduct post event debrief.
- Provide report to Emergency Operations Committee.

Deputy Incident Commander

- Assist the Incident Commander.

Takes direction from

- Incident Commander

Gives direction to

- Incident Command Staff

Initial Actions

- Assist the Incident Commander with the assembly of an incident response team and the development of a preliminary response strategy.

Responsibilities

- Fill Incident Command Structure positions as requested by the Incident Commander.
- Ensure a Recorder is appointed and events are being documented until Planning Chief is appointed.
- Assist with staff briefings and communications.
- Assist with notification and regular communication with the Emergency Operations Committee.

Post Incident

- Participate in recovery operations and the post-incident investigation at the direction of the Incident Commander.

Safety Officer

- Ensure the safety of all on-site Incident Responders.

Takes direction from

- Incident Commander.

Gives direction to

- All Incident Responders

Advises

- Operations Chief, Site Manager

Initial Actions

- Ensure all Responders are adhering to established safety protocols.
- Stop all unsafe activities.
- Aggressively make safety concerns known to the Operations Chief.

Responsibilities

- Ensure Responder Life Safety at all times.
- Recommend alternatives for any activities which are considered unsafe.
- Monitor activities and conduct a head count on a regular basis.
- Advise on safety issues related to any planned ignition.
- Ensure the proper usage of personal protective equipment.
- Ensure safe and adequate lighting is in place as required.
- Ensure only intrinsically safe radios are used in the hazard area (no pagers, cell phones, or cameras)
- Ensure proper grounding and bonding procedures are adhered to.
- Ensure that nobody, including contract personnel, work alone.
- Confirm each worker's suitability for work. Ensure workers who show signs of stress, fatigue or other adverse symptoms are demobilized and sent for treatment if necessary.
- Maintain records of all injuries and on-site medical treatments.

Post Incident

- Participate in recovery operations at the direction of the Incident Commander.

Information Officer

- Primary media contact, company spokesperson.

Confers with

- Emergency Operations Committee

Initial Actions

- Obtain initial facts and plans from the Incident Commander or the Emergency Operations Committee.
- Determine if local media are required to broadcast public safety messages.
- Prepare a Preliminary Media statement.

Responsibilities

- Answer requests from media (radio, television, newspaper).
- Proactively contact and update media sources as the situation changes.
- Develop and implement an Incident Specific Communications Plan.

Post Incident

- Confirm incident was reported in a realistic manner, that the facts were true and there was no misinformation.

Liaison Officer

- Provide link with regulatory and other outside agencies.

Confers with

- Obtain a status briefing from the Incident Commander or Deputy Incident Commander.

Takes direction from

- Incident Commander or Deputy Incident Commander

Responsibilities

- Notifies and updates appropriate government agencies and local authorities.
- Regularly communicate with Emergency Operation Center.
- Meet with the Incident Commander and other key staff for update of incident status.

Operations Chief

- Manage all tactical on-scene operations.
- Lead the emergency response teams at site.
- Ensure the health and safety of all on-site personnel.

Takes direction from

- Incident Commander

Gives direction to

- Operations personnel
- On-site response personnel

Initial Actions

- Ensure all on-site personnel are accounted for.
- Make an initial situation-assessment and advise the Incident Commander of the incident status.
- Secure the area.
- Advise other responders of a safe route of entry.
- If life safety has been assured, and with the approval of the Incident Commander, take immediate action to gain control or contain the incident.

Responsibilities

- Ensure Responder Life Safety at all times.
- In consultation with the Incident Commander develop and implement a comprehensive response plan.
- Mobilize additional personnel/resources. Contact them directly or upon request from Incident Commander.
- Assign on-site operations roles as required (i.e. Site Manager, Public Safety Manager).
- Secure the scene and restrict access to essential and authorized personnel only; release non-essential personnel from site.
- Continually re-assess situation and risk to life safety.
- Provide regular situation updates to the Incident Commander.
- Maintain control of all on-site operations.
- On notification by the Incident Commander, advise all on-scene personnel to stand down when it is safe to do so.

Post Incident

- Participate in the recovery operation and in the post-incident investigation.

OPERATIONS CHIEF

Logistics Chief

- Responsible for the timely procurement and delivery of equipment, services and personnel in support of the incident response.

Takes direction from

- Incident Commander and Operations Chief

Gives direction to

- Goods and service suppliers

Initial Actions

- Identify immediate requirements for personnel and equipment to respond to the incident.

Responsibilities

- List and obtain all immediate resources as required by the Incident Commander or the Operations Chief.
- Notify and mobilize response team personnel as requested.
- Identify current and potential requirements for additional personnel to assist with logistical support.
- Order and maintain supplies and services to support the emergency operations as requested.
- Appoint and supervise additional logistics personnel as required.

Post Incident

- Participate in recovery operations at the direction of the Incident Commander.

Planning Chief

- Provide technical support to the Incident Commander and assist with the development, execution and monitoring of the incident response action plans.

Takes direction from

- Incident Commander
- Operations Chief

Gives direction to

- Technical Specialists

Initial Actions

- Initiate a technical assessment of the incident and support the Incident Commander with the development of a preliminary response strategy.

Responsibilities

- Provide on-going technical support.
- Identify the need for specialists (environmental, technical) and appoint and supervise additional personnel as required (maintaining a span of control of 5:1).
- Provide periodic predictions on incident potential.
- Gather information to help forecast the situation.
- Collect, evaluate, and distribute incident information.

Post Incident

- Participate in recovery operations and the post-incident investigation at the direction of the Incident Commander.

Finance Chief

- Monitor incident-related cost, claims and compensation.

Takes direction from

- Incident Commander

Gives direction to

- All personnel who generate invoices or spend money.

Responsibilities

- Record time for workers and equipment.
- Maintain a record of purchase orders, bills received and other financial documentation.
- Administer vendor contracts.
- Confer with Quicksilver Emergency Operations Committee regarding legal issues and insurance claims.
- Prepare costs summaries for the Incident Commander as requested.

Public Safety Manager

- Ensure the on-going safety of the public during the incident and coordinate public safety actions.

Takes direction from

- Operations Chief

Gives direction to

- The Public
- Roadblock Leader
- Environmental Leader
- Evacuation Leader
- Rover Leader
- Telephone Leader
- Reception Center Leader

Works with

- Safety Coordinator

Initial Actions

- Block roads and secure the scene as appropriate.
- Review the Emergency Planning Zone Map (refer to Site Specific Emergency Response Plan) and assess the need to evacuate residents.

Responsibilities

- Assess the need for off-site environmental monitors. For incidents involving sour gas mobilize a mobile air-monitoring unit. Dispatch trained personnel equipped with hand held monitors to monitor downwind of the release until the unit arrives.
- Appoint a Recorder to track public safety actions.
- Review the Emergency Planning Zone Map (refer to the Site Specific Emergency Response Plan) and identify any residents who may be at risk or need to receive courtesy notifications. Determine the priority of required contacts based on risk and sensitivity.
- Appoint, brief and dispatch personnel to fill key Public Protection roles including:
  - Roadblock Leader
  - Evacuation Leader
  - Air Environment Monitors
  - Rover Leader
  - Telephone Notification Leader and Call Center Representatives
  - Reception Center Staff (if planning to evacuate residents)
- Discuss the required Public Protection actions with the Incident Commander and Planning Chief.

Responsibilities Cont.

- Prioritize and implement the appropriate Public Protection measures for each residence and business (i.e. courtesy notifications, sheltering in place, evacuation).
- Ensure personnel filling each role clearly understand their duties so that risks to the public and other responders are minimized.
- Ensure the Telephone Leader and the Evacuation Leader provides their staff with clear, safe directions to the Reception Center, if established.

Post Incident

- Ensure that all evacuees are safely returned to their residences.
- Address any immediate concerns of the evacuees upon their return.

Site Manager

- On scene Quicksilver Representative.
- Responsible for site branch of Operations.
- Initiates the Emergency Response Plan.

Confers with

- Direct reports
- Operations Chief

Gives direction to

- Response crews at site
- Contract staff at site

Initial Actions

- Assess the situation and develop a preliminary response strategy.
- Delegate tasks to response crews.
- Contact the Operations Chief.
- Determine the resources required for dealing with the incident.

Responsibilities

- Ensure Responder Life Safety at all times.
- Maintain communication with the Operations Chief.
- Regularly evaluate the effectiveness of response tactics.

Staging Area Manager

- Supervise pre-deployment area for personnel and equipment.

Takes direction from

- Operations Chief

Gives direction to

- Goods and services suppliers and personnel

Responsibilities

- Establish a Staging Area in a safe and accessible location.
- Advise the Operations Chief when resources (personnel, equipment, supplies) have arrived at the staging area.
- Document all personnel and services dispatched to, and arriving from, the incident site.

On-Site Group Leaders

- Provide tactical, on-site control/containment operations including but not limited to: Ignition, Search/Rescue, Containment/Recovery, and Control.

Takes direction from

- Site Manager

Responsibilities

- Ensure Responder Life Safety at all times.
- Ensure that the response team members are trained appropriately and clearly understand the hazards and the tasks to be completed.
- Conduct pre-task meetings for clarification and safety concerns.
- Verbally test plans before implementing.
- Continually evaluate risk. Stop any unsafe operations.
- Maintain on-going communication with Site Manager and individual members of your group.

Evacuation Leader

- Responsible for the safe and orderly evacuation of the public.

Take direction from

- Public Safety Manager

Gives direction to

- Evacuation Team Members

Responsibilities

- Clarify current and potential public evacuation requirements and supervise evacuation efforts.
- Review the Emergency Planning Zone Map in the Site Specific Emergency Response Plan. If required help the Public Safety Manager set Rover contact priorities (identify public most at risk).
- Contact and explain assignment to staff filling required Rover positions.
- Ensure that the Rovers have a safe route in and out of the Emergency Planning Zone.
- Maintain on-going communications with Rover and Reception Center Leader.
- Regularly communicate with the Telephone Leader (if appointed) to ensure complete evacuation of residents.
- Track evacuation status and residents who have arrived at the Reception Center.
- Obtain support for the Reception Center Staff as required.
- Regularly update the Public Safety Manager about public evacuation status.
- Provide resources to meet immediate needs of evacuees including health, food, and temporary accommodation.

Environmental Leader

- Conduct off-site toxicological monitoring for hazardous materials and atmospheric weather condition.

Take direction from

- Public Safety Manager

Give direction to

- Environmental Resources

Responsibilities

- Identify the locations that need to be monitored.
- Obtain and calibrate monitoring equipment, safety gear, and communication equipment.
- Determine a safe route into and out of the area; use backup personnel to protect your own safety, if required.
- Establish a communication and reporting schedule with the Public Safety Manager.
- As instructed, gather and document potential environmental impacts of the incident.
- Record all monitoring and sampling results.

Reception Center Leader

- Responsible for opening and maintaining the Reception Center and meeting the immediate needs of the evacuees.

Takes direction from

- Public Safety Manager

Responsibilities

- Clarify location of Reception Center.
- Identify a safe travel route to the designated Reception Center.
- Obtain the keys to the Reception Center, if required.
- Ask the Public Safety Manager if the local Emergency Agency has been notified. If so, confirm if they are planning to send staff to the Reception Center.
- Cooperate with emergency service representatives.
- Receive and register the evacuated families and document key issues and concerns.
- Always be courteous to evacuees, regardless of their attitude or behavior.
- Help evacuees with their immediate needs including health, food, and temporary accommodation.
- Advise the Public Safety Manager of any compensation issues that have been raised by the evacuees.
- Document any evacuees who appear to be having trouble coping with the incident, so that professional help can be arranged.

Telephone Leader

- Ensure the residents and businesses within the Emergency Planning Zone are notified of the incident and are given appropriate direction.

Takes direction from

- Public Safety Manager

Responsibilities

- Clarify immediate and potential public notification requirements (identify public most at risk or negatively impacted) and develop a notification strategy.
- In consultation with the Public Safety Manager determine a notification script. Ensure it is clear and factual and that it advises residents of the situation and provides the recommended actions.
- As required, notify and assemble the Call Center Representatives.
- Ensure each Call Center Representatives has a map and safe directions for each resident to the designated Reception Center, if established.
- Confirm the courtesy notification or public protection measures (i.e. sheltering or evacuation) for each residence and business.
- As directed by the Public Safety Manager initiate, supervise and track the telephone notifications to residents and business people.
- Any change in incident status may affect notification, advise Call Center Representatives or computerized notification service, modify notifications as required.
- If evacuating the public, communicate with the Evacuation Leader to ensure complete evacuation of residents.

Rover Leader

- Assist the public during evacuation.

Take direction from

- Public Safety Manager

Responsibilities

- Identify your assigned residences and businesses that you are responsible for and determine their proximity to the hazardous area.
- Determine a safe route into and out of the Emergency Planning Zone.
- As directed, safely proceed to your assigned homes and businesses.
- Clearly and calmly tell the residents what the situation is and its dangers, give residents safe directions to travel to the Reception Center.
- As directed by the Evacuation Leader check all buildings such as barns, shops and sheds.
- As requested, help residents with evacuation transportation.
- Advise the Evacuation Leader of any problems or issues.
- If requested, maintain a security watch over evacuated residences and property in the Emergency Planning Zone. Report any suspicious activity to Evacuation Leader who will contact the local police.
- If the travel time to and from the Reception Center is excessive or if there are a lot of residents requiring transportation, ask the Public Evacuation Leader to set up a transfer station at the edge of the Emergency Planning Zone where residents can be transferred to a shuttle vehicle.

Roadblock Crews

- Establish roadblocks to secure the area.

Take direction from

- Public Safety Manager
- Incident Commander

Gives direction to

- Road traffic

Responsibilities

- Obtain direction from the Public Safety Manager or directly from the Incident Commander and clarify roadblock location.
- Consider detour routes when selecting roadblock location.
- Use a hand held H2S/LEL monitor to test atmosphere periodically as required.
- Ensure that only personnel and equipment approved by Incident Command or Operations Chief enter area.
- Record time and license number of all vehicles entering or leaving the secured area.

- If contacted by the media refer to the Media Protocol in the Site Specific Emergency Response Plan and refer the media representative to the Media Spokesperson or the Incident Commander.

Note: Quicksilver has a responsibility to protect the public, but cannot legally prevent the public from going by our roadblock. If someone insists on going through your roadblock, advise them of the situation, record name, vehicle make and license plate. This may encourage the driver to stop.

Call Center Representatives

- Contact residents by telephone to advise them of the situation and provide advice as to the recommended actions.

Takes direction from

- Telephone Notification Leader

Responsibilities

- Collect the following information:
  - Area map with resident locations and road labels,
  - Prioritized resident list, and
  - Call and Event Log (Site Specific Emergency Response Plan).
- Clarify the message you are going to give the residents and businesses.
- Contact your assigned residents and business people.
- Document and track your communications (who you spoke with, what you/they said).
- Ensure residents have your name and telephone number.
- Provide reassurance to sheltered public.
- For evacuation, know a safe exit route for each resident and business.
- Immediately report any concerns/issues to the Telephone Notification Leader.

Technical Specialists

- Provide specialized skills or knowledge.

Takes direction from

- Planning Chief

Responsibilities

- Obtain incident briefing and tasks.
- Establish and maintain communications with the Emergency Operations Chief.
- Coordinate all activities with the Planning Chief.

Floor Wardens

Wardens

- Assist during emergencies.
- Should wear a high visibility vest during drills or emergencies.
- Must attend annual meetings to stay current with building safety features and emergency procedures.
- Are assigned to ensure smooth evacuation and direct employees to the muster areas.
- Verify that the building and encompassed areas have been evacuated.
- Search and verify restrooms and offices are vacated and report their findings.
- Should turn off the lights of each room after it has been searched.
- Appointed to assist personnel with handicaps or disabilities during an evacuation.
- Will notify the ICS personnel and advise them which doorways or areas have persons waiting to evacuate.

Notes

WHAT TO DO AT THE SCENE OF AN EMERGENCY

In an emergency, four priorities shall be maintained:

* Protection of Life
* Protection of Property
* Protection of Environment
* Preservation of Evidence

1. **Remain calm. Assess the situation (determine the problem, extent and action required).**
2. **Evacuate, call for help (raise the alarm) and notify Supervisor.**
3. **Call emergency services, as required.**
4. **If applicable, administer first aid.**
5. **If safe to do so, and within your capability, take corrective action to control the source of the emergency.**
6. **Senior employee on site to provide information to the Incident Commander.**
7. **Declare the 'All-Clear' message when the situation has been resolved.**

Notes

Uncontrolled Gas Release

- Assess the situation. Determine the problem, extent and action.
- Sound the alarm, notifying others.
- Wait for backup. **DO NOT PROCEED ALONE**.
- Don proper breathing apparatus SCBA and Personal H2S/LEL Detection Equipment.
- Notify Supervisor.
- Call Emergency Services, as required:
  - Ambulance
  - Fire
  - Law Enforcement
- Notify Regulatory agencies, as required:
  - Applicable State Agency
  - Local Authority
  - Occupational Safety and Health Administration
  - Bureau of Land Management
- Initiate leak control procedures and shut down/depressurize facilities, as required.
- Initiate monitoring for toxic and explosive gas mixture.
- Request Supervisor to alert and mobilize additional assistance, industry support services, as required.
- Protect the public - evacuate, if required (Personnel, transients, residents, schools).
- Search area downwind and down slope for transients.
- Assemble and dispatch roadblock personnel to designated locations, as required.
- Initiate containment and recovery of fluids on-site, if safe to do so.
- Declare "All Clear" message, when emergency is completely resolved.
- Complete proper reports, as applicable (Internal, Incident/Accident Report, Incident Event Log).

Contact Quicksilver Resources Corporate Health, Safety & Environment Department to:

- Notify them of the incident
- Assist with incident control
- Assist with corporate and regulatory contacts
- Assist with incident investigation

Explosion / Fire

- Assess the situation. Determine the problem, extent and action.
- Sound the alarm, notifying others.
- Protect the public. Evacuate, if required (personnel, transients, residents).
- Notify Supervisor.
- If possible, depressurize/isolate facilities and proceed with fire fighting procedures.
- Call for additional industry support services.
- Call Emergency Services, if applicable:
  - Ambulance
  - Fire
  - Law Enforcement
- Notify Regulatory agencies, as required:
  - Applicable State Agency
  - RRC
  - A State O&G Agency
  - Local Authority
  - Occupational Safety and Health Administration
  - Bureau of Land Management
- Declare "All Clear" message when emergency is completely resolved.
- Complete proper reports, as applicable (Internal, Incident/Accident Report, Incident Event Log).

Contact Quicksilver Resources Corporate Health, Safety & Environment Department to:

- Notify them of the incident
- Assist with incident control
- Assist with corporate and regulatory contacts
- Assist with incident investigation

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Oil / Hazardous Chemical Spill

- Assess the situation. Determine the problem, extent and action.
- Sound the alarm, notifying others.
- Take immediate corrective action to stop oil and/or other hazardous chemical spill. Isolate the source and contain the product.
- Notify Supervisor.
- Shut down and depressurize facilities, as required.
- Request/call-out, spill containment and recovery equipment, as required (Co-op and OSCAR).
- Call Emergency Services, as required:
  - Ambulance
  - Fire
  - Law Enforcement
- Notify Regulatory agencies, as applicable:
  - Applicable State Agency
  - Local Authority
  - Occupational Safety and Health Administration
  - Bureau of Land Management
  - Environmental Protection Agency(if needed)
- Notify landowner, if applicable.
- Protect the public - evacuate, if required (Personnel, transients, residents, schools).
- Declare "All Clear" message, when emergency is completely resolved.
- Arrange for disposal of recovered fluids and debris.
- Complete proper reports, as applicable (Internal, Incident/Accident Report, Incident Event Log).

Contact Quicksilver Resources Corporate Health, Safety & Environment Department to:

- Notify them of the incident
- Assist with incident control
- Assist with corporate and regulatory contacts
- Assist with incident investigation

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Injury / Fatality

- Assess the situation. Determine the problem, extent and action.
- Sound the alarm, notifying others.
- Administer First Aid in the following order:
  - Artificial Respiration (recovery position)
  - Automated External Defibrillator
  - Cardiopulmonary Resuscitation
  - Control bleeding
  - Open wounds or burns
  - Stabilize fractures
  - Physical Shock
- Notify Supervisor.
- Call Emergency Services, as required:
  - Ambulance
  - Fire
  - Law Enforcement
- Notify Regulatory agencies, as applicable:
  - Applicable State Agency
  - Local Authority
  - OSHA
  - Occupational Safety and Health Administration
  - Bureau of Land Management
- Notify next-of-kin, in consultation with Human Resources.
- Ensure Contractor Management is notified, if contract personnel are involved.
- Declare "All Clear" message, when emergency is completely resolved.
- Complete proper reports, as applicable (Internal, Incident/Accident Report, Incident Event Log).

Contact Quicksilver Resources Corporate Health, Safety & Environment Department to:

- Notify them of the incident
- Assist with incident control
- Assist with corporate and regulatory contacts
- Assist with incident investigation

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Hostage Taking / Ransom

- Assess the situation.
- If information is provided over the telephone, be calm, polite and attentive.
- Record all details and obey instructions requested. Take note of any accents, inflections, distress in voice, and listen for any background noises.
- Notify Police.
- Notify Supervisor.

NOTE: This is a highly sensitive emergency

Contact Quicksilver Resources Corporate Heath, Safety & Environment Department to:

- Notify them of the incident
- Assist with incident control
- Assist with corporate and regulatory contacts
- Assist with incident investigation

Telephone Threat, Extortion, Bomb Threat

- Listen carefully, be calm, polite, and do not interrupt the caller.
- Using appropriate report forms, record as much information as possible.
- Keep caller talking for as long as possible.
- Direct someone to call police.
- Notify Supervisor.
- Evacuate the area.

Notes

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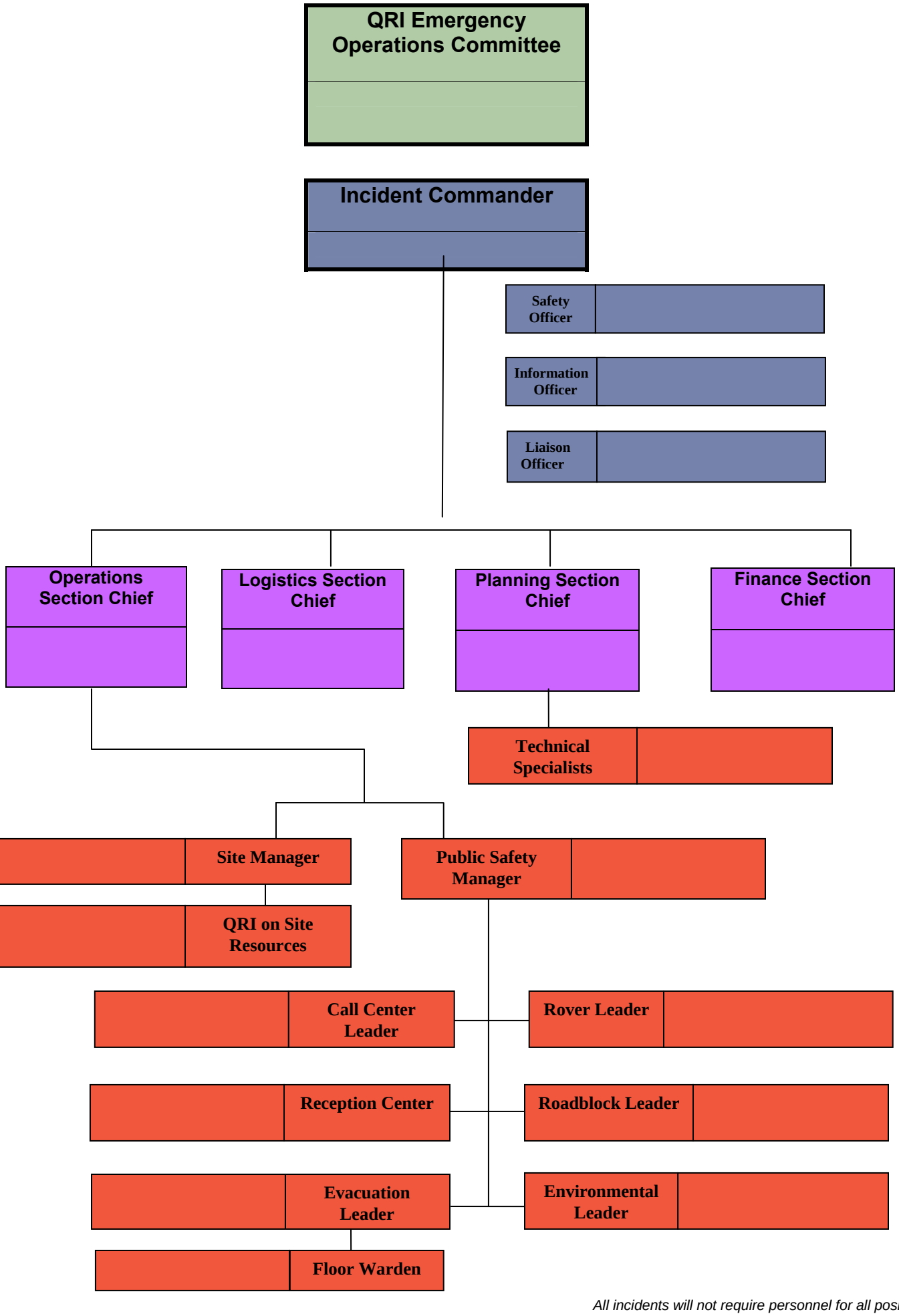

All incidents will not require personnel for all positions.

INCIDENT BRIEFING	Incident	Date	Time

Map Sketch

Summary of Current Actions

Page 1 / 2	Prepared By (Name and Position)

RESOURCES

Resources Ordered	Resources Identification	ETA	On Scene (Check)	Location/Assignment
Page 2 / 2	Signature			

Report incidents immediately to HSE 24 hr on-call # 817-665-4100

Submit written incident report within 24 hrs US-HSE@QRINC.COM

This Quick Response Guide is provided as a supplement to the Quicksilver Emergency Response Plan (ERP). All employees and contractors should be familiar with the ERP and trained to fulfill any roles they may be assigned. This guide does not replace the ERP nor the requirement for adequate training.

APPENDIX L. FUGITIVE DUST CONTROL PLAN

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

A hardcopy version of the Quicksilver Resources Inc. Fugitive Dust Control Plan has been provided to the Routt County Planning.

Document provided to Routt County Planning Department on: 09/09/2011

A digital copy of the document is included with the electronic version of the application submittal.

Document Change Log:

Any changes and/or updates to the Fugitive Dust Control Plan are noted below.

No changes have been made to the document as of the date of this submittal (September 2011).

Change Date	Description of Change
None	None

Quicksilver Resources Inc.	Fugitive Dust Control Plan
Colorado, USA	Moffat and Routt County, Colorado
	June 2011

Scope	The scope of these guidelines is to outline some basic principles to minimize and control fugitive dust emissions during land development.
Requirements	Qucksilver places the highest priority on the health and safety of our workforce and protection of our assets and the environment.
Applicable Documents	Department of Public Health and Environment Air Quality Control Commission Regulation 1 5CCR 1001-3
Safety	Safety Plan
Quality	These guidelines will be reviewed periodically and will be shared with employees and contractors to ensure that they have adequate knowledge to minimize fugitive dust emissions.

1.0 Introduction

Land development activities, including clearing, excavating, and grading, release fugitive dust, a pollutant regulated by the Air Pollution Control Division (Division) at the Colorado Department of Public Health and Environment. However, small land development activities that are less than 25 contiguous acres and less than 6 months in duration do not need to report air emissions to the Division, but must use appropriate control measures to minimize the release of fugitive dust from the site.

This Fugitive Dust Control Plan addresses how dust will be kept to a minimum on roads and pad sites.

This plan focuses action on:

1. Identifying specific individual sources of fugitive dust.
2. Control options for unpaved roadways.
3. Control options for disturbed areas.
4. Control options for transport, storage and handling of bulk materials.
5. Contingency Plan for alternative action in the event that control strategies are not adequate, effective, or practicable.

2.0 Specific Sources

Specific types of fugitive dust sources may appear to have negligible dust emissions, but when combined with other specific sources underway at the same time can create dust plumes that are visible beyond that which is appropriate for designated speeds and designs and may exceed nuisance emission limitation guidelines. It is important to consider all activities on the site together in determining compliance with federal, state, and local air quality regulations.

Task:

Provide field personnel and contractors with the information required to limit fugitive particulate matter (fugitive dust) from all specific sources to include:

- Unpaved Roadways and traffic areas.
- Construction activities including Earth Moving and excavation.
- Bulk Material (i.e. gravel and soils).
- Storage and handling of materials

3.0 Control Options for Unpaved Roadways

Any owner or operator responsible for construction or maintenance of any (existing or new) unpaved roadway is required to use all available, practical methods to minimize dust emissions:

Task:

Provide guidelines for minimizing fugitive dust emissions from all specific sources on unpaved roadways and traffic areas:

- Require that all passenger vehicles, construction equipment, and truck traffic obey the posted speed limits on all unpaved County roads to and from the project site.
- Ensure that vehicle speeds on new and existing access roads on the project site do not exceed 15 miles per hour by posting speed limits along these roads.
- Restrict vehicle traffic to existing roads by posting signs and/or providing the locations of allowable access routes to all field personnel and visitors.
- Encourage carpooling to and from the project site to limit traffic on existing County roads.
- Roads and well locations will be surfaced with compacted gravel to protect against wind erosion, to reduce the amount of fugitive dust generated by traffic and other activities, and to reduce carryout/trackout.
- Use dust inhibitors (surfacing materials, water, or non-saline dust suppressants) on all unpaved collector, local, and resource roads to prevent fugitive dust problems (ensure that any dust suppressants used are appropriate for road conditions and will not compromise the safety of workers on the project site).
- Restrict vehicular access during periods of inactivity using gates, fencing, and/or onsite security personnel.

4.0 Control Options for Disturbed Areas

Disturbed areas include new roads, well pads, parking and staging areas, and materials storage areas that have been cleared of vegetation, leveled, or excavated. These areas are susceptible to wind erosion and are a major source of fugitive dust emissions that require the appropriate controls and dust mitigation methods. Note that specific sources are subject to change as project conditions change, and will require an evaluation of current control options to ensure effectiveness and practicality.

Task:

Limit the adverse impacts of fugitive dust emissions through control measures and operational procedures designed so that no off-property transport emissions occur at the project site:

- Ensure that land clearing, grading, earthmoving, and excavation activities are suspended when wind speeds exceed a sustained velocity of 20 miles per hour.
- Surface all bare ground with gravel as soon as practicable after clearing, leveling, and grading.
- Use dust inhibitors (surfacing materials, water, or non-saline dust suppressants) on all disturbed areas as necessary to prevent fugitive dust problems.
- Identify the water source to be used for dust suppression, and ensure that contract water haulers are available when needed.
- Reduce the amount of time between initially disturbing the soil and revegetating or other surface stabilization.
- Apply vegetative or synthetic cover to topsoil and spoil piles as soon as practicable following stockpiling to prevent wind erosion and fugitive dust emissions.
- Compact the soil on disturbed areas that will not be surfaced with gravel or revegetated immediately following construction.
- Minimize surface disturbance to only that necessary for safe and efficient construction and operations.
- Use vegetative mulch, reseeding, or other methods of surface stabilization on all areas adjoining development to include shoulders, borrow ditches, and berms if practical.
- Restrict vehicular access during periods of inactivity using gates, fencing, and/or onsite security personnel.
- Identify any new sources of fugitive dust emissions and evaluate and implement the appropriate control methods for that source.
- Incorporate fugitive dust controls in all lands projects.

5.0 Control Options for Transport, Storage and Handling of Bulk Materials

Transporting bulk materials, such as gravel and fill material, can result in off-property dust emissions and other impacts (i.e. broken windshields) over some distance if the appropriate control measures are not implemented. Storage and handling of bulk materials once they arrive at the project site also requires that controls are in place to ensure that these materials do not exceed regulated nuisance dust emissions.

Task:

Use control measures and operational procedures designed so that no off-property transport emissions occur along public roadways to and from the project site:

- Enclose, cover, water, or otherwise treat loaded haul trucks to minimize the loss of material to wind and spillage.
- Require that all contract haul vehicles obey the posted speed limits on all public roadways to and from the project site.
- Ensure that haul truck speeds on new and existing access roads on the project site do not exceed 15 miles per hour by posting speed limits along these roads.
- Restrict haul trucks to existing roads and pad locations.
- Do not attempt to load/unload haul trucks when wind speeds exceed a sustained velocity of 20 miles per hour.
- Promptly remove dust-forming material from haul trucks to minimize entrainment of fugitive particulate matter.
- Avoid storage and handling of bulk material any more than necessary to complete construction.
- Use covers, enclosures, wind breaks, or watering to prevent fugitive dust emissions from material storage piles
- Restrict access to construction areas and storage piles during periods of inactivity using gates, fencing, and/or onsite security personnel.

6.0 Contingency Planning

Alternative control measures may become necessary in the event that the current dust control strategy is not adequate or effective for conditions. An alternative plan may require addition planning, permitting, or other regulatory compliance requirements to implement. In this case, the current activities at the project site would necessarily be suspended until such time as the alternate dust control methods could be put into place.

Task:

Implement alternative action to fugitive dust control plan and to each specific source if deemed necessary to comply with federal, state, and local air quality regulations:

- Provide field personnel and contractors with contact information for responsible individuals in cases where control measures need to be escalated in response to weather conditions (i.e. increased windiness).
- Use an appropriate alternative dust inhibitor if water does not prove to be effective under normal circumstances, and obtain all regulatory permissions for the use of chemical suppressants on the project site.
- Use vegetative blankets or other methods for cover of topsoil, spoil, and bulk material storage piles if immediate cover becomes necessary.
- Attempt to locate alternative sources of bulk material closer to the project site if fugitive dust emissions or other impacts from contract haul trucks on state or federal highways become an issue with public safety or regulatory compliance.

APPENDIX M. STORMWATER MANAGEMENT PLAN

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

A hardcopy version of the Quicksilver Resources, Inc. Stormwater Management Plan has been provided to the Routt County Planning.

Document provided to Routt County Planning Department on: 09/09/2011

A digital copy of the document is included with the electronic version of the application submittal.

Document Change Log:

Any changes and/or updates to the Stormwater Management Plan are noted below.

No changes have been made to the document as of the date of this submittal (September 2011).

Change Date	Description of Change
None	None

STORMWATER MANAGEMENT PLAN FOR CONSTRUCTION ACTIVITIES

Quicksilver Drilling Project

Moffat and Routt County, Colorado

Prepared For:

801 Cherry Street, Suite 3700, Unit 19
Fort Worth, Texas 76102

Prepared by:

826 21 ½ Road
Grand Junction, CO 81505

Project # 011-0710

May2009

Revised:
Sept 2011

ADMINISTRATIVE LOG
QUICKSILVER
QUICKSILVER DRILLING PROGRAM

Date	Training, SWMP Revisions or Updates	Comments
Jun-11	SWMP revised to updated format	All sections/figures/tables/appendicies updated to reflect the current format
Jun-11	SWMP revised - added Roundup 22-24	Added inspection report and site map
Jun-11	SWMP revised - added Pritlaw Partners 1H-3	Added inspection report and site map
Jun-11	Contact information updated	Local Contact: Scott Latka Corporate Contatct: Todd Hutson Phone: 307.262.6743 Phone: 817.665.5434

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INTRODUCTION

This Stormwater Management Plan (SWMP) for Construction Activities is written to comply with the Colorado Department of Public Health and Environment's (CDPHE) General Permit No.COR-030000, issued on July 1, 2007 and expires on June 30, 2012, and related U.S. Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) stormwater regulations. This SWMP addresses construction activities associated with Quicksilver Resources (Quicksilver) oil and gas activities at the Quicksilver Drilling Operations, in Moffat and Routt Counties. A copy of the certification to discharge (COR COR03F046) and the Colorado Discharge Permit System (CDPS) general permit (COR-030000) can be found in **Appendix A**.

This SWMP is intended to be revised as necessary to address planned developments, new disturbances, and other changes required to manage stormwater and protect surface water quality. These changes shall be documented in the Administrative Log located at the front of this document. A copy of the SWMP must be retained on site unless another location, specified by Quicksilver, is approved by the Water Quality Control Division.

Stormwater Runoff Permitting Requirements

The Federal Clean Water Act [Section 402(p)] requires that discharges of pollutants to waters of the U.S. from any point source be regulated by NPDES permits. In November 1990 the EPA published final regulations that established application requirements for stormwater associated with construction activity for soil disturbances of 5 acres or more be regulated as an industrial activity and covered by an NPDES permit. In December 1999 the EPA published final Phase II NPDES regulations that established application requirements for stormwater associated with construction activity for soil disturbances to be regulated as an industrial activity and covered by an NPDES permit. These regulations became effective July 1, 2002.

On June 30, 2005, Colorado stormwater regulations went into effect to require CDPS permits for stormwater discharges from construction activities for oil and gas activities (1 acre or greater). Federal permit coverage for these discharges was conditionally exempted from the Federal Clean Water Act by the 2005 Federal Energy Bill. On February 1, 2006, the CDPHE issued a letter clarifying that the CDPHE Water Quality Control Commission decided to maintain the existing requirements for stormwater permitting for oil and gas construction sites greater than 1 acre.

Project Description

Quicksilver's Drilling Operation permitted area is located throughout Moffat and Routt Counties. The permitted area is approximately 190,000 acres and will include well pads, pipelines, and access roads. The town of Craig, Colorado is the nearest population center. **Figure 1** shows the Permitted Area Location for the permitted area.

The current drilling and development plan includes well pad construction, access road construction, access road improvement, reserve pit construction, well drilling, well testing, well completion, installation of associated facilities, and pipeline construction.

1. CONSTRUCTION SITE DESCRIPTION

The following section provides a description of the construction activities.

1.A Nature of Construction Activity

The Quicksilver Drilling Operation sites will be constructed using conventional cut and fill earthmoving techniques. Reserve pits (if used) may be constructed for use during operations to contain drilling fluids and cuttings. The pits will be designed, constructed, and reclaimed according to Colorado Oil and Gas Conservation Commission (COGCC) requirements.

In areas that are disturbed by construction, topsoil will be stripped and stockpiled near the site. All brush, limbs, and other woody material will be stockpiled separately from the topsoil. Soil materials will be managed so that erosion and sediment transport are minimized. Nearby drainages will be protected by appropriate measures.

For areas where a pad site is completely reclaimed, the pad area will be reclaimed to approximate pre-construction contours and seeded.

1.B Sequence of Construction Activities

For new disturbances covered by this plan, structural and non-structural Best Management Practices (BMPs), run-on protection, and run-off controls will be installed prior to, during, and following construction activities, as practicable, with consideration given to safety, access, and ground conditions (e.g., frozen ground) at the time of construction.

The development of an oil or natural gas well is generally accomplished in seven distinct work phases. This includes (in no specific order and not limited to) Access Road and Pad Construction, Pipeline Installation, Well Drilling, Well Completion, Production, Interim Reclamation, and Final Reclamation. Each work phase is briefly discussed below and the BMPs are discussed in Section 3.C.

Access Road and Pad Construction

The drilling and development of natural gas wells requires the construction of well pads and access roads. Access road construction is generally accomplished by using traditional cut and fill techniques but may also require blasting or other construction techniques. Size and maintenance requirements for each road are based on road location and traffic level.

Most well pad work will also be performed using traditional cut and fill construction. Reserve pits may be constructed at this time to store certain fluids and solids related to drilling and completion operations. No fluids or solids, excluding any accumulated stormwater, will be stored in the reserve pits during this phase.

Basic construction activities that are conducted during this phase include clearing and grubbing, segregation of topsoil for use in reclamation, grading and excavation, compaction of well pad, final grading and contouring, and installation of surfacing materials such as gravel. Sediment discharge is the main potential pollutant of concern during this phase of construction. No chemicals or fuels will be stored on the site during this phase; however, attention will be paid to the potential for leaks that might occur during the use of construction equipment.

To the extent possible, BMPs that will be utilized to control stormwater throughout the life of the well will be constructed during this phase.

Pipeline Installation

Development of oil or natural gas wells may require the installation of pipelines used to transmit natural gas or other fluids. Pipeline installation is generally accomplished by trenching. The area of disturbance for each pipeline is determined by the length and width of the pipeline right-of-way. Sediment discharge is the main potential pollutant of concern during this phase of construction. No chemicals or fuels will be stored on the site during this phase; however, attention will be paid to the potential for leaks that might occur during the use of construction equipment.

Well Drilling

The Well Drilling phase includes the drilling of one or more wells at each location. Activities associated with the drilling phase include:

- Mobilization of the drilling rig and associated equipment, including generators and drilling-mud handling equipment. In some instances a smaller drilling rig may be used to drill the initial stages of each well prior to the larger drilling rig mobilizing to the location
- Installation of storage, office and housing trailers
- Storage of down hole chemicals, fuels and lubricants
- Installation of potable water tanks and sewage-handling equipment (e.g., portable toilets or sewage vaults)
- Well drilling activities including the installation and cementing of well casing
- Demobilization of the drilling rig and all other equipment at the completion of this phase

Sediment discharge, unused and used chemicals, and drilling water/mud are potential pollutants of concern during this phase of construction. Drilling mud and water will be used to maintain appropriate down-hole pressures and lubrication. Unused fresh water and mud chemicals will be stored on the pad. Used materials will either be discharged to the reserve pit or captured in tanks during closed-loop drilling processes. Petroleum products are used for the duration of the drilling process to fuel or lubricate equipment and include: fuel, gear oil, hydraulic oil, brake fluid, and grease. Materials to be used to cement casing placed in the well may also be stored and prepared on location or may be transported to the site.

Procedures will also be implemented for prompt containment and remediation of any spills that may occur during the drilling phase. These procedures are outlined in Quicksilver's Spill Prevention, Control and Countermeasures (SPCC) plan.

As equipment is demobilized at the completion of this phase, the well pad and surrounding areas will be carefully inspected to identify any spills or leaks that may have occurred so that those areas can be remediated prior to initiation of the well completion phase.

Well Completion

The Well Completion phase may include hydraulic fracturing (fracing), cementing, and other processes that stimulate the well and prepare it for production. The basic activities that are conducted during this phase include:

- Mobilization of equipment required for well completion
- Storage of down-hole chemicals, fuels and lubricants

- Installation of potable water tanks and sewage-handling equipment (e.g., portable toilets or sewage vaults) or continued maintenance of such equipment installed during the drilling phase
- Fracing and other well-stimulation processes
- Drill out of any plugs placed during well completion with a work-over rig
- Flowback of the well to remove frac water, sand and other impurities
- Demobilization of equipment when this phase has been completed

Several temporary facilities/structures will be placed on site during this phase. These will include: frac trucks, storage and office trailers, generators, and frac tanks. During completions, certain chemicals may be used to stimulate the formation for the extraction of natural gas. Unused water and chemicals will be stored on the pad. Used water will be stored in the reserve pit, recycled, or used in other operations.

Sediment discharge, unused and used chemicals, and frac water are potential pollutants of concern during this phase of construction. Procedures outlined in the SPCC plan will also be implemented for prompt containment and remediation of any spills that may occur.

As equipment is demobilized at the completion of this phase, the well pad and surrounding areas will be carefully inspected to identify any spills or leaks that may have occurred so that those areas can be remediated prior to initiation of the production phase.

Production

The Production phase includes the installation of long-term facilities such as permanent well heads, storage tanks, gas processing equipment, flow measurement equipment, and any associated flow lines needed to produce natural gas from the formation. An active gas well produces fluid phase products along with gas phase products. Storage tanks may be placed on site during this phase to hold any produced water and/or fluid phase hydrocarbons (condensate). The presence of tanks for storage requires implementation of an SPCC plan to prevent and control possible leaks from those tanks. In addition, secondary containment will be provided for any tanks storing chemicals that are utilized during the life of the wells.

Sediment discharge, produced fluids, and small amounts of equipment lubricant, fuel, corrosion inhibitors or other chemicals are potential pollutants of concern during this phase. Procedures outlined in the SPCC plan will also be implemented for prompt containment and remediation of any spills that may occur.

Interim Reclamation

The Interim Reclamation phase includes the contouring of the majority of the pad to a smaller area and the closure of drilling pits. The reduced area will be utilized for long-term production and ongoing routine maintenance of the well(s). In general, this phase includes contouring of the site, spreading of topsoil on contoured areas and seeding those areas.

Sediment discharge, produced fluids and small amounts of equipment lubricant, fuel, corrosion inhibitors or other chemicals are potential pollutants of concern during this phase of construction. Procedures outlined in the SPCC plan will also be implemented for prompt containment and remediation of any spills that may occur.

Permit coverage may be inactivated for oil and gas construction sites once Final Stabilization (see Section 4) has been achieved.

Final Reclamation

When the natural gas production of a well is exhausted, the well will be abandoned. Upon well abandonment each borehole will be plugged, capped, and all surface equipment will be removed. Subsurface pipelines will be removed to specified locations or abandoned in place as per COGCC Rule 1103.

The pad area will be reclaimed by contouring disturbed soils to conform to the surrounding terrain, by redistributing the stockpiled topsoil, seeding of disturbed soil areas in order to reestablish cover vegetation, and by construction of any permanent erosion and sediment control structures as needed.

Permit coverage will be re-activated when Final Reclamation begins, and may be once again inactivated when Final Stabilization (see Section 4) has been achieved.

1.C Estimate of Total Area of Site and Area to be Disturbed

The total permitted area is approximately 190,000acres. The total disturbance of areas within the permitted area will be approximately 45 acres in size, and will include well pads and pipeline. As new sites are added to the permitted area, the SWMP will be updated to reflect the new disturbances.

1.D Soil Data and Erosion Potential

Runoff characteristics are based primarily on site topography, soil type, and vegetative cover. Due to the extent of the permitted area, soils descriptions will be included on a site by site basis. The major soil types for the existing pads are: Torriorthents-Torripsamments complex, 12 to 40 percent slopes, Tresano sandy loam, 3 to 12 percent slopes, Maysprings – Gretdivid complex, 10 to 20 percent slopes, Coyet loamy sand, 3 to 12 percent slopes, Cushool fine sandy loam, 3 to 12 percent slopes, Berlake sandy loam, 3 to 12 percent slopes, Coyet – Crestman, moist complex, 20 to 50 percent slopes, and the Rock River sandy loam, 3 to 12 percent slopes. The major soil types in the permitted area are well to excessively drained soils with a very low (~2.1 inches) to moderate (~8.9 inches) water holding capacity.

A Natural Resources Conservation Services (NRCS) unit map and soils description for the dominant soils in the permitted area is provided in **Appendix B**. As sites area added to the permitted area, the respective soils data will be added **Appendix B**.

The K-factor approximates soil detachment due to runoff and raindrop impact. Lower k-Factor values (0.1 – 0.17) indicate less susceptibility to sheet and rill erosion, while higher k-Factor values (>0.30) indicate greater susceptibility to erosion.

The Hydrologic Group describes soil and soil units with the potential for runoff under similar storm and cover conditions. Group A has a high infiltration rate and a corresponding lower potential for runoff, while Group D has low infiltration rates due to finer soil texture or a high water table, giving them a high potential for runoff.

The average annual precipitation for the Quicksilver Drilling Operation is approximately 13.11 inches (Western Regional Climate Center–Craig, Colorado Station [051928]).

Table 1 below shows the soils data and erosion potential for each site within the permitted area.

Table 1: Soils Data and Erosion Potential

Cherokee 14-34R and Associated Pipeline

			Representative Value		
Soil Name	**Hydrologic Group**	**K-factor**	**% Sand**	**% Silt**	**% Clay**
Torriorthents-Torripsamments complex, 12 to 40 percent slopes					
Torriorthents	D	.24	34.2	32.3	33.5
Torripsamments	B	.17	94.1	1.4	4.5
Tresano sandy loam, 3 to 12 percent slopes					
Tresano	B	.28	64.4	18.6	17.0

Moffatt 1-8 and Associated Pipeline

			Representative Value		
Soil Name	**Hydrologic Group**	**K-factor**	**% Sand**	**% Silt**	**% Clay**
Maysprings-Gretdivid complex, 10 to 20 percent slopes					
Maysprings	B	.10	81.9	10.6	7.5
Gretdivid	B	.15	81.9	10.6	7.5

Pritlaw Partners 1H-3

			Representative Value		
Soil Name	**Hydrologic Group**	**K-factor**	**% Sand**	**% Silt**	**% Clay**
Morapos loam, 12 to 25 percent slopes					
Morapos	C	.24	39.8	37.7	22.5
Lintim loam, 12 to 25 percent slopes					
Lintim	C	.24	41.1	36.9	22.0

Roundup 22-24

			Representative Value		
Soil Name	**Hydrologic Group**	**K-factor**	**% Sand**	**% Silt**	**% Clay**
Coyet loamy sand, 3 to 12 percent slopes					
Coyet	A	.20	82.5	9.0	8.5
Cushool fine sandy loam, 3 to 12 percent slopes					
Cushool	C	.24	69.6	16.4	14.0

Weber 32-4

			Representative Value		
Soil Name	**Hydrologic Group**	**K-factor**	**% Sand**	**% Silt**	**% Clay**
Berlake sandy loam, 3 to 12 percent slopes					
Berlake	B	.20	67.0	19.5	13.5
Coyet-Crestman, moist complex, 20 to 50 percent slopes					
Coyet	A	.20	82.5	9.0	8.5
Crestman, moist	D	.20	82.2	8.8	9.0
Rock River sandy loam, 3 to 12 percent slopes					

1.E Vegetation Description and Estimate

Native vegetation for the permitted area includes Antelope bitterbrush, Big sagebrush, Bluebunch wheatgrass, Bottlebrush squirreltrail, Galleta, Indian ricegrass, Needle and Thread, Nevada bluegrass, Prairie sagewort, Prairie junegrass, Sand dropseed, Sandberg bluegrass, Silver sagebrush, Steambank wheatgrass, Truckee rabbitbrush, Western wheatgrass, Wyoming big sagebrush, and miscellaneous shrubs and forbs. Pre-disturbance groundcover is approximately 40 to 60 percent for the construction sites.

1.F Potential Pollution Sources and Locations

Potential pollution sources associated with construction sites and natural gas development include:

- Sediment resulting from erosion of soil stockpiles, construction of well pads, access roads, pipelines, and other areas cleared of vegetation
- Sediment transport from vehicle tracking
- Leakage of fuels and lubricants from equipment
- Trash and debris from clearing activities, construction materials, and workers
- Leaks or spills from storage tanks and process equipment associated with the natural gas development activities
- Fugitive dust, and runoff from dust suppression activities

The most common source of pollution from pad and access road construction is sediment, which can be carried away from the work site with stormwater runoff and impact the water quality of a receiving stream. Clearing, grading, and otherwise altering previously undisturbed land can greatly increase the rate of soil erosion over pre-disturbance rates.

Petroleum products can also be potential stormwater pollutants. These products are used in construction activities to power or lubricate equipment and include: fuel, gear oil, hydraulic oil, brake fluid, and grease.

Debris from lay-down areas, residue from equipment cleaning and maintenance, and solid waste generated from land clearing operations and human activity (trees, brush, paper, trash, etc.) present other potential pollution sources within the construction site. Additionally, one or more facility may contain construction supplies such as various sized pipe, culverts, metal sheds, empty tanks, drums and vessels, and fencing and stairs that should be monitored for the potential to pollute runoff.

Loading and unloading of condensate and produced water from above ground storage tanks may be a common activity at the Quicksilver Drilling Operation. Site spills and/or tank overflows can contaminate stormwater runoff.

Fugitive dust, as well as runoff from any water, magnesium chloride, or other chemicals that are used for dust suppression, can also be considered potential stormwater pollutants.

The location of potential pollutants will be found on the site specific maps.

The handling of spills or leaks from potential sources is described in the SPCC plan. Response to certain events may require specialized training due to health and safety concerns.

1.G Non-Stormwater Discharges

Non-stormwater discharges are not expected from the construction projects.

1.H Receiving Waters

Stormwater runoff receiving waters for the current sites covered under this SWMP include unnamed tributaries, Powder Wash and Greasewood Gulch that flow into the Little Snake River. Other receiving waters are unnamed tributaries, Sand Spring Gulch, Big Gulch, and Lay Creek that flow into the Yampa River. **Figure 2** shows the receiving waters for the permitted area.

2. SITE MAPS

The site maps for The Quicksilver Drilling Operation will be maintained along with the Stormwater Inspection Reports in the Stormwater Inspection Binder. The maps will be regularly updated to reflect all changes to the site. Additional maps will be created in response to planned field activities.

2. A Construction Site Boundaries

For an accurate description of the construction site boundaries, refer to the site specific map.

2. B Areas of Ground Disturbance

For an accurate description of the areas of ground disturbance, refer to the site specific map.

2. C Areas of Cut and Fill

For an accurate description of the areas of cut and fill, refer to the site specific map.

2. D Storage Areas

For an accurate description of the storage areas, refer to the site specific map.

2. E Location of Asphalt and Concrete Batch Plants

There will be no asphalt or concrete batch plants located within the permitted area.

2. F Locations of Structural BMPs

For an accurate description of the location of structural BMPs, refer to the site specific map.

2. G Locations of Non-Structural BMPs

For an accurate description of the location of non-structural BMPs, refer to the site specific map.

2. H Locations of Springs, Wetlands and Other Surface Waters

For an accurate description of the location of springs, wetlands, and other surface waters, refer to the site specific map.

3. STORMWATER MANAGEMENT CONTROLS

3.A Stormwater Administrator

The SWMP Administrator for the Quicksilver Drilling Operation is:

R. Todd Hutson
Environmental Manager
Address: 801 Cherry Street Suite 3700, Unit 19
Fort Worth, Texas 76102
Phone: 817.665.5434
E-mail: thutson@qrinc.com

The SWMP Administrator is responsible for developing, implementing, maintaining and revising the SWMP as necessary. The administrator may delegate the SWMP inspections and maintenance of records to qualified personnel.

3.B Potential Pollution Sources

Potential pollution sources associated with construction sites and natural gas development include:

- Sediment resulting from erosion of soil stockpiles, construction of well pads, access roads, pipelines, and other areas cleared of vegetation
- Sediment transport from vehicle tracking
- Leakage of fuels and lubricants from equipment
- Trash and debris from clearing activities, construction materials, and workers
- Leaks or spills from storage tanks and process equipment associated with the natural gas development activities
- Fugitive dust, and runoff from dust suppression activities

The most common source of pollution from pad and access road construction is sediment, which can be carried away from the work site with stormwater runoff and impact the water quality of a receiving stream. Clearing, grading, and otherwise altering previously undisturbed land can greatly increase the rate of soil erosion over pre-disturbance rates.

Petroleum products can also be potential stormwater pollutants. These products are used in construction activities to power or lubricate equipment and include: fuel, gear oil, hydraulic oil, brake fluid, and grease.

Debris from lay-down areas, residue from equipment cleaning and maintenance, and solid waste generated from land clearing operations and human activity (trees, brush, paper, trash, etc.) present other potential pollution sources within the construction site. Additionally, one or more facility may contain construction supplies such as various sized pipe, culverts, metal sheds, empty tanks, drums and vessels, fencing and stairs that should be monitored for the potential to pollute runoff.

Loading and unloading of condensate and produced water from above ground storage tanks may be a common activity at the Quicksilver Drilling Operations. Site spills and/or tank overflows can contaminate stormwater runoff.

Fugitive dust, as well as runoff from any water, magnesium chloride, or other chemicals that are used for dust suppression, can also be considered potential stormwater pollutants.

The location of potential pollutants will be found on the site specific maps.

The handling of spills or leaks from potential sources is described in the SPCC plan. Response to certain events may require specialized training due to health and safety concerns.

3.C BMPs for Stormwater Pollution Prevention

This section describes the BMPs that will be used at the Quicksilver Drilling Operation for stormwater pollution prevention. A BMP manual is included in **Appendix C**.

3.C.1 Structural Practices

The description, implementation, and application practices of structural BMPs available can be found in the BMP Manual. The location of all structural BMPs will be found on the site specific map.

3.C.2 Non-Structural Practices

The description and application practices of non-structural BMPs available and/or implemented can be found in the BMP manual. The location of all non-structural practices will be found on the site specific maps.

3.C.3 Phased BMP Installation

BMP implementation will be coordinated with the various stages of construction. BMPs to control erosion and sediment transport will be installed prior to earth disturbing activities. As additional areas are disturbed, BMPs will be implemented prior to the start of ground disturbing activities in those areas. As portions of the site are completed and previously disturbed areas are stabilized or BMPs are no longer needed, the BMPs will be removed.

Permanent or temporary erosion control measures for all slopes, channels, ditches, disturbed land area, and soil stockpiles will be implemented as soon as practicable after final grading or the final ground disturbance has been completed. When it is not possible to permanently stabilize a disturbed area after a disturbance has been completed or where significant ground disturbance activity ceases, temporary erosion control measures will be implemented as soon as practicable. **Table 2** below outlines the BMP's to be implemented during each phase of the project.

Table 2 – BMP Phasing

Project Phase	BMPs to be implemented during each phase
Pre-Disturbance/Site Preparation	• Prepare stabilized staging area. • Install vehicle tracking pad, geotextile, or mud mats where applicable to provide designated access into the ROW. • Install perimeter control BMPs. • Limit access to areas that are not to be disturbed to protect the existing vegetation.

Table 2 (continued)

Construction	• Locate stockpiles in work areas with perimeter BMPs. • Install permanent BMPs if not already done. • Leave disturbed area of site in a surface roughened condition when feasible. • Protect, inspect and repair BMPs as necessary.
Post-construction	• Inspect, maintain, and repair BMPs installed during previous phases. • Stabilize surface with gravel or other methods when feasible • Perform seeding, and mulching or installation of erosion control blankets where applicable.
Final Stabilization (see Section 4)	• Remove non-biodegradable temporary BMPs.

3.C.4 Materials Handling and Spill Prevention

Spills or leaks from potential pollution sources will be handled as described in Quicksilver's SPCC plan.

Fuels and Materials Management

Pollutants from petroleum products used during construction activities adhere easily to soil particles and other surfaces. In the case of a spill or leak, soils contaminated with petroleum products will be contained and remediated onsite or removed to a proper disposal site. Proposed soil erosion and sediment control practices will aid in retention of spills or leaks. Use of secondary containment and drip pans will reduce the likelihood of spills or leaks contacting the ground. Proposed maintenance and safe storage practices will reduce the chance of petroleum products contaminating the site. Oily wastes such as crankcase oil, cans, rags, and paper containing oils will be placed in proper receptacles and disposed of or recycled. Routine daily inspections will be conducted to identify leaks from equipment and vehicles and if needed corrective actions will be implemented.

The following guidelines for storing and managing petroleum products will be implemented:

- All product containers will be clearly labeled
- Drums will be kept off the ground within secondary containment and stored under cover if needed
- Fuel tanks will be stored within secondary containment
- Lids for drummed materials will be securely fastened
- Emergency spill response procedures will be available on-site. Persons trained in handling spills will be on call at all times
- Spill response equipment and materials (absorbent, shovels, etc.) will be easily accessible. Spills will be immediately cleaned up and contaminated materials will be properly stored on site until they can be disposed of in accordance with applicable regulations

- Storage areas and containers will be regularly monitored for leaks and repaired or replaced as necessary. Contractors and subcontractors should be reminded about proper storage, handling and transferring of petroleum products or other hazardous materials during safety meetings

All spills and releases of exploration and production waste or produced fluid exceeding 5 barrels (210 gallons) including those contained within unlined berms, shall be reported in writing on the COGCC Spill/Release Report Form 19 within 10 days of discovery of the spill.

All spills/releases that exceed 20 barrels (840 gallons) of exploration and production liquids/waste shall be verbally reported to the COGCC at (303) 894-2100 within 24 hours of discovery.

Spills or releases of any size that impact or threaten to impact any waters of the state, residence or occupied structure, livestock or public byway, shall be verbally reported to the COGCC as soon as practical after discovery (COGCC Rule 906). If the spill may potentially reach waters of the state (which includes surface water, ground water and dry gullies or storm sewers leading to surface water), it must also be reported immediately to the CDPHE at 1-877-518-5608.

Spills or releases of more than 25 gallons of refined petroleum crude oil products such as gasoline, diesel fuel, oil, or derivatives of mineral, animal or vegetable oil shall be reported to the CDPHE at 1-877-518-5608, within 24 hours.

A hazardous substance release in any amount which enters or threatens to enter waters of the state shall be reported to the CDPHE.

Other Material/Chemical Product Management

Additional materials maybe used and stored on site for use during construction. These materials will be stored appropriately and managed to minimize spills and leaks. Storage areas will be regularly inspected and any minor spills or leaks will be cleaned up immediately.

The construction contractor will maintain a lay-down or staging area for equipment and material storage on site. This area will be maintained with good housekeeping and will be inspected on a regular basis for spills, leaks, and potential of materials commingling with stormwater runoff.

3.C.5 Dedicated Asphalt or Concrete Batch Plants

There will be no dedicated asphalt or concrete batch plants within the permitted area.

3.C.6 Vehicle Tracking

In order to limit vehicle tracking of sediment, vehicles will use designated entry points into construction areas. Access roads and pads will be sloped and maintained such that stormwater exits quickly, limiting the potential for excessive mud and rutting. Stabilization methods, such as road base and chemical stabilizers, along with Stabilized Construction Entrances (see BMP manual) will be used where practicable. The location of vehicle tracking controls will be shown on the site specific maps.

3.C.7 Waste Management and Disposal, Concrete Washout

Well pad construction and drilling can generate various wastes during the course of construction. Wastes may include, but are not limited to the following:

- Sagebrush, shrubs and trees from clearing operations
- Trash and debris from construction materials and workers

- Drill cuttings, drilling fluids
- Sanitary sewage

Each of these wastes will be managed so as not to contribute to stormwater pollution. Construction trash and debris will be collected in containers and hauled off-site for disposal in suitable landfills. Sanitary waste will be containerized in portable toilets or other storage tanks with waste materials regularly pumped and transported off-site for disposal at approved facilities.

There will be no concrete washout within the permitted area.

3.C.8 Ground Water and Stormwater Dewatering

No groundwater dewatering is anticipated at this time. If groundwater is encountered, the dewatering of the site will be regulated by a dewatering permit issued through CDPHE. All stormwater will be diverted by berms and/or diversion ditches to avoid contact with the groundwater.

4. FINAL STABILIZATION AND LONG TERM STORMWATER MANAGEMENT

A site is considered finally stabilized when all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, compacted, covered, paved, or otherwise stabilized in such a way as to minimize erosion to the extent practicable, or a uniform vegetative cover has been established that reflects a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels or reference areas. The typical seed used for the Quicksilver Drilling Operation is presented below in **Table #3.**

Table 3

Typical Seed	
Species	**Variaty**
Great Basin Wildrye	Magnar
Alpine timothy	
Gardner saltbrush	
Indian ricegrass	
Inland saltgrass	
Prairie sandreed	Goshen
Thickspike wheatgrass	
Western Wheatgrass	Arriba
Winterfat	
Withchgrass	
Yarrow	

Sites are considered finally stabilized once site preparation and interim reclamation (COGCC Rule 1003) are complete and the above stabilization criteria have been met, even though the site will be disturbed again in the future for final reclamation.

Once stabilized, the site will be removed from this SWMP for sediment controls. However, if petroleum hydrocarbons or other chemicals affect stormwater as a result of industrial activities on-site, the well pad will maintain permit coverage. Permanent BMPs may be left in place if it is deemed necessary to maintain site stability.

5. INSPECTIONS AND MAINTENANCE PROCEDURES

Site inspections will be conducted with the requirements and minimum schedule as outlined in Part I.D.6 of the CDPS general permit (COR-030000). The requirements are as follows:

- All active construction sites will be inspected at a minimum of at least once every 14 calendar days, and within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion.
- If a site is considered temporarily idle, that is, no construction activities will occur following a storm event, then a post-storm inspection will be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. Routine inspections must still be conducted at least every 14 calendar days.
- For sites or portions of sites in which all construction activities that will result in ground disturbance are completed, and all activities for final stabilization, as outlined above in section 4, with the exception of vegetative coverage are completed, inspections will be conducted at least once every month, and post-storm inspections are not required.
- Inspections are not required at sites where snow cover exists over the entire site for an extended period of time as long as melting conditions do not exist. The following information must be documented in the inspection record for the use of this exclusion: dates when snow cover occurred, date when construction activities ceased, and date melting conditions began.

A trained and qualified person familiar with the SWMP and stormwater controls will conduct all inspections. The scope of the inspection will cover the construction site perimeter, all disturbed areas, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles access the site. These areas will be inspected for evidence of, or the potential for, pollutants leaving the construction site boundaries or discharging to waters of the state. Also, all erosion and sediment control practices identified in this SWMP will be evaluated to ensure that they are maintained and operating correctly.

Personnel performing site inspections will record the information as outlined below on the inspection report. The reports will be maintained in the Inspection Report Binder. The inspection reports will identify any incidents of non-compliance with the terms and conditions of the general permit. Reports will include the following:

i. The inspection date
ii. Name(s) and title(s) of personnel making the inspection
iii. Location(s) of discharges of sediment or other pollutants from the site
iv. Location(s) of BMPs that need to be maintained
v. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location
vi. Location(s) where additional BMPs are needed that were not in place at the time of inspection
vii. Deviations from the minimum inspection schedule as outlined above
viii. Description of corrective action for items iii, iv, v, and vi, above, dates corrective action(s) taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary

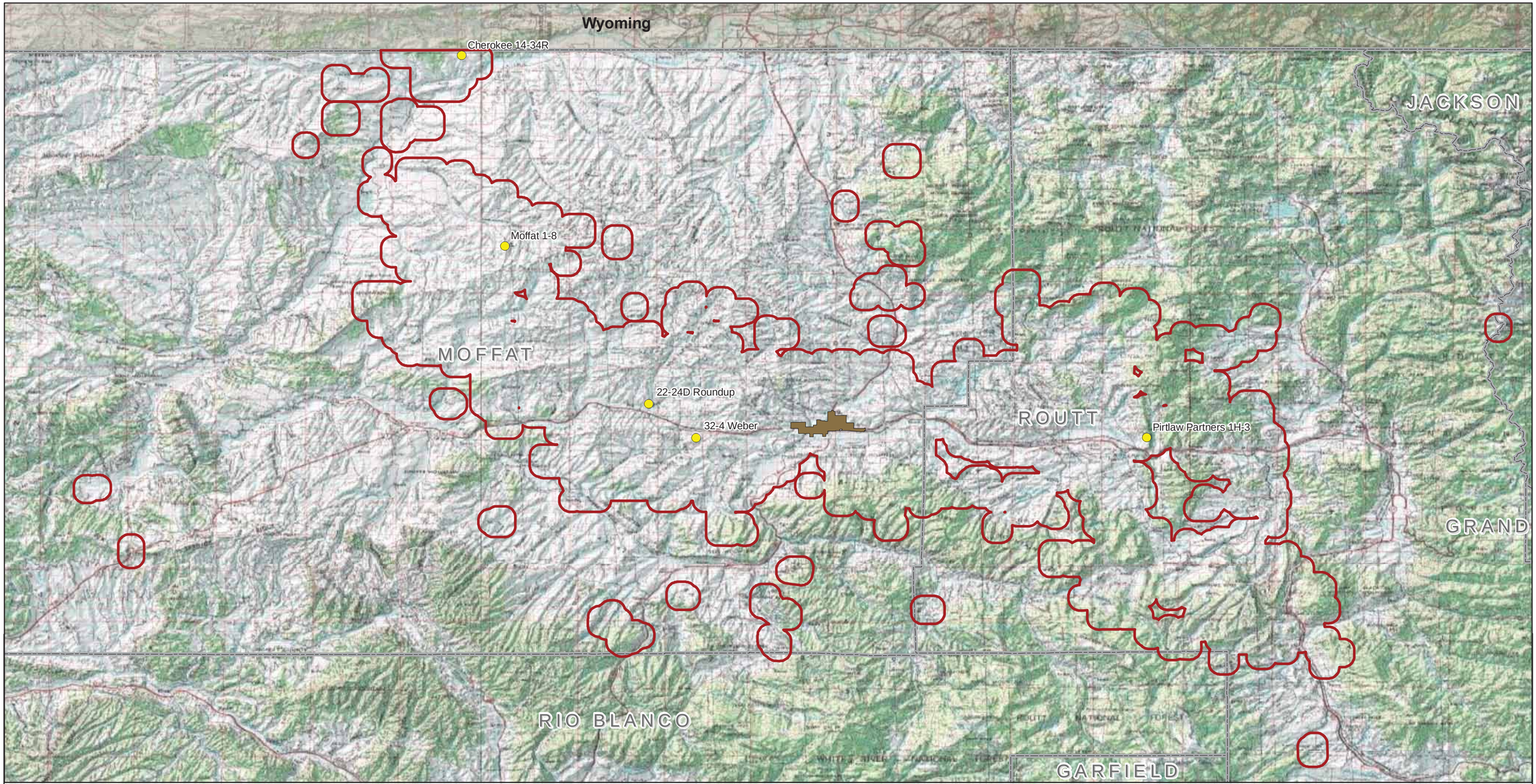
ix. After adequate corrective action(s) have been taken, or where a report does not identify any incidents requiring corrective action(s), the report shall contain a signed statement indicating the site is in compliance with the permit to the best of the signer's knowledge and belief.

If deficiencies, maintenance issues, or the need for additional BMPs is noted on the inspection form, the Stormwater Administrator will direct a subcontractor to perform the proper actions.

BMPs that have failed, or have the potential to fail without maintenance or modification, will be addressed as soon as possible, immediately in many cases, to prevent the discharge of pollutants. All BMPs will be adequately maintained in accordance with good engineering, hydrologic and pollution control practices, including removal of collected sediment outside the acceptable tolerances of the BMPs.

All inspection records will be kept within this SWMP, or in another location designated by Quicksilver, for a minimum of three years from expiration or inactivation of permit coverage.

Figures



LEGEND

- Quicksilver Pads
- Lease Boundary
- Craig, CO
- COUNTIES

0 4.5 9 18 Miles

1 in = 8.24 miles

N W E S

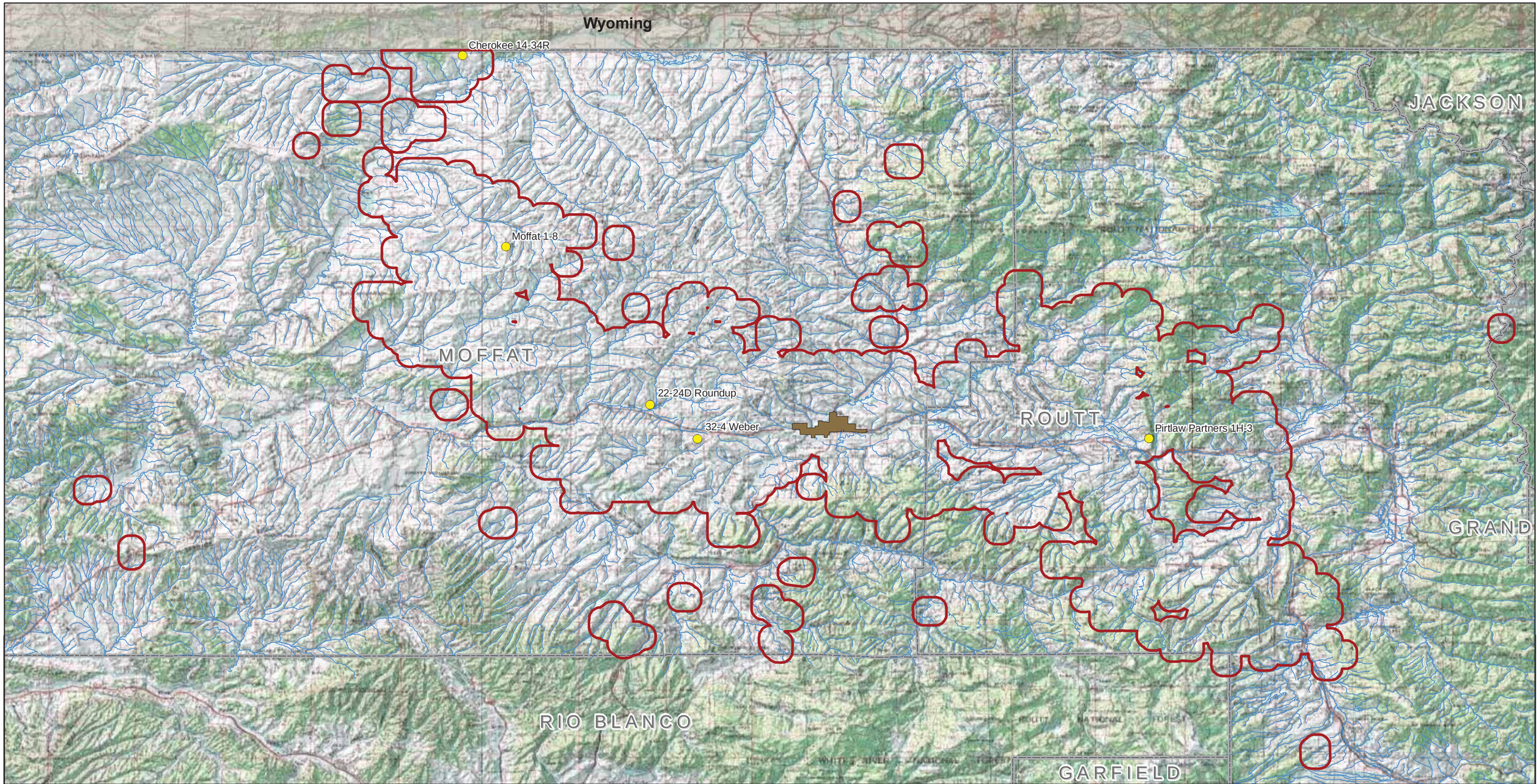
PROJECT NO:	011-0710
DRAWN BY:	JAS
DATE:	06/15/2011

QUICKSILVER RESOURCES, INC
PERMITTED AREA MAP
MOFFAT COUNTY, COLORADO
RIO BLANCO COUTY, COLORADO
ROUTT COUNTY, COLORAD

OLSSON ASSOCIATES
826 21-1/2 ROAD
GRAND JUNCTION, CO 81505
TEL 970.263.7800
FAX 970.263.7456

FIGURE

1



LEGEND

- Quicksilver Pads
- Craig, CO
- Lease Boundary
- COUNTIES
- Streams

0 4.5 9 18 Miles

1 in = 8.24 miles

N W E S

PROJECT NO:	011-0710
DRAWN BY:	JAS
DATE:	06/15/2011

QUICKSILVER RESOURCES, INC
PERMITTED AREA MAP
MOFFAT COUNTY, COLORADO
RIO BLANCO COUTY, COLORADO
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OLSSON ASSOCIATES
826 21-1/2 ROAD
GRAND JUNCTION, CO 81505
TEL 970.263.7800
FAX 970.263.7456

FIGURE

2

Appendix A

CDPS Certification COR-03F046

General Permit COR-030000

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

May 5, 2009

Tom Duncan, Proj Dir Western US
Quicksilver Resources
777 W Rosedale Ste 300
Fort Worth, TX 76104

RE: Certification, Colorado Discharge Permit System
Permit No., COR030000, Certification Number: COR03F046

Dear Mr./Ms. Duncan;

The Water Quality Control Division (the Division) has reviewed the application submitted for the Quicksilver Drilling Project facility and determined that it qualifies for coverage under the CDPS General Permit for Stormwater Discharges Associated with Construction (the permit). Enclosed please find a copy of the permit certification, which was issued under the Colorado Water Quality Control Act.

Facility: Quicksilver Drilling Project	Moffat County
Legal Contact: Tom Duncan, Proj Dir Western US	Phone number: 817-665-4933
	Email: jraab@qrinc.com
Facility Contact: Tim Coakley, SW Mgr Olsson Associates	Phone number: 970-263-7800
	Email: tcoakley@oaconsulting.com

Tom Duncan, is the legal contact for this certification, as shown above. The legal contact receives all legal documentation pertaining to the permit certification, including invoices. Tim Coakley is the local contact as listed above. This entity will be contacted for general inquiries regarding the facility.

The Annual Fee for this certification is $245.00 is invoiced every July. Do Not Pay This Now. The initial prorated invoice will be sent to the legal contact shortly.

Please read the enclosed permit and certification. If you have any questions please contact Kathy Rosow, Environmental Protection Specialist, at (303) 692-3521.

Sincerely,

Debbie Jessop, Administrative Assistant
WATER QUALITY CONTROL DIVISION

Enclosures: Certification page; General Permit; Highlight Sheet; Termination form

xc: Regional Council of Government
Moffat County, Local County Health Department
D.E., Technical Services Unit, WQCD
Permit File

/dkj cert

CDPS GENERAL PERMIT

STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION ACTIVITY

AUTHORIZATION TO DISCHARGE UNDER THE

COLORADO DISCHARGE PERMIT SYSTEM

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), this permit authorizes the discharge of stormwater associated with construction activities (and specific allowable non-stormwater discharges in accordance with Part I.D.3 of the permit) certified under this permit, from those locations specified throughout the State of Colorado to specified waters of the State. Such discharges shall be in accordance with the conditions of this permit.

This permit specifically authorizes the facility listed on the certification page (page 1) of this permit to discharge, as of this date, in accordance with permit requirements and conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

This permit and the authorization to discharge shall expire at midnight, **June 30, 2012.**

Issued and Signed this 31st day of May, 2007

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Janet S. Kieler
Permits Section Manager
Water Quality Control Division

SIGNED AND ISSUED MAY 31, 2007

EFFECTIVE JULY 1, 2007

ARTICLE IV: FIGURES

Quicksilver Resources Inc. | 1169 Hilltop Parkway, Suite 204 | Steamboat Springs, CO 80407 | 970.817.6761 | Fax 970.879.5771

Olsson Associates | 826 21 ½ Road | Grand Junction, CO 81505 | 970.263.7800 | Fax 970.263.7456

PHOTO: PIRTLAW PARTNERS, LTD. #24-33 CAMERA LOOKING: NORTH

PHOTO: PIRTLAW PARTNERS, LTD. #24-33 CAMERA LOOKING: EAST

LEGEND:

LOCATION PHOTOS : PHOTO P1

Quicksilver Resources, Inc.

PIRTLAW PARTNERS, LTD. #24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		9/09/11		FH11photos

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz

PHOTO: PIRTLAW PARTNERS, LTD. #24-33 CAMERA LOOKING: SOUTH

PHOTO: PIRTLAW PARTNERS, LTD. #24-33 CAMERA LOOKING: WEST

LEGEND:

LOCATION PHOTOS : PHOTO P2

Quicksilver Resources, Inc.

SCALE	DRG	DATE		FILE
		9/09/11		FH11photos

PIRTLAW PARTNERS, LTD. #24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
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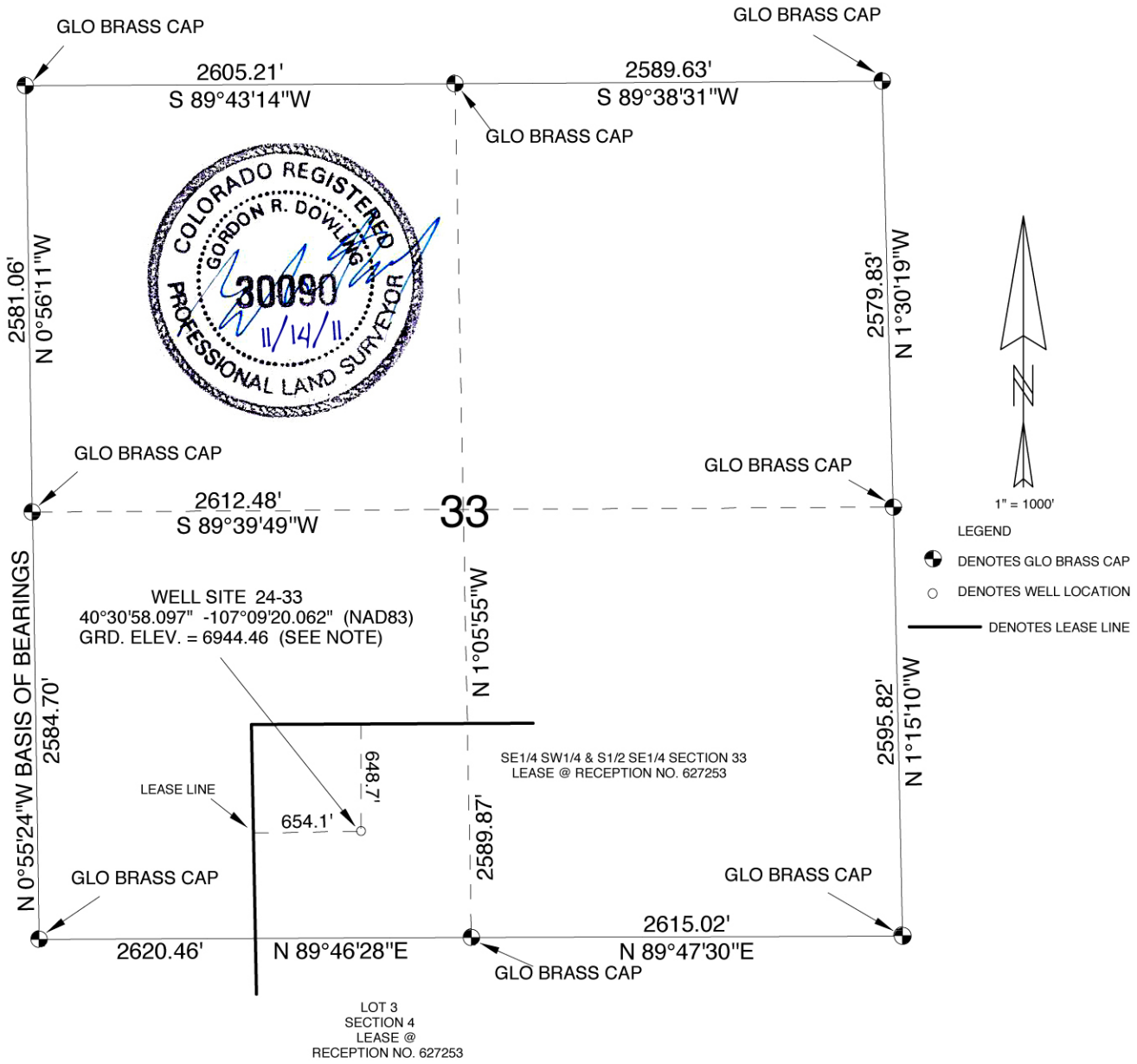


WELL SITE 24-33
COLORADO NORTH ZONE
NAD83 STATE PLANE COORDINATES
N. 1435166.56
E. 2539722.49

NAD27 STATE PLANE COORDINATES
N. 435165.24
E. 1539880.50

LATITUDE / LONGITUDE
NAD83
N. 40° 30' 58.097" : 40.5161380°
E. -107° 09' 20.062" : -107.1555728°

NAD27
N. 40° 30' 58.191" : 40.5161642°
E. -107° 09' 17.860" : -107.1549611°

SURVEYORS STATEMENT
I, Gordon R. Dowling, a duly registered Professional Land Surveyor in the State of Colorado do hereby Certify that the survey represented by this drawing was done by me or under my direct supervision and is in accordance with the applicable standards of practice and is accurate based upon my knowledge, information, and belief and correctly show the location of Pirtlaw Partners, Ltd. 24-33.

_____
Gordon R. Dowling, Colorado P.L.S. No. 30090

Dated this ____day of _____, 2011

NOTES:

1. ELEVATIONS BASED ON XCEL ENERGY HAYDEN STATION DATUM.
2. OBSERVED PDOP OF 1.8. OBSERVATIONS ARE IN COMPLIANCE WITH RULE NO. 215.
3. SITE IS MIXED NATIVE PASTURE, NO VISIBLE IMPROVEMENTS WITHIN 200' OF SITE.

NOTICE: According to Colorado Law, you must commence any legal action based on any defect in this survey within three years after you first discover such defect, in no event may any action be commenced more thAn ten years from the date of certification shown hereon.

0' 1000' 2000'

Quicksilver Resources Inc.

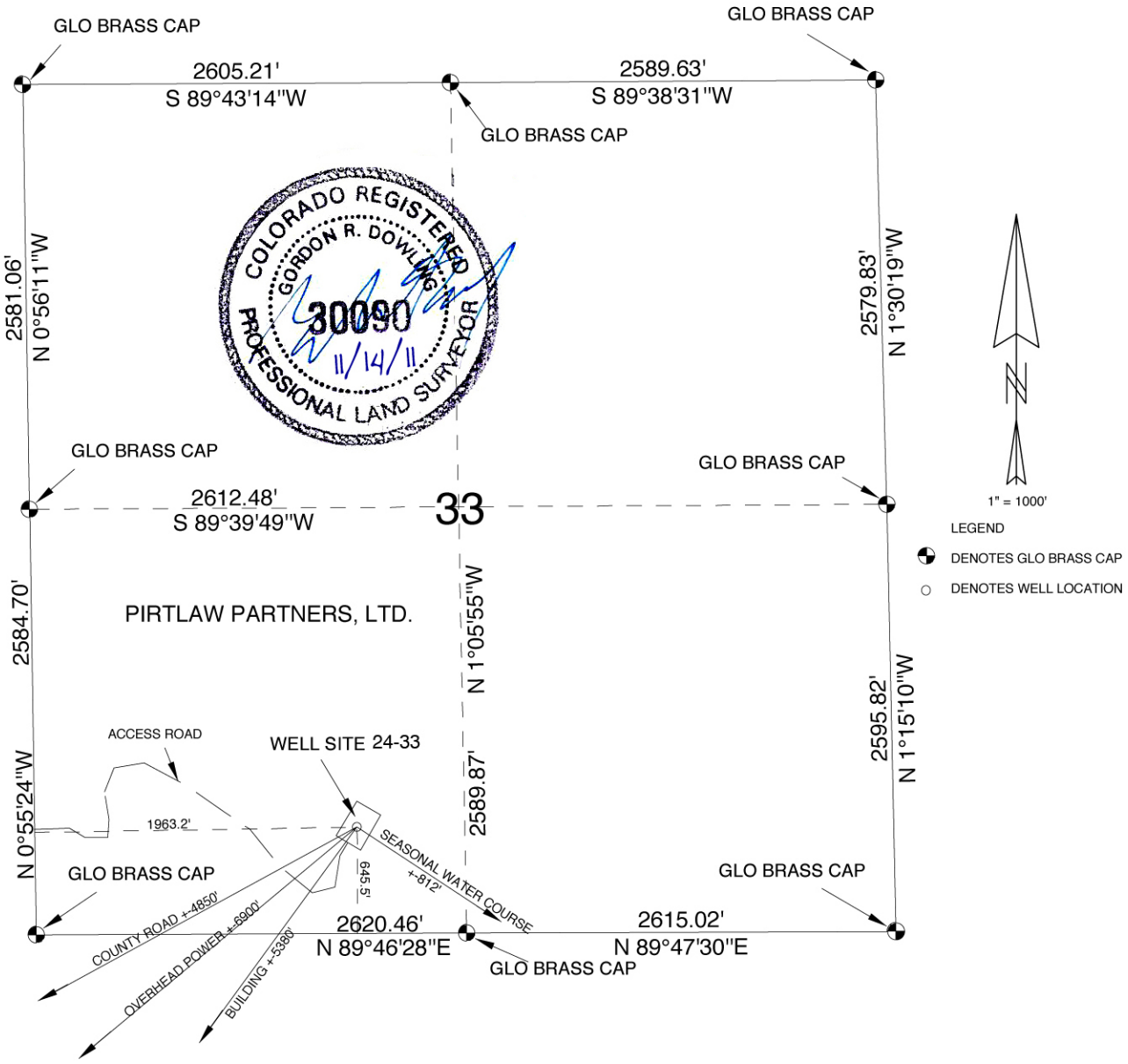
PIRTLAW PARTNERS, LTD. 24-33

SECTION 33, T7N R87W, 6th P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

DOWLING LAND SURVEYORS, LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz

SCALE	DRG	DATE	REV: 8	FILE
1" = 1000'	GRD	8/25/11	11/14/11	QRI24-33



SITE IS MIXED NATIVE PASTURE, NO VISIBLE IMPROVEMENTS WITHIN 200' OF SITE.

WELL SITE 24-33
COLORADO NORTH ZONE
NAD83 STATE PLANE COORDINATES
N. 1435166.56
E. 2539722.49

NAD27 STATE PLANE COORDINATES
N. 435165.24
E. 1539880.50

LATITUDE / LONGITUDE
NAD83
N. 40° 30' 58.097" : 40.5161380°
E. -107° 09' 20.062" : -107.1555728°

NAD27
N. 40° 30' 58.191" : 40.5161642°
E. -107° 09' 17.860" : -107.1549611°

NOTICE: According to Colorado Law, you must commence any legal action based on any defect in this survey within three years after you first discover such defect, in no event may any action be commenced more thAn ten years from the date of certification shown hereon.

0' 1000' 2000'

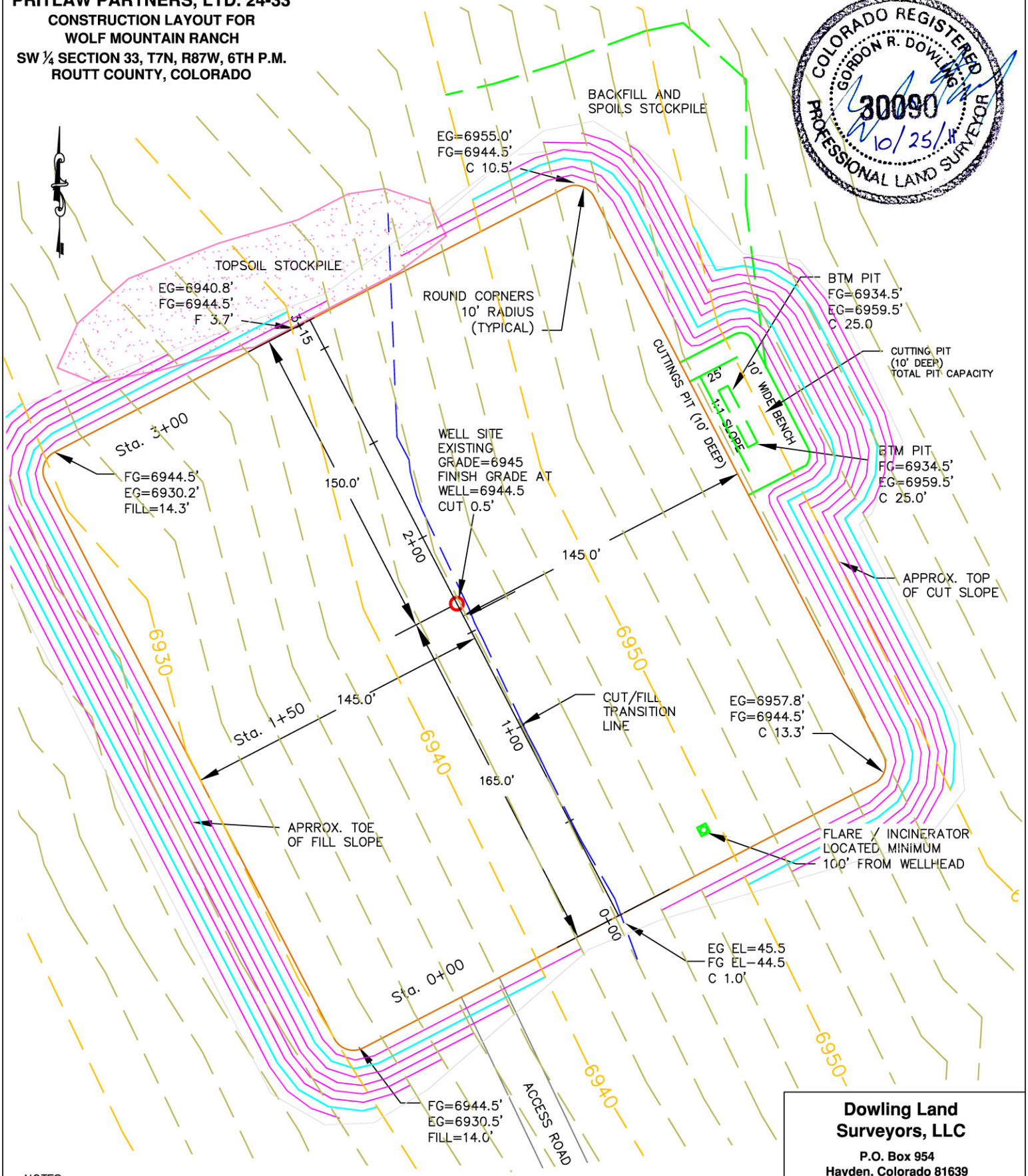
Quicksilver Resources Inc.	PIRTLAW PARTNERS, LTD. 24-33	DOWLING LAND SURVEYORS, LLC P.O. BOX 954 HAYDEN, COLORADO 81639 (970) 276-3613 dowling@plotz.biz
	SECTION 33, T7N R87W, 6th P.M. ROUTT COUNTY, COLORADO	
	LOCATION DRAWING	

SCALE	DRG	DATE	REV: 8	FILE
1" = 1000'	GRD	9/20/11	11/14/11	QR24-33A

PRITLAW PARTNERS, LTD. 24-33

CONSTRUCTION LAYOUT FOR
WOLF MOUNTAIN RANCH
SW ¼ SECTION 33, T7N, R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

COLORADO REGISTERED
GORDON R. DOWLING
30090
10/25/11
PROFESSIONAL LAND SURVEYOR



NOTES:

1) WELL LOCATED IN THE SW ¼ OF SECTION 33, TOWNSHIP 7 NORTH, RANGE 87 WEST, 6TH P.M., ROUTT COUNTY, COLORADO. 648.7 FNL AND 654.1 FWL.

Dowling Land Surveyors, LLC
P.O. Box 954
Hayden, Colorado 81639
(970)-276-3613
dowling@plotz.biz

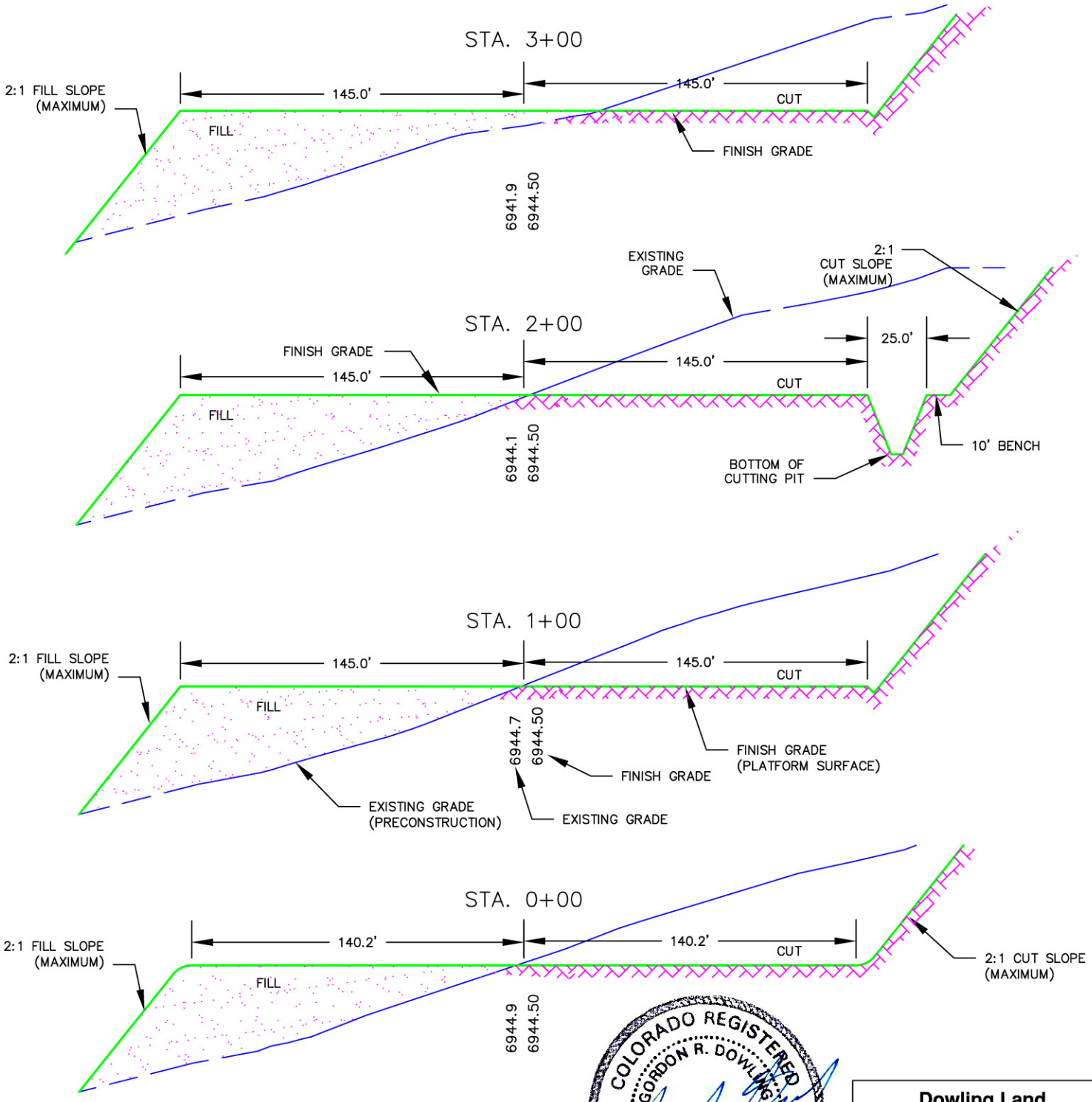
Horizontal Scale
1" = 60'

FIGURE 1
Revisions: 10-21-2011
DATE: 9-20-2011
JOB NO. 1208-001

PRITLAW PARTNERS, LTD. 24-33

CONSTRUCTION LAYOUT CROSS SECTIONS
WOLF MOUNTAIN RANCH
SW ¼ SECTION 33, T7N, R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

APPROXIMATE ACREAGE
WELL SITE DISTURBANCE =±3.16 ACRES
ACCESS ROAD DISTURBANCE = ±0.12 ACRES
TOTAL ±3.30 ACRES



NOTES:

1) WELL LOCATED IN THE SW ¼ OF SECTION 33, TOWNSHIP 7 NORTH, RANGE 87 WEST, 6TH P.M., ROUTT COUNTY, COLORADO. 648.7 FNL AND 654.1 FWL.

2) TOPSOIL NOT TO BE STRIPPED BELOW FINISHED GRADE OF WELL PAD SUBSTRUCTURE.

3) 6" TOPSOIL STRIPPING = 2,488 CY, CUT = 13,117 CY, FILL = 14,810 CY

4) 1,693 CY OF ADDITIONAL EMBANKMENT MATERIAL (AFTER INTERIM RECLAMATION)

COLORADO REGISTERED GORDON R. DOWLING 30090 10/25/11 PROFESSIONAL LAND SURVEYOR

Dowling Land Surveyors, LLC
P.O. Box 954
Hayden, Colorado 81639
(970)-276-3613
dowling@plotz.biz

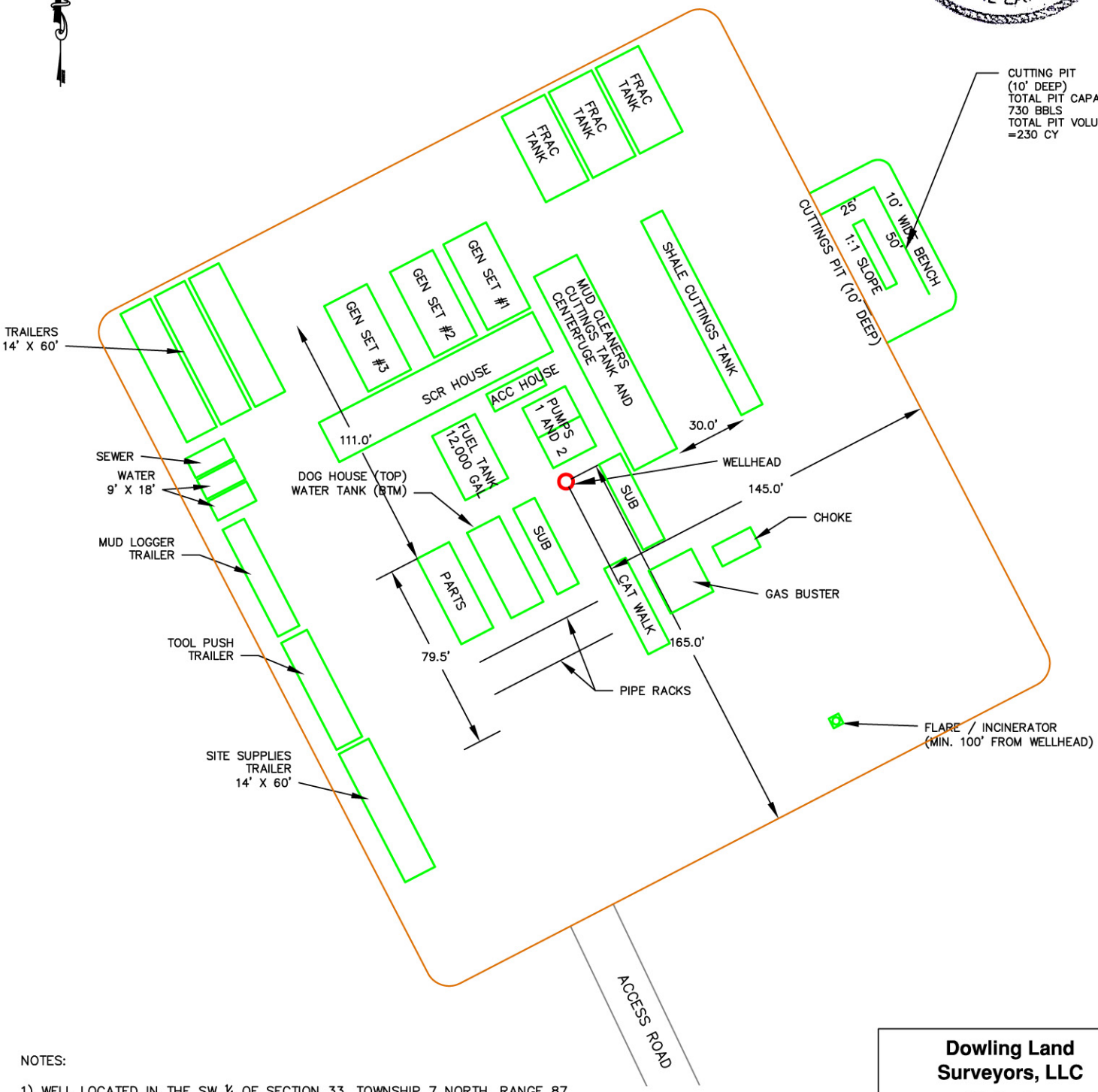
Horizontal Scale
1" = 60'

FIGURE 2
Revisions: 10-21-2011
DATE: 9-20-2011
JOB NO. 1208-001

PRITLAW PARTNERS, LTD. 24-33

TYPICAL RIG LAYOUT FOR
WOLF MOUNTAIN RANCH
SW ¼ SECTION 33, T7N, R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

COLORADO REGISTERED
GORDON R. DOWLING
30090
10/25/11
PROFESSIONAL LAND SURVEYOR



NOTES:

1) WELL LOCATED IN THE SW ¼ OF SECTION 33, TOWNSHIP 7 NORTH, RANGE 87 WEST, 6TH P.M., ROUTT COUNTY, COLORADO. 648.7 FNL AND 654.1 FWL.

Dowling Land Surveyors, LLC
P.O. Box 954
Hayden, Colorado 81639
(970)-276-3613
dowling@plotz.biz

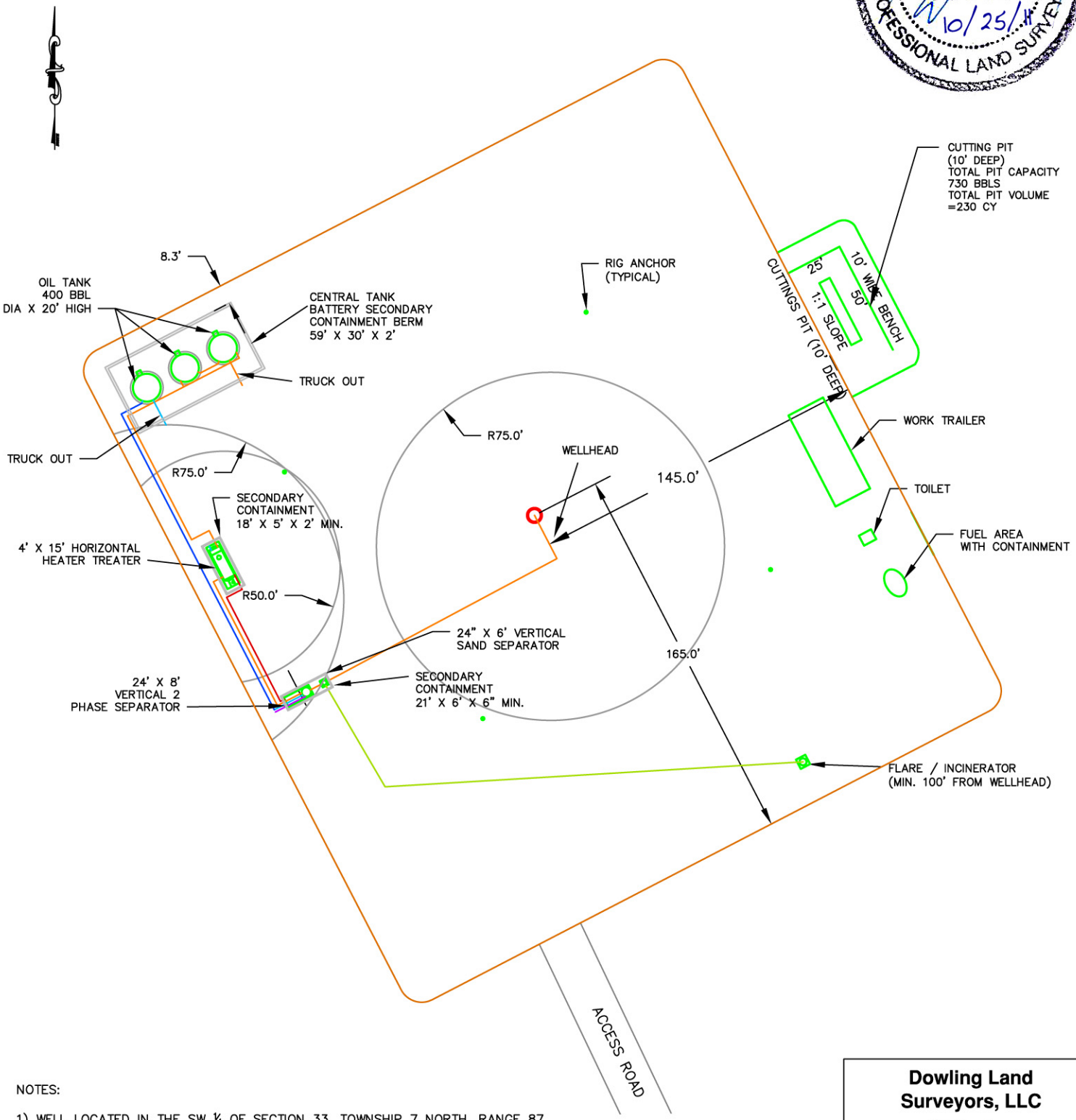
Horizontal Scale
1" = 60'

FIGURE 3
Revisions: 10-21-2011
DATE: 9-20-2011
JOB NO. 1208-001

PRITLAW PARTNERS, LTD. 24-33

TYPICAL RIG LAYOUT FOR
WOLF MOUNTAIN RANCH
SW ¼ SECTION 33, T7N, R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

COLORADO REGISTERED
GORDON R. DOWLING
30090
10/25/11
PROFESSIONAL LAND SURVEYOR



NOTES:

1) WELL LOCATED IN THE SW ¼ OF SECTION 33, TOWNSHIP 7 NORTH, RANGE 87 WEST, 6TH P.M., ROUTT COUNTY, COLORADO. 648.7 FNL AND 654.1 FWL.

Dowling Land Surveyors, LLC
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Hayden, Colorado 81639
(970)-276-3613
dowling@plotz.biz

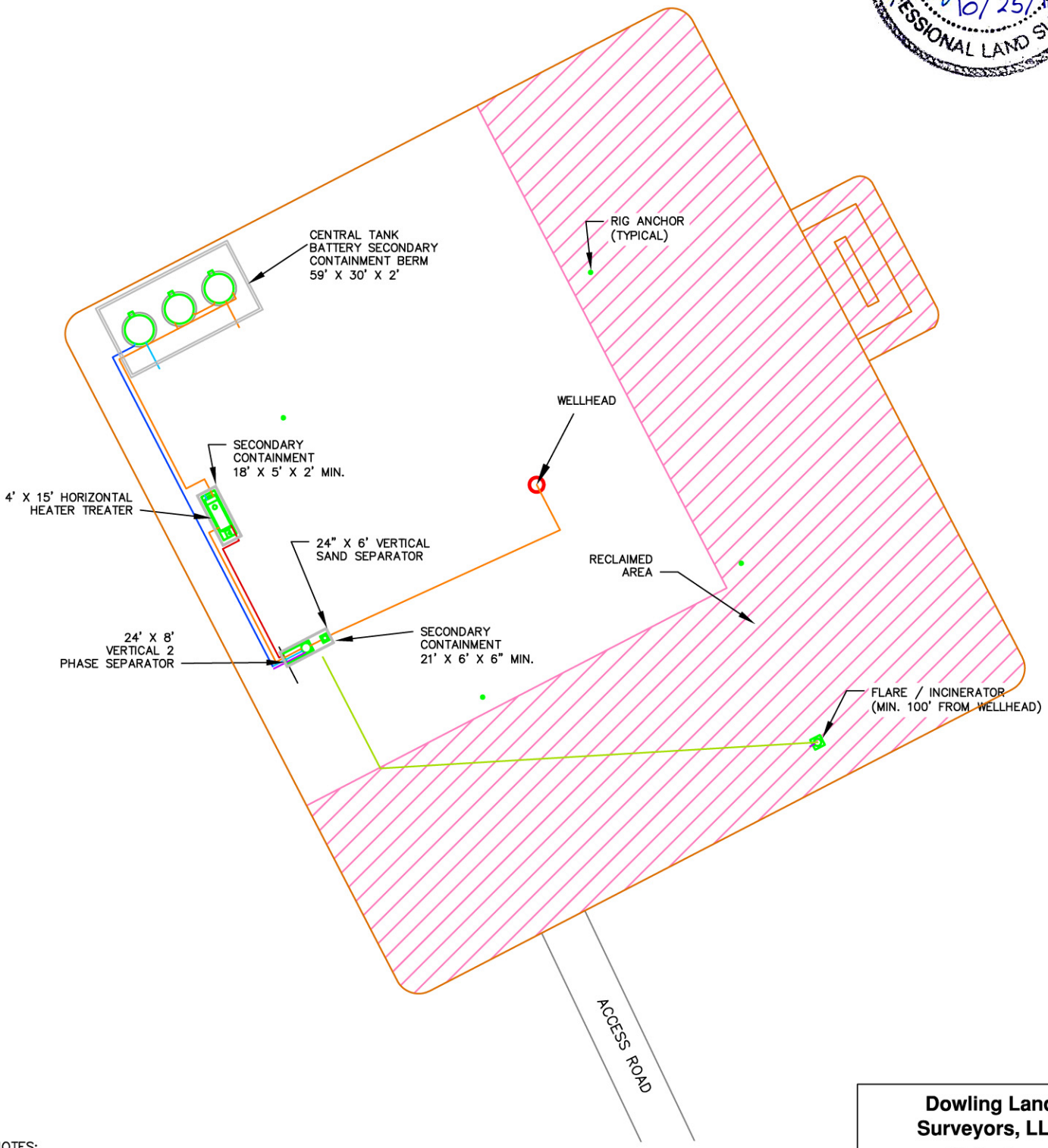
Horizontal Scale
1" = 60'

FIGURE 3
Revisions: 10-21-2011
DATE: 9-20-2011
JOB NO. 1208-001

PRITLAW PARTNERS, LTD. 24-33

RECLAMATION DIAGRAM FOR
WOLF MOUNTAIN RANCH
SW ¼ SECTION 33, T7N, R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

COLORADO REGISTERED
GORDON R. DOWLING
30090
10/25/11
PROFESSIONAL LAND SURVEYOR



NOTES:

1) WELL LOCATED IN THE SW ¼ OF SECTION 33, TOWNSHIP 7 NORTH, RANGE 87 WEST, 6TH P.M., ROUTT COUNTY, COLORADO. 648.7 FNL AND 654.1 FWL.

2) UN-RECLAIMED AREA = ±0.90 ACRES.

Dowling Land Surveyors, LLC
P.O. Box 954
Hayden, Colorado 81639
(970)-276-3613
dowling@plotz.biz

Horizontal Scale
1" = 60'

FIGURE 4
Revisions: 10-21-2011
DATE: 9-20-2011
JOB NO. 1208-001

QUICKSILVER RESOURCES, INC.

PIRTLAW PARTNERS, LTD. #24-33
SECTION 33, T7N R87W, 6th P.M.,
ROUTT COUNTY, COLORADO

PROCEED EASTERLY FROM HAYDEN, COLORADO 5.9 MILES ALONG US HIGHWAY 40 TO THE INTERSECTION WITH ROUTT COUNTY ROAD #70 (IMMEDIATELY AFTER CROSSING UNION PACIFIC RAILROAD), TURN LEFT OR NORTHWESTERLY AND PROCEED 2.1 MILES ALONG COUNTY ROAD #70 TO AN EXISTING SET OF CORRALS AND A PRIVATE GRAVEL DRIVE TO THE RIGHT, PROCEED 0.3 MILES ALONG THE PRIVATE DRIVE; TURN RIGHT AND FOLLOW THE FLAGGED ROUTE 1.0 MILES TO THE PROPOSED LOCATION.

TOTAL DISTANCE HAYDEN, COLORADO TO THE PROPOSED WELL LOCATION IS APPROXIMATELY 9.3 MILES.

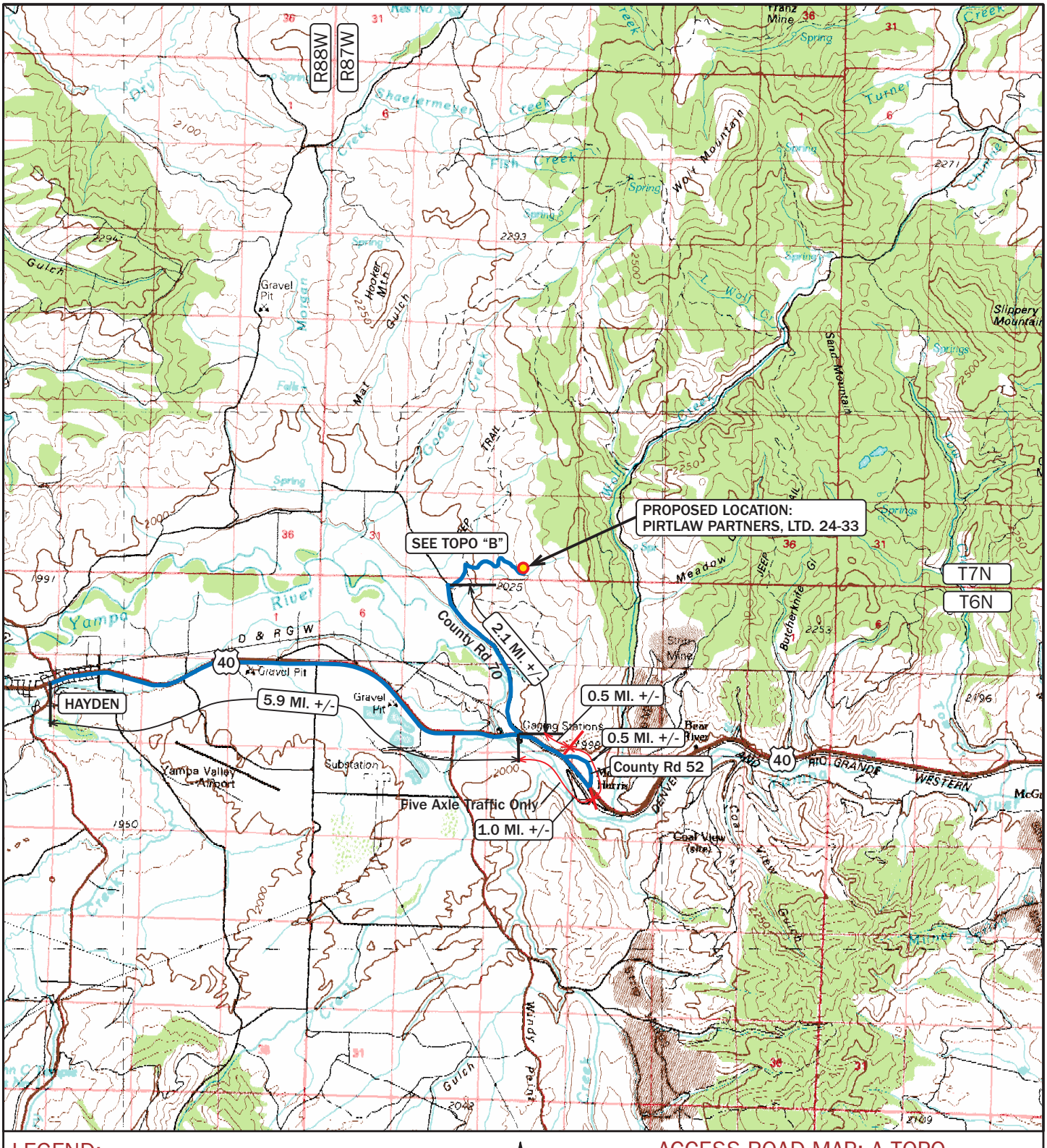
QUICKSILVER RESOURCES INC.

Five Axle Traffic Only

PIRTLAW PARTNERS, LTD. #24-33
SECTION 33, T7N R87W, 6TH P.M.,
ROUTT COUNTY, COLORADO

PROCEED EASTERLY FROM HAYDEN, COLORADO 6.9 MILES ALONG US HIGHWAY 40 TO THE INTERSECTION WITH ROUTT COUNTY ROAD #52, TURN LEFT OR NORTH AND PROCEED 0.5 MILES TO THE INTERSECTION OF US HIGHWAY 40 TURN RIGHT OR PROCEED WEST TOWARD HAYDEN .5 MILES TO ROUTT COUNTY ROAD #70 TURN RIGHT OR NORTHWESTERLY AND PROCEED 2.1 MILES ALONG COUNTY ROAD #70 TO AN EXISTING SET OF CORRALS AND A PRIVATE GRAVEL DRIVE TO THE RIGHT, PROCEED 0.3 MILES ALONGTHE PRIVATE DRIVE; TURN RIGHT AND FOLLOW THE FLAGGED ROUTE 1.0 MILES TO THE PROPOSED LOCATION.

TOTAL DISTANCE HAYDEN, COLORADO TO THE PROPOSED WELL LOCATION IS APPROXIMATELY 11.3 MILES.



LEGEND:

- Proposed Location

ACCESS ROAD MAP: A TOPO

N

0 1 2 MI

Quicksilver Resources, Inc.

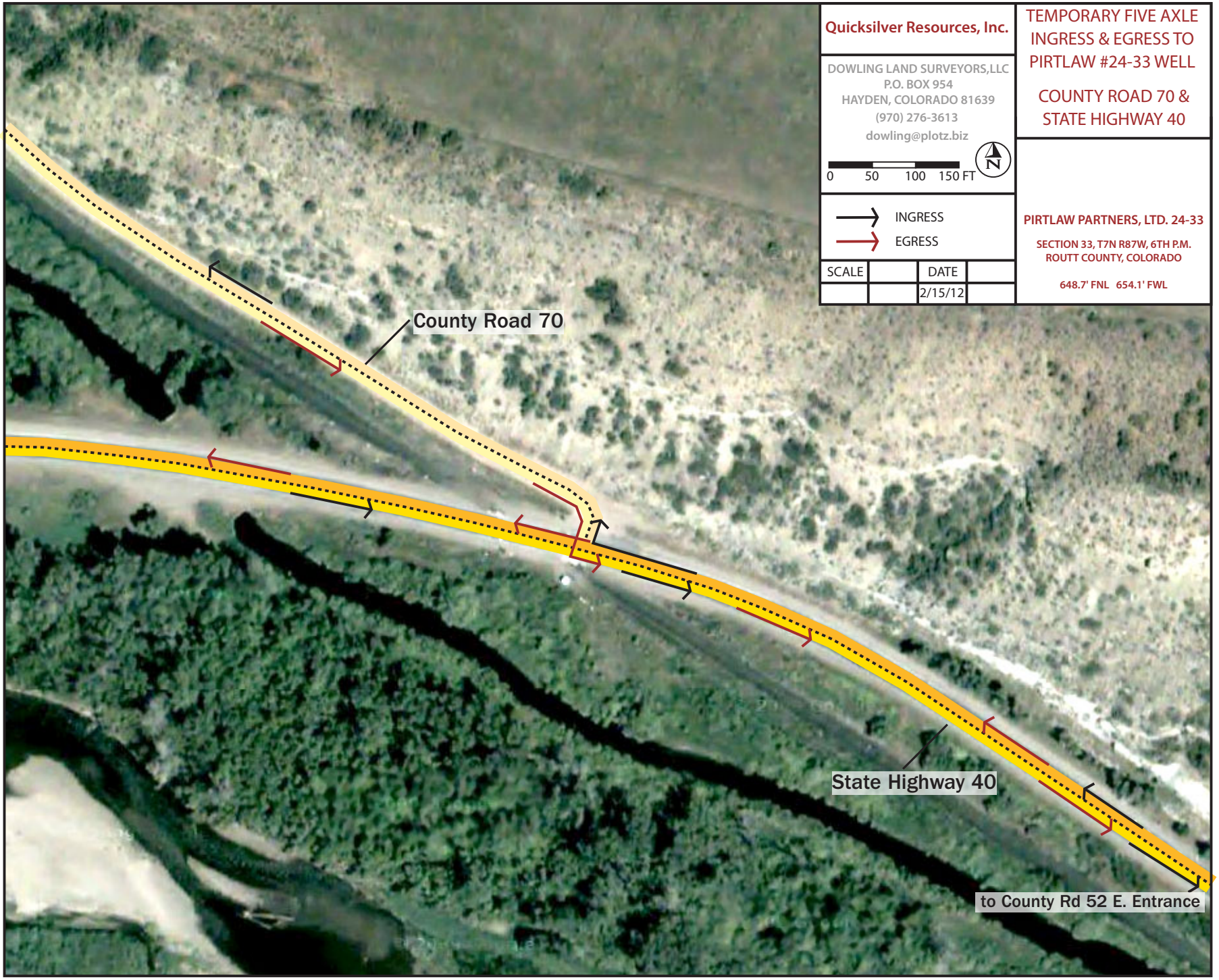
PIRTLAW PARTNERS, LTD. 24-33

SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

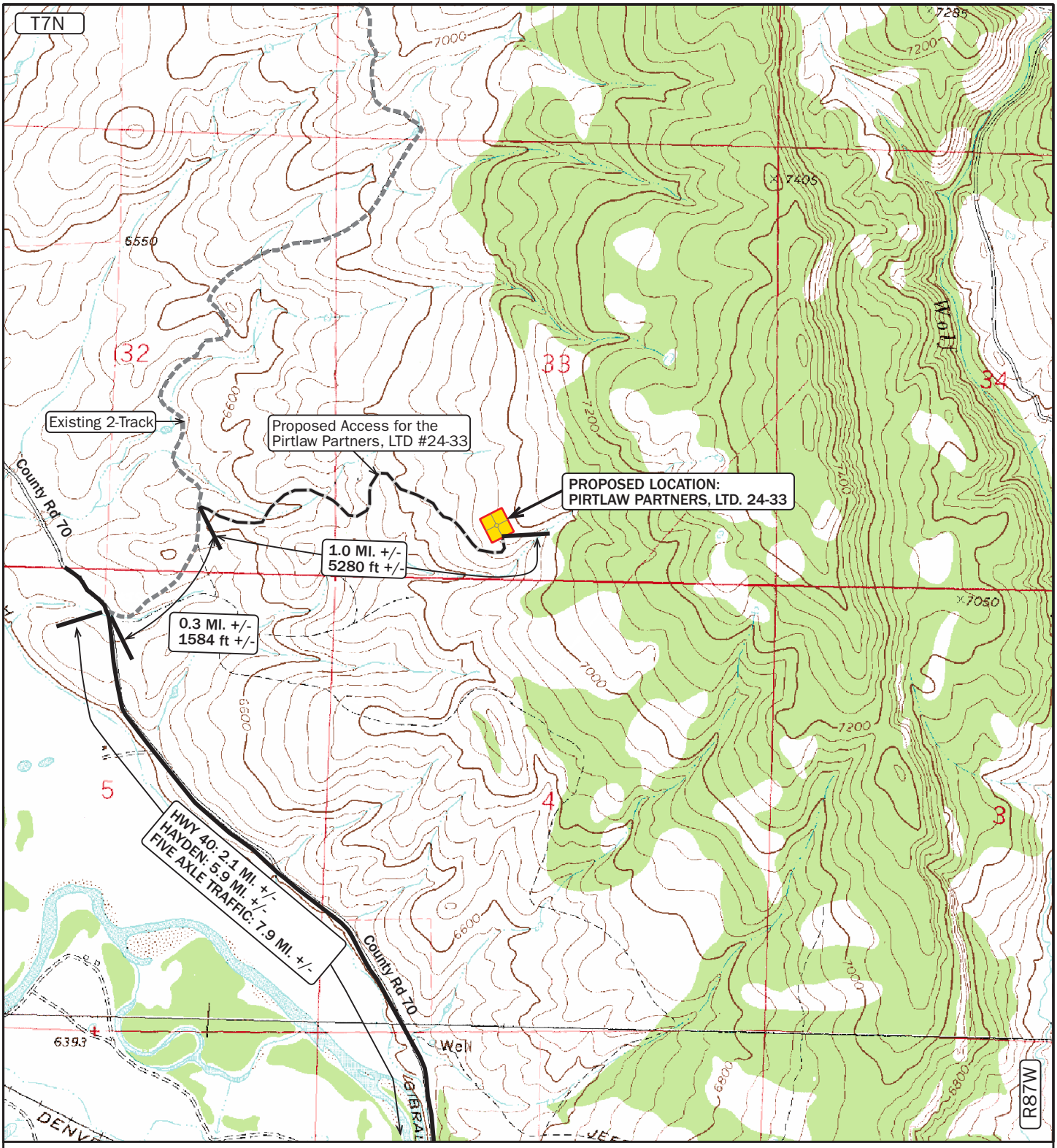
648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		02/16/12		FH11PG12

DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz


Quicksilver Resources, Inc.
DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz
0 50 100 150 FT
N
INGRESS
EGRESS
SCALE
DATE
2/15/12
TEMPORARY FIVE AXLE INGRESS & EGRESS TO PIRTLAW #24-33 WELL
COUNTY ROAD 70 & STATE HIGHWAY 40
PIRTLAW PARTNERS, LTD. 24-33
SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO
648.7' FNL 654.1' FWL
County Road 70
State Highway 40
to County Rd 52 E. Entrance


County Road 52
County Road 52
State Highway 40
Quicksilver Resources, Inc.
DOWLING LAND SURVEYORS,LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz
0 100 200 300 FT
N
SCALE
DATE
2/15/12
TEMPORARY FIVE AXLE INGRESS & EGRESS TO PIRTLAW #24-33 WELL
COUNTY ROAD 52 & STATE HIGHWAY 40
PIRTLAW PARTNERS, LTD. 24-33
SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO
648.7' FNL 654.1' FWL



LEGEND:

- Existing County Road
- Existing 2-Track
- Proposed Access Road

ACCESS ROAD MAP: B TOPO

N

0 1000 2000 FT

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SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		02/16/12		FH11PG13

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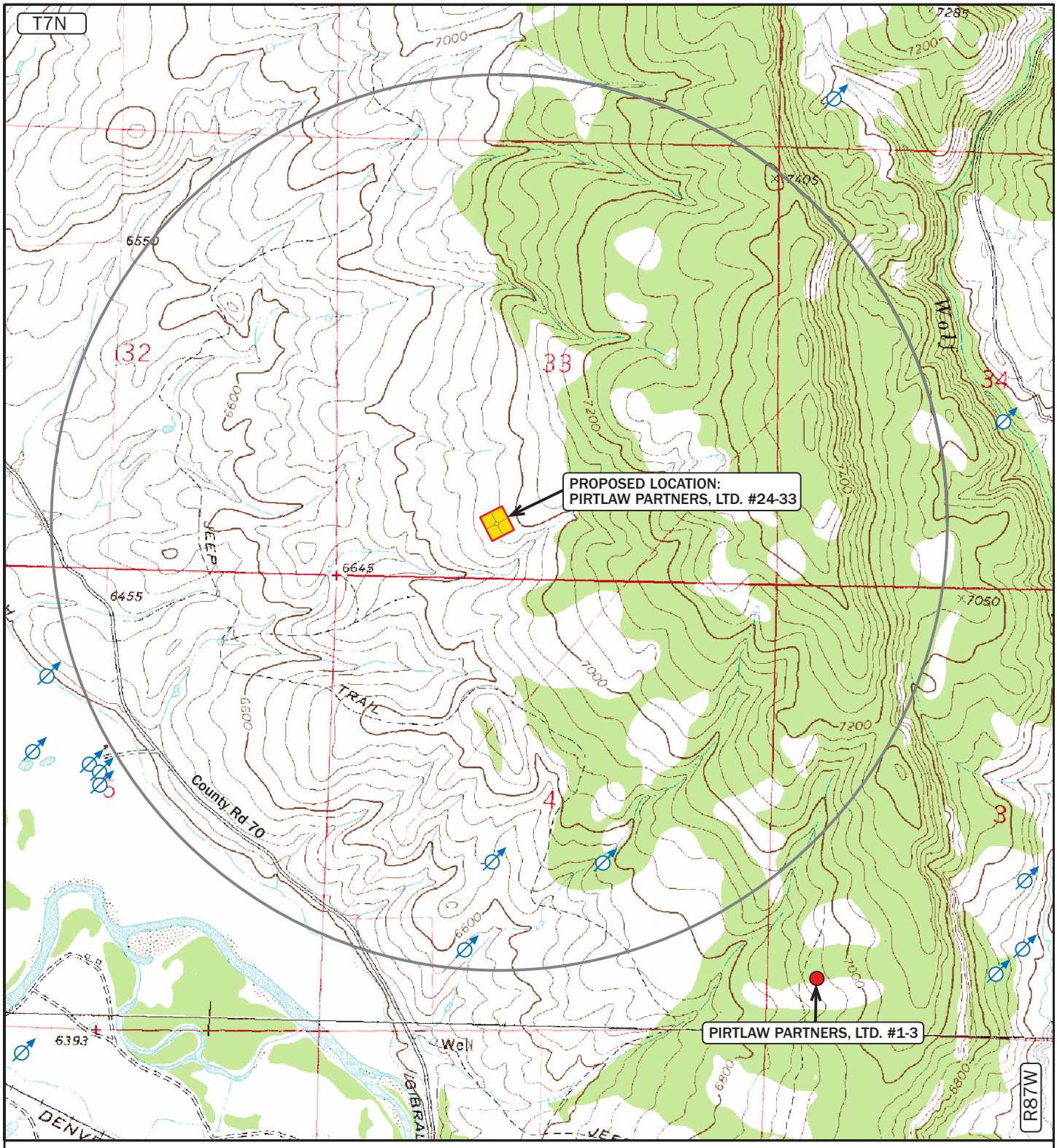
(970) 276-3613
dowling@plotz.biz



LEGEND:

- Water Well (9/9/11 CO Div. Water Resources)
- Existing Oil/Gas Well (9/9/11 COGCC Well Data)

TOPOGRAHIC MAP: C TOPO

N

0 1000 2000 FT

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648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		10/25/11		FH11PG14

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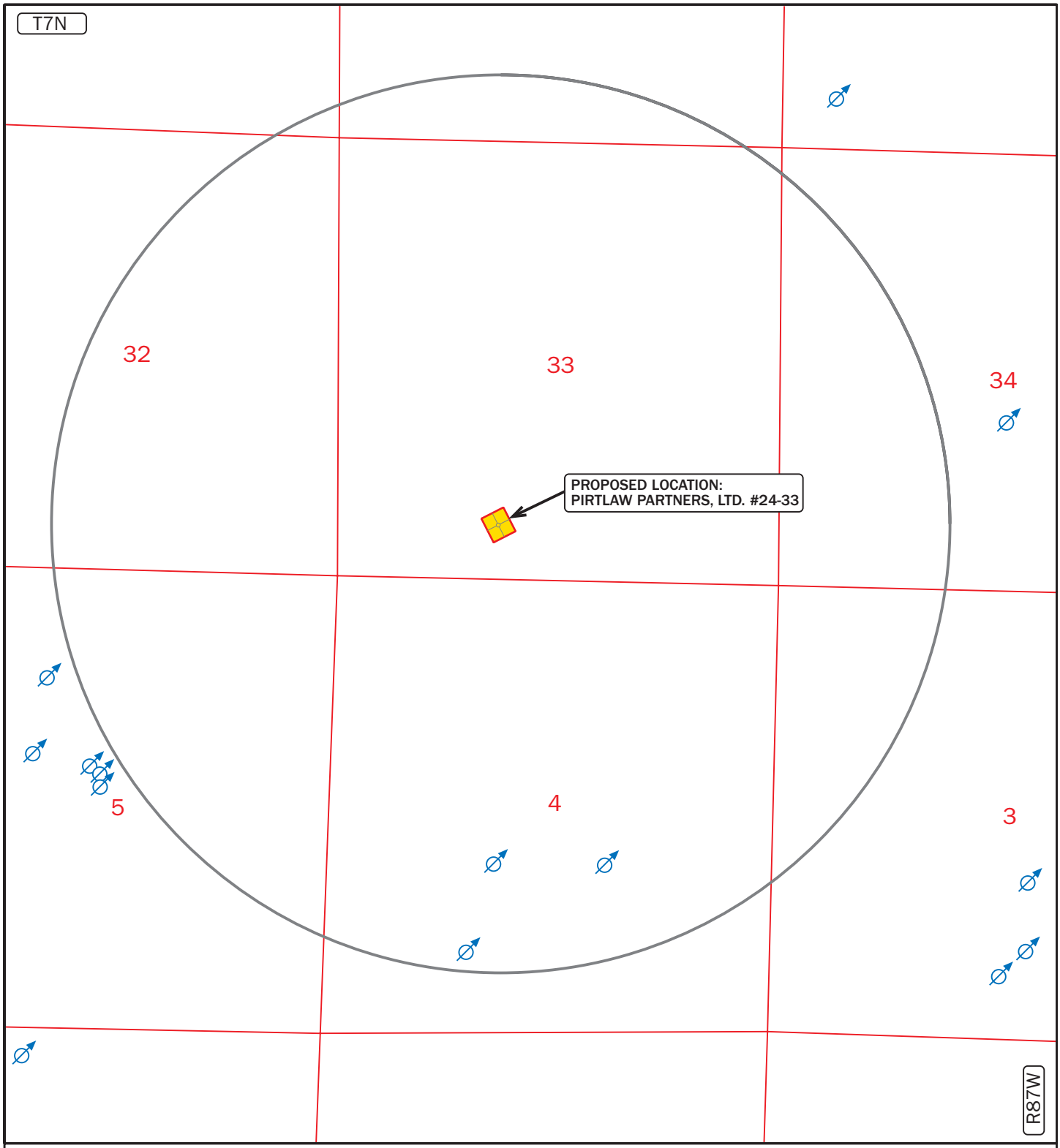

LEGEND:

Water Well (9/9/11 CO Div. Water Resources)

TOPOGRAHIC MAP: C1 TOPO

N

0 1000 2000 FT

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ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		10/25/11		FH11PG15

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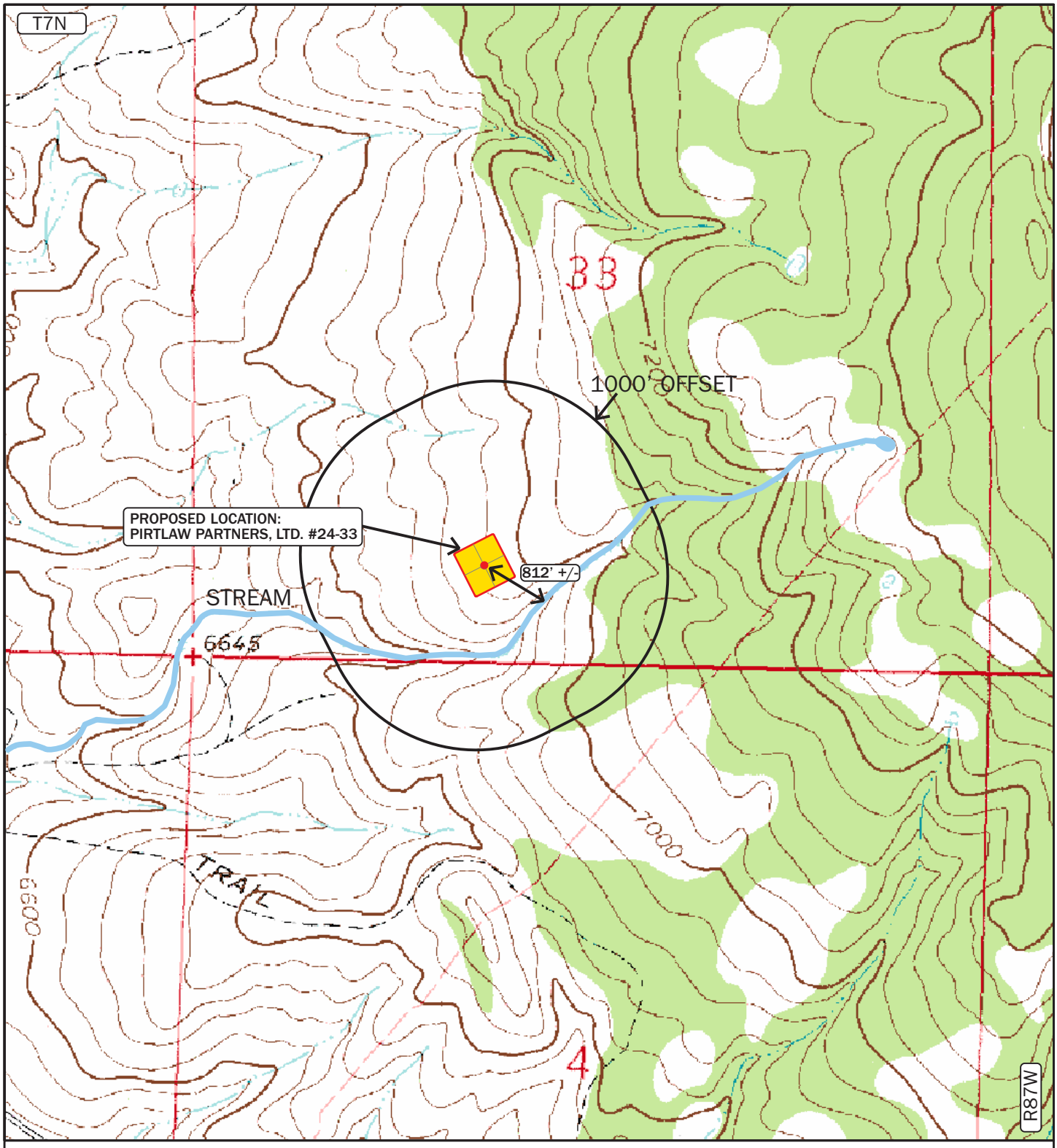

LEGEND:

Existing Drainage

1000' Offset Boundary

HYDROLOGY MAP: W TOPO

N

0 500 1000 FT

Quicksilver Resources, Inc.

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SECTION 33, T7N R87W, 6TH P.M.
ROUTT COUNTY, COLORADO

648.7' FNL 654.1' FWL

SCALE	DRG	DATE		FILE
		11/14/11		FH11PG16

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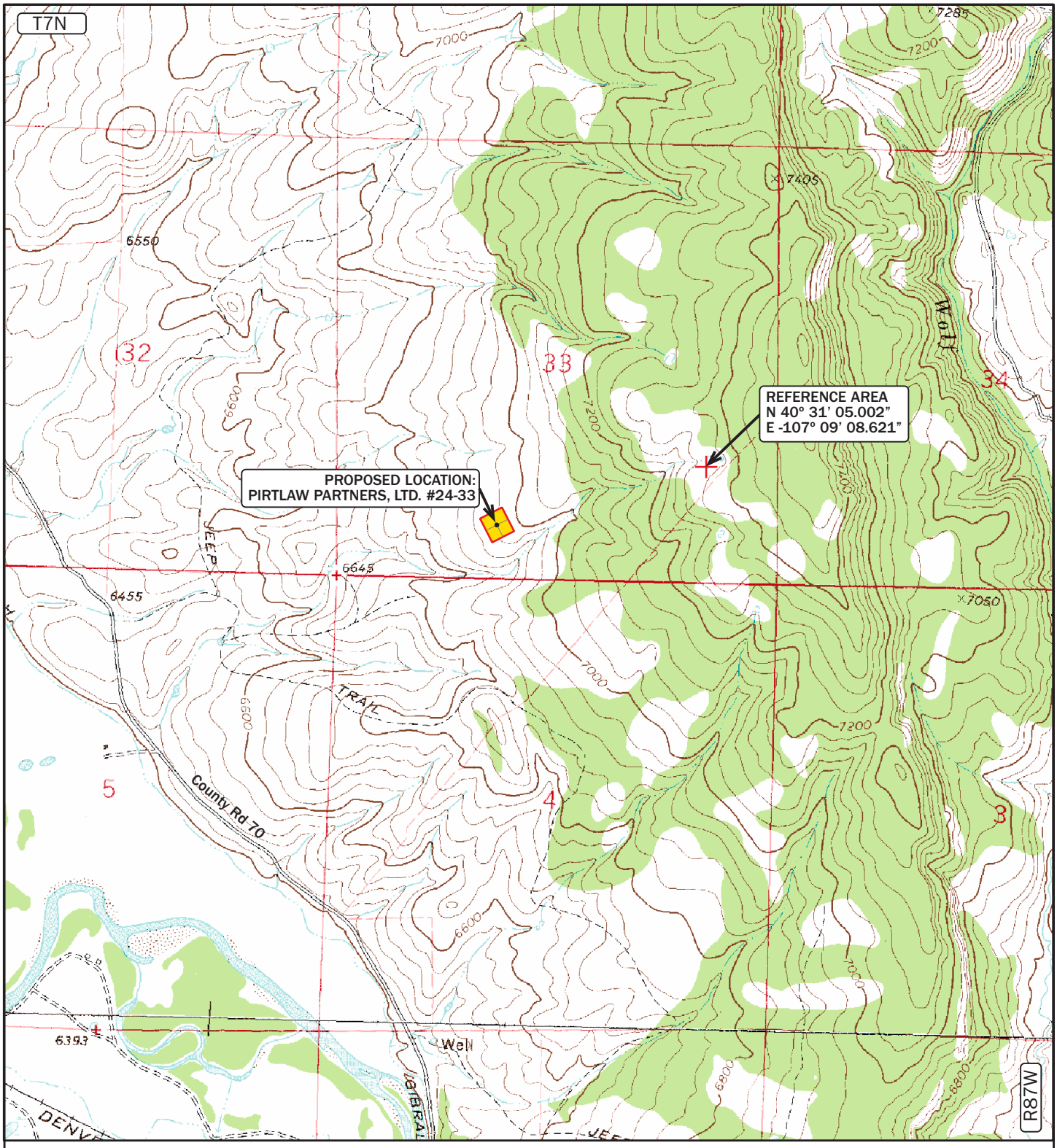

LEGEND:

REFERENCE AREA MAP: REF TOPO

N

0 1000 2000 FT

Quicksilver Resources, Inc.	**PIRTLAW PARTNERS, LTD. 24-33** **SECTION 33, T7N R87W, 6TH P.M.** **ROUTT COUNTY, COLORADO** **648.7' FNL 654.1' FWL**	DOWLING LAND SURVEYORS,LLC P.O. BOX 954 HAYDEN, COLORADO 81639 (970) 276-3613 dowling@plotz.biz

SCALE	DRG	DATE		FILE
		10/25/11		FH11PG17

PHOTO: REFERENCE POINT CAMERA LOOKING: NORTH

PHOTO: REFERENCE POINT CAMERA LOOKING: EAST

LEGEND:

REFERENCE POINT PHOTOS :PHOTO REF1

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ROUTT COUNTY, COLORADO

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SCALE	DRG	DATE		FILE
		11/01/11		FH11refph

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PHOTO: REFERENCE POINT CAMERA LOOKING: SOUTH

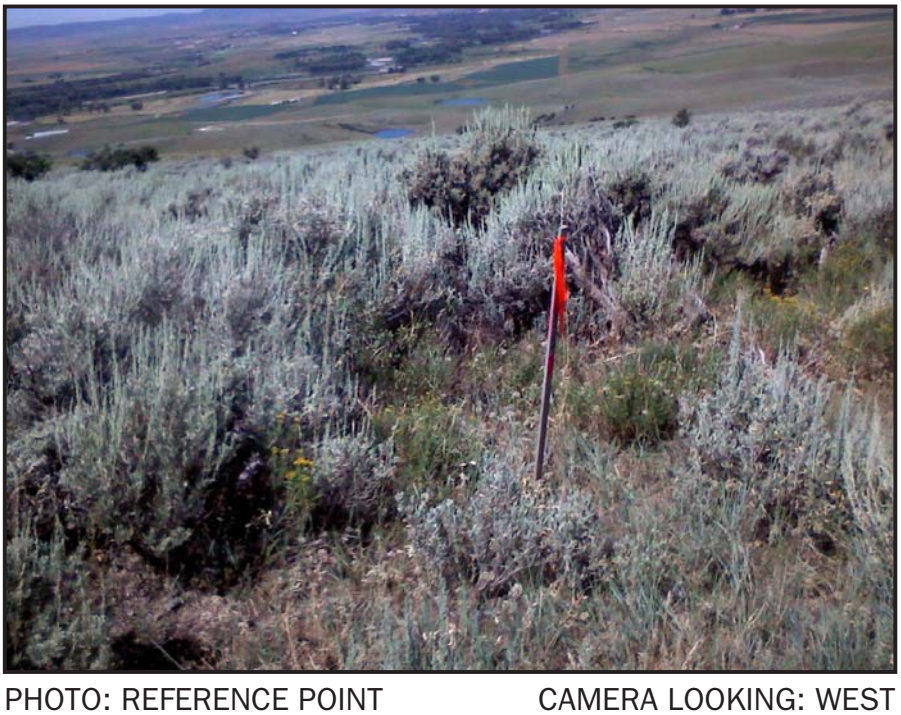

PHOTO: REFERENCE POINT CAMERA LOOKING: WEST

LEGEND:

REFERENCE POINT PHOTOS :PHOTO REF2

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SCALE	DRG	DATE		FILE
		9/09/11		FH11refph

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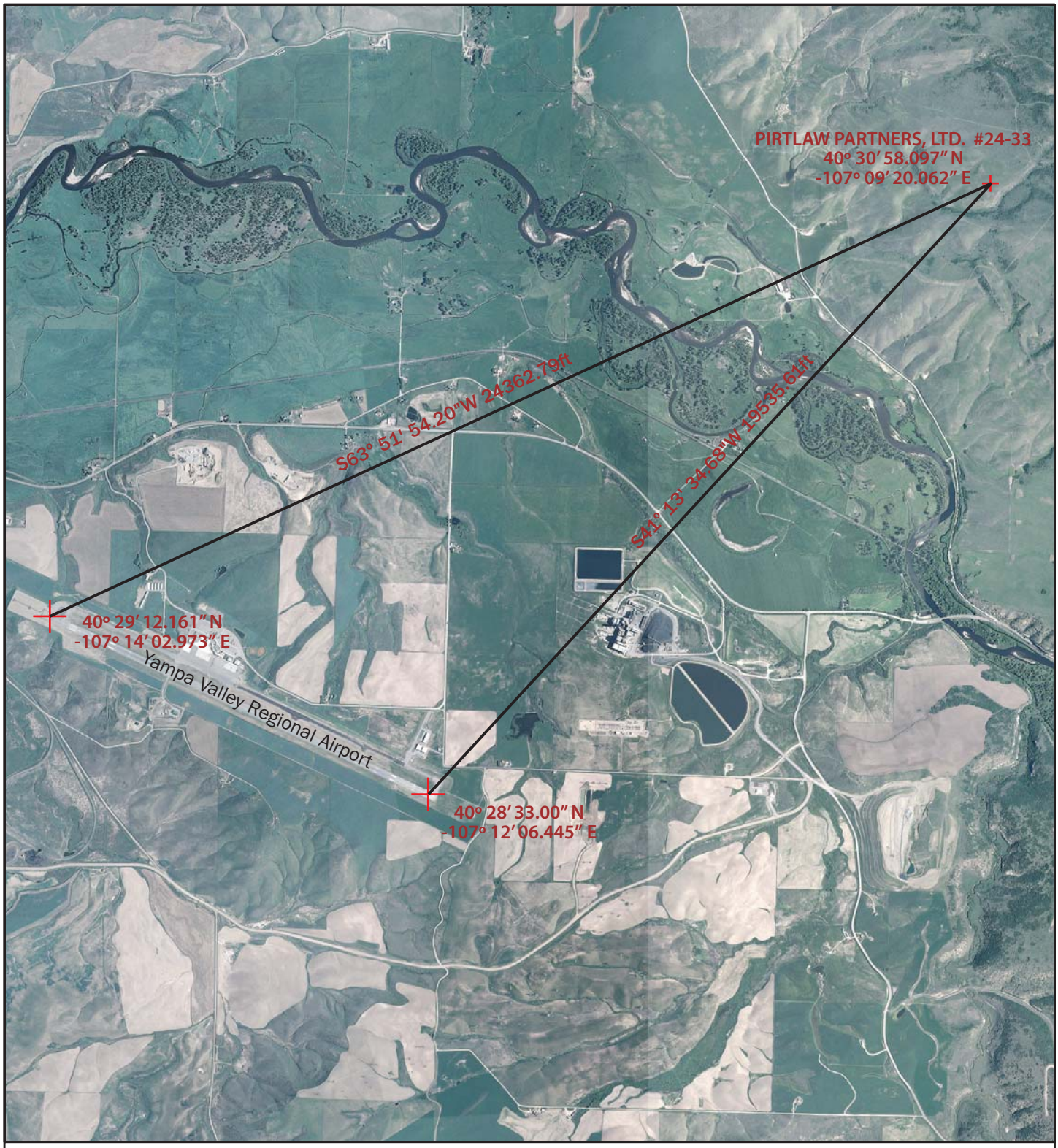

LEGEND:

YAMPA VALLEY REGIONAL AIRPORT TIES

N

0 1000 2000 FT

Quicksilver Resources, Inc.

SCALE	DRG	DATE		FILE
		9/09/11		FH11PG17

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