State of Colorado

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Quicksilver Resources, Pirtlaw Partners Ltd 32-09 Pad, SWNE Sec 9 T6N R87W, Routt County, Form 2A#400262066_COGCC Response to Routt County LGD Comments

Kubeczko, Dave <dave.kubeczko@state.co.us> Fri, Oct 12, 2012 at 12:29 PM
To: Dave Kubeczko <dave.kubeczko@state.co.us>

Scan No 1293012 ROUTT COUNTY LGD COMMENT CORRESPONDENCE 2A#400262066

---------- Forwarded message ----------
From: **Kubeczko, Dave** <dave.kubeczko@state.co.us>
Date: Fri, Oct 12, 2012 at 12:27 PM
Subject: Quicksilver Resources, Pirtlaw Partners Ltd 32-09 Pad, SWNE Sec 9 T6N R87W, Routt County, Form 2A#400262066_COGCC Response to Routt County LGD Comments
To: Chris Brookshire <cbrookshire@co.routt.co.us>

Chris,

COGCC appreciates Routt County's participation in the LGD comment portion of the Form 2A permitting process. Attached is COGCC's Responses to Routt County's comments (submitted on January 27, 2012) for the Quicksilver Resources, Pirtlaw Partners Ltd 32-09 Pad, Form 2#400247021 and Form 2A#400262066. These responses will become an attachment to the Form 2A. COGCC's review process is complete and the Form 2 and Form 2A permits will be approved soon. If you have any questions, please do not hesitate to call me at (970) 309-2514 (cell), or email; or Greg Deranleau at (303) 894-2100 x5153. Thanks.

Dave

David A. Kubeczko, PG

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Routt County LDG Comments
Regulatory Form 2A#400262066
Quicksilver Resources, Pirtlaw Partners Ltd 32-09; NWNE sec 9 T6N R87W, Routt County

Comments submitted on January 27, 2012: **COGCC Response to Comments sent on October 12, 2012:**

Comment No. 1 - WILDLIFE CONCERNS.

This well is the third oil well proposed in this area. The Pirtlaw 24-33 API05-107-06248-00 and Pirtlaw 14-03 API 05-107-06241-00 are located north of the proposed Pirtlaw 32-09. All of the sites are located east of the Yampa River and will have cumulative impacts on the wildlife in the area, noise impacts, and potential air and water quality impacts. The surface is in a conservation easement intended to protect the visual, wildlife, agriculture and DPW Hunting for Wildlife programs.

COGCC Response to Comment No. 1 - WILDLIFE CONERNS.

Colorado Parks and Wildlife has had consultation with Quicksilver Resources concerning wildlife issues at this location, as well as the other two locations. Quicksilver has agreed to the following wildlife BMPs:

1. Where oil and gas activities must occur near active bald eagle winter roost sites, conduct these activities outside the time period from November 15 through February 28.
2. Restrict post-development well site visitations to between the hours of 10:00 a.m. and 2:00 p.m. from November 15 to March 15 for active bald eagle winter roost sites.
3. Where oil and gas activities must occur within 1.25 miles of Columbian sharp-tailed grouse leks or within other mapped Columbian sharp-tailed grouse breeding or summer habitat, conduct these activities outside the period between March 15 and July 30. Pirtlaw Partners 32-09 is approximately 0.6 miles from the Wolf Mountain Ranch Lek.
4. For work-over activity attempt to avoid March 15 to July 30 time period. If it is necessary to work within that time period consult/notify local CPW contact and restrict daily visits to period from 9am to 4pm.
5. Restrict well site visitations to portions of the day between 9:00 a.m. and 4:00 p.m. during the Columbian sharp-tailed grouse lekking season, from March 15 to June 1.
6. When compressor stations must be sited within 1.25 miles of Columbian sharp-tailed grouse active and inactive (within last 10 years) lek sites, locate compressor stations no closer than 2,500 feet from the lek.
7. Install raptor perch deterrents on equipment, fences, cross arms and pole tops in Columbian sharp-tailed grouse habitat.
8. Reclaim/restore Columbian sharp-tailed grouse habitats with native grasses and forbs conducive to optimal Columbian sharp-tailed grouse habitat and other wildlife appropriate to the ecological site. Reclamation of breeding habitat should include a substantially higher percentage of forbs than other areas.
9. Muffle sound from compressors, pump jacks or other motors necessary to run operations at the site. If mufflers are used, point upward to dissipate sound and vibration.
10. Install and utilize bear-proof dumpsters and trash receptacles for all food-related trash on location following COGCC Rule 1204 a-1.

Since CPW has regulatory authority for wildlife in Colorado, COGCC believes that CPW has adequately assessed wildlife issues at this location, and therefore, no additional wildlife BMPs are necessary.

Additionally, COGCC has met with the landowner, to discuss the locations. The landowner is involved in significant wildlife conservation measures on the property and has reviewed and approved these proposed locations and is successfully working with the operator on measures to reduce cumulative impacts on wildlife.

Comment No. 2 - ROUTT COUNTY SPECIAL USE PERMIT.

A Special Use Permit is required for Oil and Gas Operations in Routt County. The petitioner is aware of this process.

COGCC Response to Comment No. 2 - ROUTT COUNTY SPECIAL USE PERMIT.

No COGCC response necessary.

Comment No. 3 - ADDITIONAL WILDLIFE CONCERNS.

There are wildlife concerns in this area. The well site is approximately 1,200' from Bald Eagle Winter Concentration area, within Columbian Sharp-tailed Grouse Production area, within Greater Sage Grouse Production area, within Elk Severe Winter Range, within Great Blue Heron foraging area, and abutting Mule Deer Severe Winter range. All conditions placed by the CPW must be complied with. The Columbian Sharpe-tailed Grouse should be closely monitored to determine if any wildlife are being impacted by oil/gas operations. Since this is the third well site in this area and all sites are located within a mile of each other, additional reduction/restriction in hours for site visits/maintenance and hauling to reduce noise and/or human disturbance should be considered for all sites.

COGCC Response to Comment No. 3 - ADDITIONAL WILDLIFE CONERNS.

Colorado Parks and Wildlife has had consultation with Quicksilver Resources concerning wildlife issues at this location, as well as the other two locations. As stated above in COGCC's response to Comment No. 1 - WILDLIFE CONCERNS, Quicksilver has agreed to the appropriate wildlife BMPs for this location.

All wildlife BMPs that are attached to the Form 2A permit are enforceable by COGCC through our inspection process. Anyone who observes activities that are in violation of these permit BMPs can call the COGCC and a follow up inspection will take place. Any violations will be addressed immediately.

CPW has prepared sensitive wildlife habitat (SWH) and restricted surface occupancy (RSO) maps for all of Colorado. CPW has determined which species required monitoring and protection from potential oil and gas activities. The Blue Heron is not covered under the COGCC's 1200-series rules or House Bill 07-1298. Since CPW has regulatory authority for wildlife in Colorado, they are already conducting wildlife monitoring for any potentially affected species on a yearly basis.

CPW has adequately assessed wildlife issues at this location, and therefore, additional wildlife BMPs (including more restrictions on site visits and timing limitations) are not necessary at this or the other two locations.

Comment No. 4 - NEARBY SURFACE WATER CONCERNS.

The site is located approximately 1,600' (1/3 mi.) east of the Yampa River and 600' from a stock pond and intermittent stream. Routt County is concerned with the possible contamination of water. Because of the location of the proposed well, annual surface water monitoring shall be performed at the stock pond and intermittent stream. Baseline samples shall be taken prior to operation.

COGCC Response to Comment No. 4 - NEARBY SURFACE WATER CONCERNS.

COGCC conducted two additional onsite inspections at the proposed well pad location and found two nearby stock ponds located downgradient of the pad. Quicksilver has agreed to sample these two ponds and the intermittent stream to the north if sufficient water is present prior to drilling and completion. COGCC has placed the following COA on the Form 2A:

COA 9 - Water Testing: Prior to drilling, operator shall sample two (2) to three (3) closest domestic water wells, other water wells, and/or springs; and two (2) to three (3) nearby surface water features (two nearby surface water ponds and the intermittent stream to the north [if water is present]). If possible, the water wells or springs selected should be on opposite sides of the oil and gas location not exceeding a one (1) mile radius. The sample location shall be surveyed in accordance with Rule 215.

Initial baseline testing shall include laboratory analysis of pH, specific conductance, total dissolved solids (TDS), dissolved gases (methane, ethane, propane), alkalinity (total bicarbonate and carbonate as CaCO3), major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, phosphorus), major cations (calcium, iron, magnesium, manganese, potassium, sodium), other elements (barium, boron, selenium and strontium), presence of bacteria (iron related, sulfate reducing, slime and coliform), total petroleum hydrocarbons (TPH) and BTEX compounds (benzene, toluene, ethylbenzene and xylenes). Field observations such as odor, water color, sediment, bubbles, and effervescence shall also be included. COGCC recommends that the latest version of EPA SW 846 analytical methods be used where possible and that analyses of samples be performed by laboratories that maintain state or national accreditation programs.

If free gas or a dissolved methane concentration greater than 1.0 milligram per liter (mg/l) is detected in a water well, gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen – 12C, 13C, 1H and 2H) shall be performed to determine gas type. If test results indicated thermogenic or a mixture of thermogenic and biogenic gas. If the methane concentration increases by more than 5.0 mg/l between sampling periods, or increases to more than 10. mg/l, the operator shall notify the Director and the owner of the water well immediately.

After 90 days, but less than 180 days of completion of the first proposed well a "post-completion" test shall be performed for the same analytical parameters listed above and repeated one (1), three (3) and six (6) years thereafter. If the well is a non-producing well, then the one (1), three (3) and six (6) year samples will not be required. If no significant changes from the baseline have been identified after the third test (i.e. the six-year test), no further testing shall be required. Additional "post-completion" test(s) may be required if changes in water quality are identified during follow-up testing. The Director may require further water well sampling at any time in response to complaints from water well owners.

Copies of all test results described above shall be provided to the Commission and the water well owner within three (3) months of collecting the samples. The data shall be sent via email to the COGCC Environmental Data Analyst (Arthur Koepsell; email arthur.koepsell@state.co.us), with a copy provided to the COGCC OGLA Specialist for Western Colorado (Dave Kubeczko; email dave.kubeczko@state.co.us). Documented refusal to grant access by well owner shall not constitute a violation of this COA.

Comment No. 5 - ANNUAL GROUNDWATER MONITORING CONCERNS.

Annual ground water monitoring should be performed at a location down-gradient between the drilling well site and the Yampa River at either a water well, seep or spring. Baseline samples shall be taken prior to operations.

COGCC Response to Comment No. 5 - ANNUAL GROUNDWATER MONITORING CONCERNS.

Quicksilver has agreed to sample two to three domestic water wells, other water wells, or springs prior to drilling and completion of this well. COGCC has placed the following COA on the Form 2A:

COA 9 - Water Testing: Prior to drilling, operator shall sample two (2) to three (3) closest domestic water wells, other water wells, and/or springs; and two (2) to three (3) nearby surface water features (two nearby surface water ponds and the intermittent stream to the north [if water is present]). If possible, the water wells or springs selected should be on opposite sides of the oil and gas location not exceeding a one (1) mile radius. The sample location shall be surveyed in accordance with Rule 215.

Initial baseline testing shall include laboratory analysis of pH, specific conductance, total dissolved solids (TDS), dissolved gases (methane, ethane, propane), alkalinity (total bicarbonate and carbonate as CaCO3), major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, phosphorus), major cations (calcium, iron, magnesium, manganese, potassium, sodium), other elements (barium, boron, selenium and strontium), presence of bacteria (iron related, sulfate reducing, slime and coliform), total petroleum hydrocarbons (TPH) and BTEX compounds (benzene, toluene, ethylbenzene and xylenes). Field observations such as odor, water color, sediment, bubbles, and effervescence shall also be included. COGCC recommends that the latest version of EPA SW 846 analytical methods be used where possible and that analyses of samples be performed by laboratories that maintain state or national accreditation programs.

If free gas or a dissolved methane concentration greater than 1.0 milligram per liter (mg/l) is detected in a water well, gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen – 12C, 13C, 1H and 2H) shall be performed to determine gas type. If test results indicated thermogenic or a mixture of thermogenic and biogenic gas. If the methane concentration increases by more than 5.0 mg/l between sampling periods, or increases to more than 10. mg/l, the operator shall notify the Director and the owner of the water well immediately.

After 90 days, but less than 180 days of completion of the first proposed well a "post-completion" test shall be performed for the same analytical parameters listed above and repeated one (1), three (3) and six (6) years thereafter. If the well is a non-producing well, then the one (1), three (3) and six (6) year samples will not be required. If no significant changes from the baseline have been identified after the third test (i.e. the six-year test), no further testing shall be required. Additional "post-completion" test(s) may be required if changes in water quality are identified during follow-up testing. The Director may require further water well sampling at any time in response to complaints from water well owners.

Copies of all test results described above shall be provided to the Commission and the water well owner within three (3) months of collecting the samples. The data shall be sent via email to the COGCC Environmental Data Analyst (Arthur Koepsell; email arthur.koepsell@state.co.us), with a copy provided to the COGCC OGLA Specialist for Western Colorado (Dave Kubeczko; email dave.kubeczko@state.co.us). Documented refusal to grant access by well owner shall not constitute a violation of this COA.

Comment No. 6 - WATER TESTING PROTOCOL CONCERNS.

Water testing protocol and reporting to Routt County should be in accordance with the COGA program requirements.

COGCC Response to Comment No. 6 - WATER TESTING PROTOCOL CONCERNS.

Quicksilver has placed the following BMP on the Form 2A permit:

> "Quicksilver Resources Inc. is an original participating operator in the COGA Baseline Groundwater Quality Sampling Program and will follow the COGA program on this well."

In addition, COGCC has placed the following COA on the Form 2A:

COA 9 - Water Testing: Prior to drilling, operator shall sample two (2) to three (3) closest domestic water wells, other water wells, and/or springs; and two (2) to three (3) nearby surface water features (two nearby surface water ponds and the intermittent stream to the north [if water is present]). If possible, the water wells or springs selected should be on opposite sides of the oil and gas location not exceeding a one (1) mile radius. The sample location shall be surveyed in accordance with Rule 215.

Initial baseline testing shall include laboratory analysis of pH, specific conductance, total dissolved solids (TDS), dissolved gases (methane, ethane, propane), alkalinity (total bicarbonate and carbonate as CaCO3), major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, phosphorus), major cations (calcium, iron, magnesium, manganese, potassium, sodium), other elements (barium, boron, selenium and strontium), presence of bacteria (iron related, sulfate reducing, slime and coliform), total petroleum hydrocarbons (TPH) and BTEX compounds (benzene, toluene, ethylbenzene and xylenes). Field observations such as odor, water color, sediment, bubbles, and effervescence shall also be included. COGCC recommends that the latest version of EPA SW 846 analytical methods be used where possible and that analyses of samples be performed by laboratories that maintain state or national accreditation programs.

If free gas or a dissolved methane concentration greater than 1.0 milligram per liter (mg/l) is detected in a water well, gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen – 12C, 13C, 1H and 2H) shall be performed to determine gas type. If test results indicated thermogenic or a mixture of thermogenic and biogenic gas. If the methane concentration increases by more than 5.0 mg/l between sampling periods, or increases to more than 10. mg/l, the operator shall notify the Director and the owner of the water well immediately.

After 90 days, but less than 180 days of completion of the first proposed well a "post-completion" test shall be performed for the same analytical parameters listed above and repeated one (1), three (3) and six (6) years thereafter. If the well is a non-producing well, then the one (1), three (3) and six (6) year samples will not be required. If no significant changes from the baseline have been identified after the third test (i.e. the six-year test), no further testing shall be required. Additional "post-completion" test(s) may be required if changes in water quality are identified during follow-up testing. The Director may require further water well sampling at any time in response to complaints from water well owners.

Copies of all test results described above shall be provided to the Commission and the water well owner within three (3) months of collecting the samples. The data shall be sent via email to the COGCC Environmental Data Analyst (Arthur Koepsell; email arthur.koepsell@state.co.us), with a copy provided to the COGCC OGLA Specialist for Western Colorado (Dave Kubeczko; email dave.kubeczko@state.co.us). Documented refusal to grant access by well owner shall not constitute a violation of this COA.

Quicksilver will provide the data to the COGCC within 3 months of sampling. COGCC will then upload this data to the COGCC database, which will become available through the COGCC online GIS mapping system. No further notification will be required of the operator.

Comment No. 7 - SURFACE CASING PLACEMENT CONCERNS.

Routt County requests information from the COGCC after drilling operations are complete for the location of aquifers and showing that casing was completed at minimum requirements to protect all aquifers.

COGCC Response to Comment No. 7 - SURFACE CASING PLACEMENT CONCERNS.

COGCC requires the submittal of Drilling and Completion Reports, Form 5's and Completed Interval Reports, Form 5As, within 30 days of drilling and completion of a well to describe "downhole" conditions. The Forms are reviewed by COGCC engineering staff to verify compliance with the drilling and cementing rules, and checked to ensure that aquifers have been adequately protected. Unless the operator has requested the information be held confidential, the approved Forms are available to the public to review in the well-file on the COGCC website.

COGCC Rule 317.i. applies if unanticipated aquifers are encountered while drilling the production hole:

> **317. GENERAL DRILLING RULES;** i. **Production casing cementing.** The operator shall ensure that all cement required under this rule placed behind production casing shall be of adequate quality to achieve a minimum compressive strength of at least three hundred (300) psi after twenty-four (24) hours and eight hundred (800) psi after seventy-two (72) hours measured at ninety-five degrees Fahrenheit (95 °F) and at eight hundred (800) psi. After thorough circulation of a wellbore, cement shall be pumped behind the production casing (200) feet above the top of the shallowest known producing horizon. All fresh water aquifers which are exposed below the surface casing shall be cemented behind the production casing. All such cementing around an aquifer shall consist of a continuous cement column extending from at least fifty (50) feet below the bottom of the fresh water aquifer which is being protected to at least fifty (50) feet above the top of said fresh water aquifer. Cement placed behind the production casing shall be allowed to set seventy-two (72) hours, or until eight hundred (800) psi calculated compressive strength is developed, whichever occurs first, prior to the undertaking of any completion operation.

Comment No. 8 - AIR QUALITY MONITORING CONCERNS.

Continued best management practices should be used to test or monitor air quality. The COGCC should work with CDPHE to develop monitoring system requirements and schedules for all operators. New technology should be used to prohibit emissions from tanks, equipment and flares at the onset of production.

COGCC Response to Comment No. 8 - AIR QUALITY MONITORING CONCERNS.

COGCC cannot "prohibit" emissions or flares. Operators are required to comply with Colorado Department of Public Health and Environment (CDPHE) rules incorporated by reference in COGCC Rule 805.b.(1) regarding odor emissions. Operators are required to comply with statewide green completion requirements identified in Rule 805.b.(3). Operators are required to seek approval for long-term production venting or flaring on a Sundry Notice, per Rule 912.b. COGCC may approve production flaring (production venting is not encouraged) if costs for pipeline construction are prohibitive based on an economic analysis submitted with the Sundry Notice. Flaring is required if hydrogen sulfide is present in the gas. Flared or vented gas must be reported monthly on Form 7, per Rule 912.c. Flared gas subject to Rule 912.b. approval must be directed to a controlled device operated efficiently to provide maximum reduction of air contaminants where practicable and without endangering the safety of the well site personnel and the public, per Rule 912.d. Operators shall notify the local emergency dispatch

or the local governmental designee of any natural gas flaring with reasonable notice timeframes specified in Rule 912.e.

When production flaring is approved per Rule 912.b., COGCC requires annual updates (requests to flare) on Sundry Notices, which discuss whether or not any new gathering systems or increased development of the field have changed pipeline economics such that installation of a new pipeline would be an economically viable option in lieu of continued flaring. COGCC encourages operators to use a portion of the gas flow for lease operations, if possible. COGCC also encourages other innovative approaches, in lieu of flaring (e.g., on-site gas turbine electric generation or re-injection into offset wells for pressure maintenance [UIC approval would be required for gas injection]).

Garfield County, in conjunction with Colorado State University and has initiated a long-term air quality monitoring program that will be conducted from Fall 2012 through Fall 2015. The initial criteria presented by Garfield County at the Northwest Colorado Oil and Gas Forum meeting of September 6, 2012 will allow for the evaluation of the need for air monitoring requirements at future well pad locations. Currently, air monitoring is regulated by the CDPHE.