Laramie Energy II, LLC
Tier II Gas Wells
Quarterly Production Monitoring Report
Furr 16-22D and Furr 16-22B
Rulison Field, Garfield County, Colorado
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1.0 Introduction

Laramie Energy II, LLC (Laramie Energy II) is developing natural gas resources in the vicinity of Jack's Pocket on the north flank of Battlement Mesa in Garfield County, Colorado. These gas wells were originally drilled by Petrohunter Operating Co. and GSL Energy Corp. and were purchased and completed by Laramie Energy II in 2008. Laramie Energy II retained Olsson Associates (Olsson Associates) to collect natural gas and produced water samples from the Furr Wells to comply with the requirements of the Colorado Oil and Gas Conservation Commission (COGCC) Sampling and Analysis Plan (SAP) requirement developed by URS Corporation (URS) for all natural gas wells within a three-mile radius of the former Project Rulison site.

The Laramie II natural gas wells discussed in this report are all located within a 3-mile radius of the Project Rulison underground nuclear test site conducted in September 1969 by the Atomic Energy Commission, a predecessor agency to the Department of Energy (DOE), and Austral Oil, a private oil company. Project Rulison was a subsurface natural gas stimulation nuclear test designed to produce natural gas from tight gas sands in the Cretaceous age Williams Fork Formation.

In general, the SAP requires all companies drilling or producing natural gas wells within specified zones and sectors surrounding the former Rulison site to review certain drilling data (gamma ray logs) and to sample certain production media (natural gas and produced water) to document the presence or absence of potential impacts associated with Project Rulison.

All known natural gas wells within the three mile radius of Project Rulison (including Laramie Energy II wells) are shown on Figure 1. Laramie Energy II's Furr Gas wells are shown more specifically on Figure 2. This report presents the second quarter, 2009 production monitoring results for the Laramie Energy II Furr 16-22B and 16-22D well conducted on June 24, 2009.

The drilling and baseline monitoring activities for the Furr wells were conducted in November and December 2008 with the results presented in a report titled Laramie Energy II, LLC Tier II Gas Well Baseline Monitoring and Production Report, Rulison Field, Garfield County, Colorado November - December 2008. The results of this drilling and baseline/quarterly monitoring indicate that no Project Rulison related radionuclides were detected in any of the gas or produced water samples. Copies of the report, including the December 17, 2008 baseline/production data for the Furr 16-22B and Furr 16-22D wells, were provided to Laramie Energy II, the Colorado Oil and Gas Conservation

Commission (COGCC), the Colorado Department of Public Health and Environment (CDPHE) Hazardous Materials and Waste Management Division - Radiation Management Unit, S.M. Stoller/DOE, the Garfield County Oil and Gas Liaison, and URS Corporation.

For purposes of classifying the Laramie Energy II wells within the context of the approved SAP, both the Furr 16-22D and Furr 16-22B are considered Tier II wells located respectively in Sectors 10 and 11. The Furr 16-22B is currently considered to be the closest natural gas wells to the former Project Rulison site in sector 11. The Furr 16-22D has a surface location in sector 11 and a bottom hole location in sector 10, but the bottom hole location is close to the sector dividing line.

As shown by the baseline sampling conducted in November and December of 2008, the first quarter laboratory analytical results collected in early April 2009, and the second quarter laboratory analytical results for samples collected in June 2009 do not indicate the presence of any Project Rulison related radioactivity. A summary table of Laramie Energy II well locations and sampling activities is presents as Table 1.

1.1 Tier II Zone Monitoring Requirements

URS Corporation (URS) is working for Noble Energy, EnCana Oil & Gas (USA), Inc., and Williams Production RMT who are also conducting natural gas well drilling operations in the vicinity of Project Rulison. URS has developed a Rulison Sampling Analysis Plan (SAP), Revision 2 issued in March 2008. The URS Rulison SAP defines Tier II wells as those gas wells located outside the 1-mile radius, but within the 3-mile radius of Project Rulison; whereas Tier I wells are defined as those gas wells located within the 1-mile radius of Project Rulison. This SAP has been adopted by the COGCC, and outlines the required sampling and analysis for all operators within a three-mile radius or Project Rulison.

According to the March 2008 Revision 2 of the URS SAP the Tier II well monitoring includes:

- Drilling Monitoring;
- Production Monitoring; and
- Baseline produced water and natural gas monitoring.

A discussion of these monitoring activities was presented in the May 2009 report. According to the URS Rulison SAP Table 2 - Tier I and II Sampling and Analysis Scheme for Gas Wells within a Three Mile Radius of Project Rulison

well production sampling provisions require that Tier II wells, such as the Furr 16-22 B and 16-22D, be sampled and analyzed as follows:

- A one-time sampling and analysis of produced water for the radiological and non-radiological analytes listed in Table 3 and Table 4 of the Rulison SAP. The Tier II wells are to be sampled as soon as possible after frac-ing but no later than 30-days after the first gas delivery from a new gas well;
- If a Tier II gas well is the closest well in a sector (i.e. no Tier I well), produced water and natural gas will be sampled and analyzed for the radiological analytes listed in Table 3 quarterly during the first year, semi-annually (twice a year) during the second and third year, and annually thereafter; and
- Further testing contingent on verified Project Rulison-related radionuclide detection in Tier I zone wells.

1.2 Laramie Energy II Furr 16-22B and Furr 16-22D Gas Wells

Both the Furr 16-22B and Furr 16-22D are directionally drilled wells meaning that the bottom of the well is located several hundred feet to thousands of feet away from the surface location as shown on Figure 2.

The Laramie Energy Furr 16-22B well is the closest Tier II well in Sector 11, and as such is required to be sampled quarterly during the first year. However, it was shut-in on April 14, 2009, and could not be sampled at that time. It was sampled on December 17, 2008 as part of the baseline sampling, and was sampled during the second quarter on June 24, 2009.

The Furr 16-22D has a surface location in sector 11 and a bottom hole location in sector 10. The Furr 16-22D was sampled on April 14, 2009 in lieu of the Furr 16-22B as it is the next closest Tier II well to Project Rulison operated by Laramie Energy II. The Furr 16-22D was sampled on June 24, 2009 during the second quarter sampling event for consistency, but may be dropped from subsequent sampling events since there are wells with bottom hole locations closer to Project Rulison within sector 10. Noble Energy has Tier I and Tier II wells located in sector 10 that are closer to the dividing line between sector 10 - sector 9 but that are also closer to the former Project Rulison site than any of the Furr wells as shown on Figure 1.

Olsson Associates conducted the second quarter 2009 sampling trip for both the Furr 16-22D and Furr 16-22B wells. According to the URS Rulison SAP, duplicate samples are to be collected with a frequency of one for every twenty samples collected. A field blank is to be collected with a frequency of one for every 20 produced water samples collected. Therefore, a duplicate sample (22-9-16) from the Furr 16-22D well, and a field blank sample consisting of distilled water provided by GEL Laboratories were collected. Both were submitted for laboratory analysis for use in quality control/quality assurance (QA/QC) analysis.

This report presents the results from Furr 16-22B and Furr 16-22D gas and produced water samples collected on June 24, 2009. Copies of the Isotech Laboratories Inc. laboratory reports for the Furr 16-22B, Furr 16-22D, and 22-9-16 (duplicate) gas tritium and carbon-14 (^{14}C) analysis are included as Appendix A. The analytical results for the produced water sample from the Furr 16-22B, Furr 16-22D, 22-9-16 (duplicate), and field blank analyzed by GEL Laboratory LLC are presented as Appendix B. Monthly produced water volumes have declined over time in both wells. Graphs showing the monthly production from data on the COGCC internet website are included as Appendix C.

1.3 Tier II Zone Drilling Monitoring Requirements

The drilling monitoring requirements in the SAP consist of a review of the open- or cased-hole gamma-ray logs through the Williams Fork Formation interval for evidence of elevated gamma radiation. This review is conducted to determine whether there is potential evidence of Project Rulison-related gamma radiation observed in the formation during gas well drilling. The gamma-ray logs also detect naturally occurring radionuclides such as potassium-40, uranium, and thorium isotopes. According to the URS Rulison SAP, the logs will be reviewed for evidence of above normal gamma-ray signatures. A gamma radiation measurement greater than 500 API gamma units or any other gamma readings that appear to be anomalous are to be noted by the drilling supervisor or his designated representative and immediately reported to the Company management and the [radiation safety officer] RSO for review and guidance. Mr. Richard Henry with URS Corp. has agreed to act as RSO for Laramie Energy II.

A review of the well logs for the Furr 16-22B and Furr 16-22D wells on the COGCC website database shows that gamma-ray signatures were typically less than 200 API gamma units. Special attention was paid to the well log intervals below 6,000 feet to the bottom of each the wells. Copies of these logs were presented the first quarter 2009.

1.4 Data Verification and Validation Requirements

Section 9 of the Rulison SAP outlines the data verification and validation requirements. Olsson retained Diane Short & Associates of Lakewood, Colorado to perform the independent data validation on the November and December 2008 radiochemistry and non-radiochemistry baseline and production data, and also on the radiochemistry parameters for the first quarter 2009 production data for the Furr 16-22D well.

The data verification and validation was provided as an addendum to the Laramie Energy II, L.L.C. Tier II Gas Well Baseline Monitoring and Production Monitoring Report, Rulison Field, Garfield County, Colorado November - December 2008 (May 2009). The July 2009 addendum was also submitted to the COGCC, Colorado, CDPHE-HMWMD Radiation Control, S.M. Stoller/DOE, Garfield County, and URS Corp.

The data in this report and subsequent quarterly reports will also be verified and validated. A duplicate sample of the gas and produced water was collected from the Furr 16-22D to evaluate quality assurance/quality control (QA/QC) of the field sampling and laboratory procedures. The SAP requires that a field blank and a duplicate sample be collected on a frequency of 1 sample for every 20 samples. A field blank was also collected during the June 2009 sampling event.

1.5 Background Radiation Studies

Tritium, a radioactive isotope of hydrogen (^3H), is produced naturally in small quantities in the upper atmosphere, and produced in much larger quantities during the detonation of a nuclear device. Tritium is a weak beta emitter and does not emit gamma rays. In addition to being potentially entrained within natural gas, tritium is the most abundant and most mobile nuclide in the Rulison inventory. Tritium levels were evaluated in groundwater and surface water in the area before and after the Project Rulison experiment and were found to be comparable to background concentrations for that time in both sets of samples.

The USGS sample results ranged from less than 220 tritium units (TU) (not detected) to a maximum of 618 TU reported for a well sample collected in May 1969, approximately four months before Project Rulison was conducted. Background activities for tritium were higher at the time due to nuclear weapons testing, so tritium activities in the late 1960s and early 1970s ranged from 700 pCi/L to more than 1,000 pCi/L (Voegeli and Claassen, 1971).

Today natural background tritium levels in precipitation typically range from 10 TU to 20 TU (32 pCi/L to 64 pCi/L). The CDPHE basic groundwater quality standard for tritium is 20,000 pCi/L referenced as the level of activity that could potentially result in an annual dose of 4 millirems of beta radiation.

According to the USGS Open File Report Geohydrology - Project Rulison (Voegeli, West, Cordes, 1970), intervals below 6,000 feet below ground surface (bgs) in the R-EX hole were analyzed in 1968 for the presence of gross alpha as Uranium equivalent and gross beta, as ^{90}Sr-^{90}Y. The alpha activities ranged from < 0.4 µg/L to 9.8 µg/L, and gross beta activities ranged from 29 pCi/L to 70 pCi/L (Voegeli, 1969).

Additionally, Olsson Associates obtained a copy Basic Data Report No. 7 - Radiochemical analyses of Ground and Surface Water in Colorado, 1954-1961 (Scott and Voegeli, 1961) a study conducted by the USGS in cooperation with the Colorado Water Conservation Board. Tritium activities were not analyzed in this study; however, since it was conducted eight years before Project Rulison it does provide information on background radiation throughout the state. The geometric mean for beta-gamma activity in groundwater samples collected throughout the state was 17.34 picocuries per liter (pCi/L) while the median and mode were both 14 pCi/L. The arithmetic mean of these groundwater samples was 62.2 pCi/L.

1.6 Rulison Path Forward

In June 2009 the U.S. Department of Energy (DOE), Office of Legacy Management issued a draft report entitled “Rulison Path Forward” which was intended to serve as a guide for discussions with the Colorado State regulators and other interested stakeholders in response to increased drilling for natural gas reserves near the underground nuclear explosion site at Rulison, Colorado. The report outlines the DOE’s recommendation that gas development occur in a conservative, staged drilling approach as the gas production companies move closer toward the COGCC established half-mile radius surrounding the DOE 40-acre institutional control boundary around the Rulison site. Operators wishing to drill within the COGCC half-mile radius would require a full hearing before the commission before the application for permit to drill (APD) could be approved.

Institutional controls are legally enforceable spatial boundaries that limit intrusion at a site to a safe distance to be protective of human health and the environment. The institutional controls at Rulison prohibit drilling below the 6,000 feet depth within the 40-acres known as Lot 11 (NE ¼, SW ¼ Section 25, T7S, R95W) surrounding the Project Rulison site. The depth at which the detonation occurred (8,426 feet bgs) and the low permeability of the Williams Fork Formation and overlying strata inhibit any potential migration of impacted water from the cavity. Investigations and remediation of surface contamination were conducted in the 1970s up through 1996 with the cleanup of non-radiological contamination associated with the drilling mud pits and effluent pond that were remediated in

1996 as documented in the Rulison Site Surface Report Published in July 1998. Although no feasible technology exists to remove the subsurface radioactivity contamination from in or around the cavity, the DOE has no evidence that indicates radionuclides from the Rulison site have migrated or ever will migrate beyond the 40-acre institutional control boundary.

The DOE had the Desert Research Institute conduct modeling which calculates potential transport distances from the Rulison site to a hypothetical producing well. The results of the most recent conservative modeling show that wells at the half-mile radius, even in the east-west direction of the natural fracture trend, are safe for gas production. Despite low risks, the DOE recommends a cautious approach to gas development near the Rulison site.

1.7 Radionuclides of Concern

According to the DOE Rulison Path Forward (June 2009), tritium is the only contaminant of concern, which is consistent with the 1973 AEC Project Manager's report. Most of the longer-lived radionuclides produced by the detonation were incorporated into the molten rock that cooled to form a melt glass at the bottom of the cavity. Krypton-85 and carbon-14 were two other longer-lived radionuclides that were produced by the detonation that could potentially be present in natural gas. However, gas production testing of the re-entry well in 1970 removed almost all of the krypton-85 and carbon-14 created by the detonation, leaving tritium as the only contaminant of concern. According to the DOE Rulison Path forward, *Table 1 - Radionuclides in Re-entry Well Gas* the estimated remaining krypton-85 was < 10 curies, and the remaining carbon-14 was estimated at < 1 curie. The curie is a unit of radioactivity measurement.

Of the 10,000 curies of tritium produced by the Rulison detonation, 2,824 curies were estimated to have been removed by production testing measurements. Following correction for decay, the estimated remaining tritium activity in and around the Rulison cavity will be 700 curies by late 2009. The DOE Rulison path forward states that even if tritium were to reach a producing gas well the risk is low in that there is no reasonable exposure scenario. Water vapor is removed from the gas stream at the well pad where it condenses out and is separated as a waste byproduct. The produced water is separated from the gas stream prior to the gas entering the distribution system. The gas in the distribution system is co-mingled with gas from other wells producing throughout the area.

For perspective, the activity of tritium used in self-luminating exit signs typically ranges from 7.5 curies to 11.5 curies and the tritium activity used in gun sights and luminous dials on wrist watches ranges from about 0.005 curies to 0.012

curies. A picocurie is one-trillionth of a curie so converting 7.5 curies to the units used in production monitoring would be 7,500,000,000,000 picocuries.

Production monitoring is conducted for tritium in natural gas and produced water, but also involves analyzing gas samples for carbon-14, and produced water samples for gross alpha activities, gross beta activities, gamma spectroscopy, cesium-137, chlorine-36, strontium-90, technetium-99, and total uranium. The laboratory units for these parameters are also expressed in picocuries per liter (pCi/L), where one picocurie is a trillionth of a curie. One picocurie is equivalent to 0.037 disintegrations per second or 2.22 disintegrations per minute.

2.0 Natural Gas and Produced Water Sampling

Laramie Energy II authorized sampling of the Furr 16-22D and Furr 16-22B wells, are both Tier II wells with wellheads located in sector 10. The Furr 16-22D has a surface location in sector 10 and a bottom of hole location in sector 11. Olsson performed the sampling of the natural gas and produced water by following the URS Rulison SAP, Revision 2, March 2008. There are no Tier I wells within Sector 10; therefore, the Furr 16-22B is the closest Tier II well in this sector. The Furr 16-22D is the next closest Tier II well to Project Rulison operated by Laramie Energy II. Noble Energy has completed Tier II wells and Tier I wells in Sector 10 that are closer to Project Rulison that any of the Laramie Energy II wells. However, these Noble Energy wells are located near the dividing line between sectors 9 and 10.

2.1 Quarterly Production Sampling

Well Identification:	Well Surface Location:
• Furr 16-22B	SE ¼, SE ¼, Section 22, T7S, R95W; and
• Furr 16-22D	SE ¼, SE ¼, Section 22, T7S, R95W.

Olsson Associates personnel sampled natural gas and produced water the Furr 16-22B and Furr 16-22D wells on June 24, 2009 for the radiochemistry parameters listed in Table 3 of the URS Rulison SAP. The samples consisted of natural gas collected from the Furr 16-22B and 16-22D well separator with the assistance of Laramie Energy II's pumper. Olsson Associates collected the gas sample using a two-stage regulator and obtaining the gas from the separator. Additionally a duplicate gas sample (22-9-16) was collected from the Furr 16-22D well.

Olsson Associates collected the produced water samples from the dump lines on the separators for the Furr 16-22B and 16-22D wells. Since there are multiple wells on these pads and production fluids are co-mingled in the onsite tank batteries, it is not possible to collect representative produced water samples for individual wells from the onsite production tanks as described in the URS Rulison SAP sampling protocols.

2.2 Natural Gas Sample Analysis

The natural gas samples collected from the Furr 16-22B, Furr 16-22D, and 22-9-16 (Furr 16-22D duplicate) on June 24, 2009 were submitted to Isotech in Champaign, Illinois for gas compositional analysis including carbon-14 (^{14}C) and

tritium (^{3}H), a radioactive form of hydrogen. The natural gas samples were each collected in an evacuated, propane tank provided by Isotech, using a two-stage pressure regulator connected to the separator or the natural gas wellhead. Copies of the laboratory reports from Isotech are included in Appendix A.

Isotech reported the tritium (^{3}H) results in tritium units (TU). One TU is equivalent to 3.19 picocuries per liter (pCi/L); therefore, any tritium present in the gas would be less than 32 pCi/L. The tritium analysis measures counts above background, and if the concentration is high enough the laboratory can report a finite value with a calculated uncertainty. If the concentration is low relative to the standard deviation of the measurement then the values are reported as "less than" the laboratory reporting limit, meaning that tritium was not detected. Isotech's reporting limit for tritium ranges from about 10 TU to 15 TU.

Beginning in about 1954, atmospheric tritium levels rose in excess of 1,000 TU due to nuclear weapons testing, and have declined back to natural background levels since then as a result of the ban on nuclear testing. Current natural background levels for tritium in the atmosphere range from 5 TU to 50 TU (15.9 pCi/L to 159.5 pCi/L). The isotopic composition of hydrogen is compared relative to the Vienna Standard Mean Ocean Water (VSMOW) standard.

Isotopic composition of carbon is relative to the Vienna Peedee Belemnite (VPDB) δ^{13} Standard and is based on the carbon isotopes in the shell of a marine fossil. The laboratory detection limit is 1 percent modern carbon (pMC). The results indicate that carbon-14 (^{14}C) is not present in the natural gas and the natural gas has been isolated from sources of modern carbon. According to the DOE Rulison End State Vision, (2005) and the Rulison Path Forward (2009) the amount of ^{14}C present in the Rulison Site source term was estimated at 2.2 curies to 2.4 curies. Less than 1 curie is estimated to remain in the Rulison cavity corrected for the ^{14}C activity that was removed during production testing in the early 1970s.

2.3 Produced Water Sample Analysis

Produced water samples were collected from the dump lines on the Furr 16-22B and 16-22D separator units located on the well pad. These produced water samples, a duplicate sample, and a field blank sample were submitted for analysis of radiochemistry parameters as listed in Table 3, as specified for Tier II wells in Table 2 of the URS Rulison SAP. Produced water samples and the field blank collected on June 24, 2009 were submitted to Isotech (Champaign, IL) for tritium analysis and to GEL Laboratory in Charleston, South Carolina for radiochemistry analysis (gamma spectroscopy, gas flow proportional counting for

gross alpha and gross beta, chlorine-36 (^{36}Cl), strontium-90 (^{90}Sr), liquid scintillation analysis for Technetium-99 (^{99}Tc), and total uranium). Copies of the laboratory reports from Isotech are included as Appendix A, and a copy of the GEL Laboratories report is included as Appendix B. The laboratory analytical results are discussed in the following section and the results are summarized in Table 1 through Table 5.

A produced water sample could not be collected from the Furr 16-22B during the April 2009 sampling event due to the well being shut-in at that time. During the June 24, 2009 sampling event, the Furr 16-22B was slow to yield produced water from the dump line on the separator; however, a sufficient volume of water was produced to collect a sample. According to production records available on the COGCC internet website, monthly produced water volumes have shown a steady decline for both wells. Copies of the production records for these wells and a graph showing the rates of decline are presented in Appendix C.

2.4 Performance and Monitoring Criteria

A duplicate gas and produced water sample were collected from the Furr 16-22D well for QA/QC evaluation in keeping with the Rulison SAP protocols. The duplicate sample (Sample ID: 22-9-16) was collected to satisfy the required one duplicate sample for every 20 samples collected. The gas sample and an aliquot of the produced water sample were submitted to Isotech Laboratory for compositional analysis of the gas, including tritium and carbon-14, and tritium analysis of the produced water sample. The remaining aliquots of the produced water sample were submitted to GEL Laboratories, Inc. for radiochemistry analyses.

Olsson also collected and submitted a field blank (water) sample to the laboratories for QA/QC evaluation on the same sampling frequency as presented in the Rulison SAP Section 9 for data verification and validation. Copies of the report prepared by Diane Short and Associates for the evaluation of the data are presented as Appendix D.

3.0 Laboratory Analytical Results

The following sections present the laboratory analytical results for natural gas samples and produced water samples. Radionuclide results are presented first followed by the results for inorganic and organic analyses. The laboratory analytical results for the natural gas and produced water sample show that there are no Project Rulison related radionuclides present in the natural gas or produced water collected from the Furr 16-22B and 16-22D Tier II gas wells.

3.1 Natural Gas Sample Results

The natural gas sample results are presented in Table 1 and copies of the Isotech laboratory gas sample reports are presented in Appendix A. The Isotech laboratory reports present the compositional analysis reported in mol percent for components in each of the gas samples. The results show that the samples are predominantly composed of methane with lesser concentrations of helium, hydrogen, oxygen, carbon dioxide, nitrogen, ethane, propane, iso-butane, N-butane, iso-pentane, and hexanes. Argon, carbon monoxide, hydrogen sulfide, and ethylene gas were not detected. The gas samples were also analyzed for the radionuclides tritium (^{3}H) and carbon-14 (^{14}C).

3.1.1 Tritium Resuts

The tritium (^{3}H) in the three gas samples Furr 16-22B, 16-22D, 22-9-16 (duplicate) were reported as < 10 TU, < 11.7 TU, and < 12.8 TU, respectively, which means that tritium not detected above the laboratory method detection limits in any of the samples.

3.1.2 Carbon-14 Results

The carbon-14 result was reported for the gas samples from the Furr 16-22B, 16-22D, 22-9-16 (duplicate) as < 0.5, < 0.4, and < 0.5 percent modern carbon (pMC), respectively. The results were reported as less than the laboratory method detection limit (0.5 pMC), meaning that carbon-14 (^{14}C pMC) was not detected, which indicates that the gas sample has been isolated from sources of modern carbon.

3.2 Produced Water Sample - Radiochemistry Results

The following sections present the laboratory analytical results for the produced water samples collected from the Furr 16-22B and 16-22D gas wells on June 24, 2009. Copies of the laboratory report from Isotech and GEL are included as Appendix A and Appendix B, respectively.

3.2.1 Tritium Results

The laboratory results for tritium (^3H) in the produced water samples as reported by Isotech were < 13.7 TU (< 43.7 pCi/L) for the Furr 16-22B sample, < 12.0 TU (< 38.3 pCi/L) for the Furr 16-22D sample, and < 10.5 TU (< 33.5 pCi/L) for the 22-9-16 (Furr 16-22D duplicate sample). The tritium activity reported for the Field Blank (distilled water) was 54.3 ± 3.8 TU (173.2 ± 12.1 pCi/L). The minimum detectable concentration (MDC) that Isotech is able to achieve for ^3H using this method is 10.0 TU. The tritium results in produced water are summarized in Table 2.

Natural background tritium levels in precipitation typically range from 10 TU to 20 TU (32 pCi/L to 64 pCi/L) and a reasonable upper bound for tritium background activities may be estimated at 100 TU or approximately 320 pCi/L. The CDPHE basic groundwater quality standard for tritium is 20,000 pCi/L referenced as the level of activity that could potentially result in an annual dose of 4 millirems of beta radiation.

3.2.2 Gross Alpha Radiation Results

The laboratory results for gross alpha activities show that alpha radiation was detected in the produced water samples from the Furr 16-22B (21.8 ± 13.3 pCi/L), Furr 16-22D (27.1 ± 12.4 pCi/L), and 22-9-16 sample (20.8 ± 11.4 pCi/L). Alpha activity was not detected in the field blank water sample. The laboratory detection limit (DL) ranged from 4.26 pCi/L to 20.2 pCi/L and the laboratory reporting limit (RL) was 5.00 pCi/L.

The detected gross alpha activity is likely due to naturally occurring radionuclides associated with high total dissolved solids (TDS) concentrations present in the samples. Although the TDS was not analyzed during this event, the TDS concentrations were assessed and reported during the baseline sampling conducted in December 2008 and were found to range from 16,000 milligrams per liter (mg/L) to 17,000 mg/L. For comparison, the U.S. EPA has a suggested secondary drinking water standard of 500 mg/L for TDS. The alpha activity is within the expected range of natural background radiation for the area and is likely due to the presence of naturally occurring uranium, thorium, and their daughter products present in the produced water from the producing formation.

One part per million (ppm) uranium (^{238}U) equals 0.33 picocuries per gram (pCi/g); and one ppm thorium (^{232}Th) equals 0.11 pCi/g.

The results for the gross alpha activities in the produced water sample are summarized on Table 3 and copies of the laboratory report are presented in Appendix B.

3.2.3 Gross Beta Radiation Results

The laboratory results for gross beta activities in produced water samples indicated that gross beta activities were detected in the Furr 16-22B, Furr 16-22D, and 22-9-16 sample with beta activities of 31.9 ± 11.6 pCi/L, 61.7 ± 16.3 pCi/L, and 35.5 ± 10.9 pCi/L, respectively. The laboratory reported that beta activities were not detected in the field blank sample. The laboratory detection limit (DL) ranged from 4.97pCi/L to 25.2 pCi/L and the laboratory reporting limit (RL) was 5.00 pCi/L.

The gross beta results are within the expected range of natural background radiation for the area and are likely due to the presence of naturally occurring potassium-40 (^{40}K). Potassium-40 (^{40}K) was detected in the Furr 16-22B produced water sample with a reported activity of 95.1 ± 26.1 pCi/L and a detection limit (DL) of 41.7 pCi/L. Potassium-40 was not detected in the produced water sample from the Furr 16-22D, but was reported for the duplicate sample 22-9-16 at 62.6 ± 44.7 pCi/L with a DL of 34.4 pCi/L. The results for the field blank indicated that there was uncertain identification of ^{40}K.

The results for the gross beta activities are summarized on Table 3 and copies of the laboratory reports are presented in Appendix B for the June 24, 2009 samples.

3.2.4 Strontium-90 and Technetium-99 Results

The produced water samples and field blank submitted to GEL Laboratories were analyzed for Strontium-90 (^{90}Sr) and Technetium-99 (^{99}Tc). The laboratory results show that Strontium-90 (^{90}Sr) and Technetium-99 (^{99}Tc) were not detected in the three produced water samples or field blank. The results for the ^{90}Sr and ^{99}Tc activities are summarized on Table 3 and copies of the laboratory reports are presented in Appendix B.

3.2.5 Chlorine-36 results

The produced water samples and field blank were submitted to GEL for analysis of chlorine-36 (^{36}Cl). The results show that ^{36}Cl activities were not detected above the laboratory reporting limits in any of the produced water samples, but were reported in the field blank at 258 ± 158 pCi/L with a DL of 256 pCi/L and a

RL of 100 pCi/L. The results for the ^{36}Cl activities are summarized on Table 3 and copies of the laboratory reports are presented in Appendix B.

According to the January 2005 DOE Rulison Site End State Vision document, the estimated inventory of ^{36}Cl produced by the Rulison detonation was 2.82 curies (Ci), and according to the URS 3rd Quarter 2008 Report, ^{36}Cl is a less common radionuclide in the inventory at Project Rulison.

3.2.6 Gamma-Emitting Radionuclide Results

The majority of the results for the gamma-emitting radionuclides show that gamma activities were not detected above laboratory reporting limits. This is indicated with a letter 'U' in the results of the laboratory report and also in the first row of Table 4.

The laboratory results for gamma-emitting radionuclides in the Furr 16-22D produced water sample show that Actinium-228, Bismuth-214, Lead-214, and Radium-228 results were qualified as 'UI' Gamma Spectroscopy - 'Uncertain Identification.' These naturally occurring radionuclides are daughter products of Uranium-238 and Thorium-232 (^{232}Th) decay series. Copies of the laboratory reports for gamma spectroscopy results are included in Appendix B.

Potassium-40 was detected in the Furr 16-22B produced water sample collected on June 24, 2009. Potassium-40 was not detected in the Furr 16-22D sample, but was reported in the duplicate sample (22-9-16). Potassium-40 (^{40}K) was previously detected in seven of the fourteen produced water samples submitted in November and December 2008 including the sample from the Furr 16-22D. Potassium-40 is one of the most common radionuclides in nature and is frequently found in sedimentary rocks high in clay minerals since these minerals contain potassium in their chemical formulas.

Krypton-85 (^{85}Kr) is included in the GEL gamma spectroscopy report, but was not detected in any of the two produced water samples or field blank, but was reported as 'UI' uncertain identification in the duplicate sample (22-9-16) with a result of 0.00 ± 604 pCi/L and a detection limit of 1140 pCi/L. Since the possible positive result is less than the reported detection limit, and since it was not detected in the Furr 16-22D sample, ^{85}Kr is likely not present in the sample. The electronic data deliverable indicated that ^{85}Kr was not detected and that the data had been rejected due to low abundance.

GEL Laboratories does not perform Krypton isotopic analysis or beta activity. Analyzing for ^{85}Kr beta activity is problematic due to the large sample volumes required, long counting time, and because only a limited number of laboratories worldwide have the specialized equipment to perform the analysis.

3.3 Data Verification and Validation

The following presents the results of the data verification and validation analysis of the Isotech and GEL laboratory reports.

3.3.1 Isotech Results

Samples of natural gas and produced water were collected from the Furr 16-22B and Furr 16-22D on June 24, 2009. A duplicate sample (22-9-16) was collected from the Furr 16-22D. Isotech Laboratories received three produced water samples and the field blank on June 26, and the three gas LP tanks on June 29, 2009. The produced water samples and field blank were submitted for tritium analysis by the direct count method and the gas samples were submitted for compositional analysis including carbon-14 and tritium.

Olsson requested that Isotech perform the analysis consistent with what they are doing for URS per the Rulison SAP. No QA/QC data was provided; however, all of the gas samples were reported as less than the laboratory reporting limit. The three produced water samples were all reported as less than the laboratory reporting limit, and the field blank was reported at 54.3 ± 3.8 TU. According to Isotech the chemical analysis was based on standards accurate to within 2%. A duplicate error ratio (DER) cannot be calculated for the tritium in produced water since both samples were reported as less than the laboratory reporting limit. The difference in reporting limits between the Furr 16-22D and the duplicate (22-9-16) was 1.5 TU. The results for the gas compositional analysis indicate good agreement between the Furr 16-22D sample and the duplicate sample compositional analysis. The difference in reporting limits for tritium was 1.1 TU (~3.52 pCi/L) and the difference for carbon-14 was 0.1 pMC for the two samples.

Diane Short and Associates was retained to verify and validate the data. The tritium results were provided to Diane Short and Assoicates; however Isotech only provided sample results without quality control information. Therefore, it was not possible for Diane Short and Associates to validate the Isotech data.

3.3.2 GEL Results for GFPC, LSC, and Total Uranium

Diane Short and Associates reviewed and validated the GEL laboratory data and prepared two separate reports. One report was for the gas flow proportional counting (GFPC) for gross alpha/beta, Cl-36 and Sr-90, liquid scintillation (LSC) for Tc-99, and total uranium in water. The second report was for validation of the gamma spectroscopy results.

According to Diane Short and Associates, the data are considered fully useable for project purposes with consideration of the following. Aliquots of the three produced water samples and the field blank were received by GEL Laboratories

on June 25, 2009 for analysis of gross alpha, gross beta, ^{90}Sr, ^{99}Tc, ^{36}Cl, and total uranium.

According to the laboratory receipt and review form, the samples were received intact and stored on ice. Chain of custody documents were included, sample containers were intact and sealed, and the samples were received within holding time. The sample identifications, date and time, and the number of containers indicated on the chain of custody matched with the sample containers, and the chain of custody was signed in relinquished /received sections. The laboratory commented that all samples except the field blank were biphasic with a thick layer of oil at the top. The laboratory decanted off the oil layer and discarded it, and only analyzed the aqueous portion of the sample.

According to Diane Short and Associates, GEL provided a QC summary as part of the analytical data package, but did not include raw data. Diane Short and Associates conducted a Level II review of the GEL data. Non-conformance reports were generated to document any procedural anomalies that may deviate from referenced standard operating procedures or contractual documents. The non-conformance report was generated due to the sample being improperly preserved upon receipt. This was due to buffering by the sample matrix, and although the sample containers contained acid prior to sample collection, it was neutralized by the produced water. The laboratory added acid upon receipt per Olsson Associates instruction. The laboratory added preservative to bring the sample pH into the acceptance range, as permitted by 40 CFR, and according to Diane Short and Associates, this should have no impact on the results. No qualifiers are applied.

Additionally, the laboratory noted that the samples were received at 11 °C and 12 °C. Chilling samples to less than 6 °C is not required for radiological testing by 40 CFR. No qualifiers are applied.

Gross alpha and gross beta results were reported for both the Furr 16-22D and 22-9-16 sample. The observed minimum detectable concentration (MDC), or detection limit (DL) is higher than the normal MDC or reporting limit (RL). Diane Short and Associates compared these results to previous results which have included comments that this occurs due to a non-homogeneous matrix (oily liquid). No qualification is required.

Gas flow proportional counting (CFPC) results for surrogate/tracer recoveries of potassium chloride carrier (chlorine-36), strontium carrier, and technetium-99m tracer recovery percentages were reportedly within the acceptable limits for the laboratory. GEL provides a non-conformance report for the Cl-36 data stating that the RDL is less than the minimum detectable activity (MDA) due to reduced aliquots. No qualification is applied.

GEL indicated that the matrix spike (MS)/matrix spike duplicate (MSD) did not meet recovery requirements due to the matrix being non-homogeneous and a miscellaneous liquid. The MS recovery for alpha was 45.4%, 38.4% for the MSD. The MS recovery for gross beta was 33.4%, and 40.3% for the MSD. The matrix spikes conducted for CL-36, Tc-99, and total Uranium were in control. The matrix duplicates for these analyses were in control.

Matrix duplicates were analyzed using the same samples as were used for the matrix spikes. The matrix duplicate for alpha is in control. The relative percent difference (RPD) for the gross beta is 55 percent and the derived error ratio (DER) is 2.53. The sample and the matrix duplicate have levels that are less than five times the RL, and the absolute difference of the results is less than two times the RL. Therefore the parent sample is qualified 'JD' to indicate that the precision of this analysis may be out of normal limits on this sample for the gross alpha/gross beta.

Preparation blanks for the LSC methods are supposed to be less than the calibration MDC or the sample MDC, whichever is reported. If all sample results in a batch are reported as 'detected,' then the prepation blank must be less than the activitiy of the lowest MDC in the batch. All of the Tc-99 results were all reported as 'non-detect.'

For the GFPC methods, if a sample activity is less than five times the MDC, the activity of the preparation blank shall be equivalent to zero when the measurement uncertainty is considered or shall be less than the MDC. If the sample activity is greater than 5 times the MDC, the activity of the preparation blank shall be equivalent to zero where the measurement uncertainty is considered. This is determined from the normalized absolute difference (NAD).

The impact of contamination may be evaluated where appropriate by calculating the NAD for the Method Blank and subsequent evaluation criteria as defined in the Army Corp. guidance section III and elsewhere. When the NAD is found to be greater than 1.96 but less than 2.58, the results are qualified 'JMB#' where the '#' represents the isotopes blank activity. Such results are considered to be estimated and possibly undetected values due to the presence of blank contamination.

The GEL report provides results for the gross alpha/gross beta method blank but does not provide an MDC. The MDC levels are provided for samples, and no sample result is greater than five times the MDC. The method blank is reported as a 'non-detect.' Therefore, no qualifications are required for method blank levels. The sample results for Sr-90, Cl-36, Tc-99 were all reported as 'non-detects' and the method blanks wee also reported as 'non-detects' so no

qualifications are required. Total uranium was not detected in the method blanks, but was detected in the produced water samples. No qualifiers are required.

Results for the field blank sample indicate that no analytes were detected. No qualifiers are added due to field blank outliers. Results for sample ID, 22-9-16, a field duplicate for the 16-22D sample indicate that the RPD for gross beta was 53% but the result was less than five times the RL and the absolute difference is less than two times the RL. Therefore, the field duplicate is in control for this parameter. All others are fully in control.

3.3.3 GEL Results for Gamma Spectroscopy

The overall assessment of the gamma spectroscopy data reviewed by Diane Short and Associates was that the data were considered fully useable for project purposes with consideration of the following qualification or comments. The laboratory noted that sample 16-22D was received at a pH of 3. The sample containers provided by GEL were pre-acidified. However, the dissolved salts in the produced water samples have a buffering capacity which results in the pH being above 2 by the time the sample was received by the laboratory. The laboratory added acid to preserve the sample and bring the sample pH into the acceptance range. This is permissible per 40 CFR and should have no impact on the results. No qualifiers are added.

Additionally, as noted in the previous section, the samples were received at 11 °C and 12 °C and the laboratory noted this in the receiving documentation. Chilling to less than 6 °C is not required for radiological testing by 40 CFR. No qualifiers are added. The laboratory noted that all of the samples except the field blank contained a thick layer of a light non-aqueous liquid (LNAPL). These are produced water samples collected from the dump lines of the individual well separators and as such contain a separate phase layer of natural gas condensate floating on top of the water. Olsson Associates gave permission for the laboratory to decant the oil phase and analyze only the aqueous phase. The Rulison SAP only requires that the aqueous phase be analyzed.

Some analytes did not meet the DER limit of 1.0 (DOE limit is 1.42). These analyte results were all reported as 'non-detect' in both the sample and the duplicate sample. The only detected analyte is K-40 which is with the acceptance limit of the RPD and the DER. Sample ID 22-9-16 is a field duplicate for the 16-22D sample, and it is in control for gamma spectroscopy results. Potassium-40 is detected in the field duplicate at a level of less than 5 times the RL, but not in the 16-22D sample. The difference between the two measured results; however, is less than 2 times the RL so the field duplicate criteria are met.

The laboratory flagged a number of results with 'UI' to indicate that they had some type of detection issue. The issues cited by the laboratory are summarized in the table of the gamma spectroscopy report provided by Diane Short and Associates. These results could potentially suffer from negative bias and are qualified as 'JQ.'

4.0 Summary

The results of the second quarter 2009 sampling of Laramie Energy II's two closest Tier II wells indicate that radiation associated with Project Rulison was not detected. The Furr 16-22B and Furr 16-22D gas wells are both located in Section 22, Township 7S, Range 95 West of the Sixth Principal Meridian. The Furr 16-22B and Furr 16-22D are Tier II wells in Rulison SAP Sectors 10 and 11 and are located within the 3-mile radius of Project Rulison as shown on Figure 1 and Figure 2.

Isotech Laboratories indicated that the LP tanks containing the gas samples and the produced water samples submitted for tritium analysis arrived in good condition. GEL laboratories indicated that all of the produced water samples, except for the field blank, were bi-phasic, meaning that there was a thick layer of oil floating on top of the water samples. Olsson Associates gave the laboratory permission to remove the oil and analyze only the aqueous portion of the samples as the Rulison SAP requires for Tier II wells.

The analytical results show that tritium (^{3}H), reportedly the only radionuclide of concern in the Project Rulison estimated inventory, was not detected in the three gas samples or in produced water samples analyzed by Isotech in Champaign, Illinois. Tritium has a 12.3 year half-life and a significant amount of the tritium estimated to have been produced by the detonation was released in 1970 during the production testing of the re-entry well. The DOE estimated amount of Project Rulison related tritium remaining in late 2009 is 700 curies.

Carbon-14 (^{14}C) was also identified in the Project Rulison estimated inventory as a radionuclide that potentially could be present in natural gas. The Isotech analytical results for the natural gas samples collected from the Furr 16-22B and Furr 16-22D wells show that ^{14}C was not detected (< 0.5 pMC). The laboratory results show the samples have been isolated from modern carbon sources.

Gross alpha activities were reported in all three produced water samples, but not in the field blank sample. Gross alpha activities in the produced water are likely to due to high TDS that were detected in the baseline samples collected in December 2008.

Potassium-40 (^{40}K), one of the most abundant naturally occurring radionuclides, was reportedly detected in the Furr 16-22B produced water sample. Potassium-40 is a beta emitter. Gross beta activities are likely to be related to naturally

occurring ^{40}K. The laboratory analytical results indicate that, ^{36}Cl, ^{90}Sr, ^{99}Tc, and total Uranium results were reported as 'not detected' in the produced water samples.

The results of the gamma spectroscopy analysis show that gamma emitting radionuclides were generally not detected. Naturally occurring radionuclides, such as Actinium-228, Bismuth-214, Lead-214, and Radium-228 were reported as uncertain identification in the Furr 16-22D produced water sample. These radionuclides are daughter products of natural Uranium-238 and Thorium- 232 decay. Krypton-85 was reported as 'UI' (uncertain identification) in the duplicate sample (22-9-16), but not in the sample collected/reported from the Furr 16-22D well. The ^{85}Kr data in the duplicate sample was rejected due to low abundance. Other gamma emitting radionuclides were reportedly not detected, as shown with a 'U' qualifier preceding the result in the laboratory report.

Laboratory analytical results for gross alpha and gross beta indicate that alpha activities and beta activities were within the range of natural background and these low level activities are most likely due to naturally occurring radionuclides in the Uranium-238 and Thorium-232 decay chain, such as Bismuth-214 (^{214}Bi) and Lead-214 (^{214}Pb), and Potassium-40 (^{40}K).

The laboratory analytical results show that gas flow proportional counting of Chlorine-36 and Strontium-90 indicate that these radionuclides were not detected in any of the produced water samples. Chlorine-36 was reported in the Field Blank with an activity of 258 ± 158 pCi/L, and a detection limit of 100 pCi/L. Strontium-90 was not detected in the Field Blank or the produced water samples. Laboratory results for liquid scintillation counting of Technetium-99 indicate that ^{99}Tc was not detected in the three produced water samples or the field blank. Total Uranium was not detected in any of the produced water samples or field blank.

Results of the data verification and validation indicate that the data is usable for the purposes of this project with consideration of the qualifications mentioned in the laboratory report, and those of the independent data reviewer. The laboratory data was reviewed by Diane Short and Associates.

5.0 References

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TABLES AND FIGURES

TABLE 1

FURR GAS WELL INFORMATION
Furr 16-22B and Furr 16-22D Tier II Wells - Second Quarter 2009
Laramie Energy II
Rulison Area Gas Well Monitoring

			Surface Location								
COUNT	**WELL**	**PAD**	**QTR/QTR**	**SEC**	**TWP**	**RNG**	**TOTAL DEPTH (FT.)**	**COMPLETION INITIATION DATE**	**4th Quarter 2008**	**1st Quarter 2009**	**2nd Quarter 2009**
1	Furr A11-15B	Furr A-11	NE SW	15	7S	95W	7,643	9/22/08	B (11/13/08)	N/A	N/A
2	Furr A11-15D	Furr A-11	NE SW	15	7S	95W	7,645	9/29/08	B (11/13/08)	N/A	N/A
3	Furr Hagen 6-22B	F-1	SW NE	22	7S	95W	8,225	10/3/08	B (12/17/08)	N/A	N/A
4	Furr Hagen 6-22D	F-1	SW NE	22	7S	95W	8,225	10/3/08	B (12/17/08)	N/A	N/A
5	Furr 7-22B	F-1	SW NE	22	7S	95W	8,077	10/8/08	B (12/17/08)	N/A	N/A
6	Furr 7-22D	F-1	SW NE	22	7S	95W	8,110	10/8/08	B (12/17/08)	N/A	N/A
7	Furr 10-22B	F-1	SW NE	22	7S	95W	8,130	10/13/08	B (12/17/08)	N/A	N/A
8	Furr 9-22B	F-2	SE SE	22	7S	95W	8,820	10/24/08	B (12/17/08)	N/A	N/A
9	Furr 9-22D	F-2	SE SE	22	7S	95W	8,720	10/30/08	B (12/17/08)	N/A	N/A
10	Furr 16-22B	F-2	SE SE	22	7S	95W	8,520	10/24/08	B (12/17/08)	QP (NS)	QP (6/24/09)
11	Furr 16-22D	F-2	SE SE	22	7S	95W	8,540	10/30/08	B (12/17/08)	QP (4/14/09)	QP (6/24/09) D
12	Furr 10-22D	F-3	SW SE	22	7S	95W	8,606	11/6/08	B (12/17/08)	N/A	N/A
13	Furr 15-22B	F-3	SW SE	22	7S	95W	9,172	11/6/08	B (12/17/08)	N/A	N/A
14	Furr 15-22D	F-3	SW SE	22	7S	95W	8,476	11/6/08	B (12/17/08)	N/A	N/A

B - Baseline Data Collection Date (Date)
QP - Quarterly Production Data Collection Date
D - Duplicate Sample Collected
N/A - Not Applicable (See explanation below)
NS - Not Sampled (The Furr 16-22B was shut-in during the 04/14/09 sampling event and could not be sampled.)

According to the URS Rulison SAP, Revision 2, March 2008, Table 2 - *Tier I and Tier II Sampling and Analysis Scheme for Gas Wells within a Three-Mile Radius of Project Rulison*, Tier II Zone wells require a One-Time sampling and analysis (Baseline) for the radiological and non-radiological analytes in SAP Tables 3 and 4 and natural gas for the radiological analytes listed in SAP Table 3 as soon as possible after fracing but no later than 30 days after first gas delivery form a new gas well. If a Tier II well is the closest well in a sector (i.e., no Tier I well), produced water and natural gas will be sampled and analyzed for the radiological analytes listed in Table 3 quarterly during Year 1, semiannually during Years 2 and 3, and annually thereafter.

The Furr 16-22B and Furr 16-22D are the two Tier II wells closest to Project Rulison in Sector 11, and there are no Tier I wells in this sector.
A duplicate sample was collected from the Furr 16-22D and was identifiied as '22-9-16' during the 06/24/09 sampling event.
A field blank sample was also collected during the 06/24/09 sampling event.

TABLE 2

GAS SAMPLE DATA
Rulison Area Well Monitoring
Furr 16-22B and Furr 16-22D Wells
Natural Gas Samples - Laramie Energy II - Rulison Field, Garfield County, Colorado

Well Name/ No.	Sample Source	Latitude/	Longitude	Qtr/Qtr	Section	Township	Range	P.M.	Isotech Lab No.	Sample Name	Date Sample	CO %	H_2S %	He %	H_2 %	Ar %	O_2 %	CO_2 %	N_2 %	C_1 %	C_2 %	C_2H_4 %	C_3 %	iC_4 %	nC_4 %	iC_5 %	nC_5 %	C_6+ %	$^{14}C_1$ pMC	Std. Dev. (±)	Tritium TU	Std. Dev. (±)	Total BTU calc	Specific Gravity calc
Furr 16-22B	Separator	39.41662	-107.97507	SE SE	22	7S	95W	6th	152400	Furr 16-22B	12/17/2008	ND	ND	0.0029	0.0036	ND	ND	2.97	0.029	89.26	5.12	ND	1.50	0.335	0.322	0.139	0.0981	0.220	< 0.4	N/A	< 10.0	N/A	1076	0.642
									N/A		4/14/2009	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
									165099		6/24/2009	ND	ND	0.0033	0.0029	ND	0.0324	3.00	0.17	89.76	4.86	ND	1.35	0.278	0.248	0.0969	0.0640	0.133	< 0.5	N/A	< 10.0	N/A	1061	0.634
Furr 16-22D	Separator	39.41662	-107.97512	SE SE	22	7S	95W	6th	152398	Furr 16-22D	12/17/2008	ND	ND	0.0029	0.0033	ND	0.0060	3.25	0.053	88.76	5.35	ND	1.52	0.337	0.307	0.128	0.0895	0.192	< 0.8	N/A	< 10.0	N/A	1073	0.644
									160503		4/14/2009	ND	ND	0.0029	0.0042	ND	0.0098	3.39	0.086	88.87	5.24	ND	1.45	0.309	0.278	0.117	0.0789	0.167	0.5	0.1	< 10.0	N/A	1066	0.643
									165100		6/24/2009	ND	ND	0.0038	0.0040	ND	0.0272	2.88	0.16	89.50	5.15	ND	1.43	0.296	0.261	0.0094	0.0656	0.121	< 0.4	N/A	< 11.7	N/A	1066	0.636
22-9-16	Separator	39.41662	-107.97512	SE SE	22	7S	95W	6th	165101	22-9-16 (Duplicate)	6/24/2009	ND	ND	0.0033	0.0040	ND	0.0144	3.36	0.10	89.07	5.17	ND	1.42	0.297	0.263	0.101	0.0666	0.133	< 0.5	N/A	< 12.8	N/A	1063	0.640

Accronyms:
pMC - Percent Modern Carbon.
TU - Tritium Units (One TU is equivalent to 3.19 pCi/L of water)
< - Not Detected (Above Laboratory Method Detection Limit)
Std. Dev. (±) - Standard Deviation
BTU - British Thermal Units (cu. Ft. dry calcuated at 60°F and 14.7 psia)
calc - calculated value
N/A - not applicable
ND - not detected (Mol %)
NS - not sampled (Furr 16-22B shut in on 04/14/09)

Gas Component:
CO - Carbon Monoxide
H_2S - Hydrogen Sulfide
He - Helium
H_2 - Hydrogen
Ar - Argon
O_2 - Oxygen
CO_2 - Carbon Dioxide
N_2 - Nitrogen
C_1 - Methane
C_2 - Ethane
C_2H_4 - Ethylene
C_3 - Propane
iC_4 - Iso-Butane
nC_4 - N-Butane
iC_5 - Iso-Pentane
nC_5 - n-Pentane
C_6+ - Hexanes+

$^{14}C_1$ - Carbon 14 — Carbon-14 (14C) Detection Limit is 1.0 pMC. Isotopic composition of carbon is relative to the Vienna Peedee Belemnite (VPDB).
Tritium — Tritium (^3H) Detection Limit 10.0 TU. Isotopic composition of hydrogen is relative to Vienna Standard Mean Ocean Water (VSMOW)
Std. Dev./ (±) — Standard Deviation (±) Uncertainty

Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol.% Chemical analysis based on standards accurate to within 2%.

Table presents Second Quarter 2009 (06/24/09) laboratory analytical results for the Furr 16-22B and the Furr 16-22D wells. First quarter results for the Furr 16-22D (04/14/09) and also the baseline results obtained for the Furr 16-22B and Furr 16-22D (12/17/08).

TABLE 3

TRITIUM ANALYTICAL RESULTS FOR PRODUCED WATER SAMPLES
Furr 16-22B and Furr 16-22D Tier II Wells
Laramie Energy II, Rulison Field, Garfield County, Colorado

Well Name/Number	Sample Source	Latitude	Longitude	QTR/ QTR	Section	Township	Range	P.M.	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	Laboratory	Tritium (TU)	Tritium (pCi/L) calculated
Furr 16-22B	Separator	39.41669	-107.97507	SE SE	22	7S	95W	6th	Furr 16-22B	12/17/2008	12:54	ISO	< 10.8	< 34.5
										4/14/2009	NS		NS	NS
										6/24/2009	11:55		< 13.7	< 43.7
Furr 16-22D	Separator	39.41662	-107.97512	SE SE	22	7S	95W	6th	Furr 16-22D	12/17/2008	12:13	ISO	< 10.0	< 31.9
										4/14/2009	11:00	ISO	< 10.0	< 31.9
										6/24/2009	11:40		< 12.0	< 38.3
22-9-16 (Furr 16-22D Duplicate)	Separator	39.41662	-107.97512	SE SE	22	7S	95W	6th	22-9-16	6/24/2009	12:50	ISO	< 10.5	< 33.5
Field Blank	NA	NA	NA	SE SE	22	7S	96W	6th	Blank	6/24/2009	12:05	ISO	54 ± 3.8	173.22 ± 12.1

Table presents 2nd Quarter 2009 (06/24/09) laboratory analytical results for the Furr 16-22B and Furr 16-22D wells. Results for the Furr 16-22D first quarter sample (04/14/09) and also the baseline results for both wells (12/17/08) are also presented.
Tritium (^3H) Detection Limit 10.0 TU. Isotopic composition of hydrogen is relative to Vienna Standard Mean Ocean Water (VSMOW).

Abbreviations:
ISO - Isotech Laboratories, Inc. of Champaign, Illinois
TU - Tritium Units (One TU is equivalent to 3.19 pCi/L of water) Note: Isotech reported the tritium results in TU and Olsson Associates converted to equivalent picocuries per liter.
pCi/L - picocuries per liter

< - Result is less than the method detection limit
NS - Not Sampled (Furr 16-22B was shut-in and the separator did not yield sufficient water volume to enable sample collection in April 14, 2009.)

TABLE 4

Radiochemistry Gas Flow Proportional Counting/Liquid Scintillation Analysis/Total Uranium for Produced Water Samples
Furr 16-22B and Furr 16-22D Tier II Wells
Laramie Energy II - Rulison Field, Garfield County, Colorado

WELL NAME/ Sample ID	Sample Source	Latitude/	Longitude	QTR/ QTR	Section	Township	Range	P.M.	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	Laboratory	GFPC Gross Alpha	Result ± Uncertainty (pCi/L)	Detection Limit (pCi/L)	GFPC Gross Beta	Result ± Uncertainty (pCi/L)	Detection Limit (pCi/L)	GFPC Chlorine-36	Result ± Uncertainty (pCi/L)	Detection Limit (pCi/L)	GFPC Strontium-90	Result ± Uncertainty (pCi/L)	Detection Limit (pCi/L)	LSA Technetium-99	Result (pCi/L)	Detection Limit (pCi/L)	Total Uranium	Result ± Uncertainty (µg/L)	Detection Limit (µg/L)
Furr 16-22B	Separator	39.41669	-107.9751	SE SE	22	7S	95W	6th	16-22B	12/17/2008	12:54	GEL	U	5.88 ± 16.8	30.4	U	15.9 ± 27.6	46.8	U	-98.4 ± 152	271	U	0.817 ± 0.781	1.27	U	8.00 ± 17.5	29.7		0.548 ± 0.116	0.267
										4/14/2009	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
										6/24/2009	11:55	GEL		21.8 ± 13.3	20.2		31.9 ± 11.6	18.1	U	125 ± 136	229	U	-0.98 ± 0.861	1.93	U	-8.79 ± 13.0	22.8	U	-0.0389 ± 0.0302	0.0766
Furr 16-22D	Separator	39.41662	-107.9751	SE SE	22	7S	95W	6th	16-22D	12/17/2008	12:13	GEL	U	-40 ± 27.6	56.2	U	0.428 ± 30.6	52.5	U	195 ± 210	353	U	-0.727 ± 0.945	1.92	U	9.98 ± 17.6	29.8		0.394 ± 0.0727	0.267
										4/14/2009	11:00	GEL		33.0 ± 16.3	21.8		79.4 ± 23.0	34.8	U	47.7 ± 72.7	124	U	-0.567 ± 0.476	1.17	U	-7.01 ± 22.5	39.5	U	0.00 ± 0.00	0.289
										6/24/2009	11:40	GEL		27.1 ± 12.4	17.4		61.7 ± 16.3	25.2	U	70.4 ± 117	201	U	-0.586 ± 0.826	1.61	U	-9.54 ± 16.1	28.0	U	0.00 ± 0.00	0.0766
22-9-16 (Furr 16-22D Duplicate)	Separator	39.4166	-107.975	SE SE	22	7S	95W	6th	22-9-16	6/24/2009	12:50	GEL		20.8 ± 11.4	17.1		35.5 ± 10.9	16.5	U	168 ± 126	207	U	-0.318 ± 0.594	1.32	U	3.11 ± 24.0	41.0	U	0.00 ± 0.00	0.0766
Field Blank	N/A	N/A	N/A							6/24/2009	12:05	GEL	U	-1.14 ± 1.63	4.26	U	-1.12 ± 2.54	4.97		258 ±158	256	U	-0.498 ± 0.784	1.54	U	-10.4 ± 12.6	22.1	U	0.00 ± 0.00	0.0766
											April 2009 GEL Reporting Limits:				5.00			5.00			100			2.00			50.0			1.00
											June 2009 GEL Reporting Limits:				5.00			5.00			100			2.00			50.0			1.00

Table presents 2nd Quarter 2009 (06/24/09) laboratory analytical results for the Furr 16-22B and 16-22D well, 1st Quarter 2009 (04/14/09) for the Furr 16-22D, and also the baseline results both wells (12/17/08).
The Furr 16-22B well was shut-in and was not sampled during the April 14, 2009 sampling event.

Abbreviations:
pCi/L - picocuries per liter (activity in parts per trillion)
µg/L - micrograms per liter (concentration in parts per billion)

U - Result is less than the sample specific Minimum Detectable Concentration (MDC) or Minimum Detectable Activity (MDA), Method Detection Limit (MDL), Limits of Detection (LOD), total propogated uncertainty (TPU), or laboratory reporting limit (RL).
NS - Not Sampled (Furr 16-22B well was shut-in during the 4/14/09 sampling event and was not sampled)
NA - Not Analyzed
N/A - Not Applicable
GFPC - Gas Flow Proportional Counting
LSA - Liquid Scintillation Analysis

TABLE 5

GAMMA SPECTROSCOPY RESULTS FOR PRODUCED WATER SAMPLES
Furr 16-22B and Furr 16-22D Tier II Wells
Laramie Energy II - Rulison Field, Garfield County, Colorado

WELL NAME/No.	Sample Collection Point	Latitude/	Longitude	QTR/QTR	SEC	TWP	RNG	P.M.	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	Gamma Emitting Radionuclides	Ac-228 Result (pCi/L)	Am-241 Result (pCi/L)	Sb-124 Result (pCi/L)	Sb-125 Result (pCi/L)	Al-26 Result (pCi/L)	Ba-133 Result (pCi/L)	Ba-140 Result (pCi/L)	Be-7 Result (pCi/L)	Bi-212 Result (pCi/L)	Bi-214 Result (pCi/L)	Ce-139 Result (pCi/L)	Ce-141 Result (pCi/L)	Ce-144 Result (pCi/L)	Cs-134 Result (pCi/L)	Cs-136 Result (pCi/L)	Cs-137 Result (pCi/L)	Cr-51 Result (pCi/L)	Co-56 Result (pCi/L)	Co-57 Result (pCi/L)	Co-58 Result (pCi/L)	Co-60 Result (pCi/L)	Eu-152 Result (pCi/L)	Eu-154 Result (pCi/L)	Eu-155 Result (pCi/L)	I-131 Result (pCi/L)	Ir-192 Result (pCi/L)	Fe-59 Result (pCi/L)	Kr-85 Result (pCi/L)
Furr 16-22B	Separator	39.4167	-107.9751	SE SE	22	7S	95W	6th	16-22B	12/17/2008	12:54	Qualifier	U	U	U	U	NA	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	3.91	0.459	1.22	-1.04	NA	-0.923	16.6	-4.13	-3.67	4.67	0.590	-0.838	-6.11	1.19	11.4	0.177	6.72	-0.858	0.0899	-3.17	0.181	-5.17	-0.406	-7.3	NA	-0.128	-2.27	-1760
												Uncertainty (±)	15.7	11.6	4.83	5.60	NA	3.29	25.1	20.1	15.9	5.23	2.03	4.96	14.1	2.41	9.13	2.18	31.3	2.24	1.78	2.47	2.39	5.88	5.55	7.85	NA	2.49	4.80	638
												MDC	15.6	17.3	8.58	9.02	NA	4.63	44.1	34.0	25.9	8.60	3.55	8.54	22.2	4.20	17.6	3.41	52.8	3.52	2.90	3.47	3.54	9.11	9.20	11.3	NA	4.13	7.62	928
										4/14/2009	NS	Qualifier	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
												Result																													
												Uncertainty (±)																													
												MDC																													
										6/24/2009	11:55	Qualifier	U	U	U	U	NA	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	11.6	-3.81	-0.143	3.25	NA	-7.26	-19.4	-14.5	18.6	8.74	-2.29	1.36	-7.7	3.36	0.283	-0.784	-1.22	0.205	1.31	-1.14	-1.26	2.57	-0.359	-2.93	NA	0.868	-1.35	-911
												Uncertainty (±)	14.6	16.1	4.82	6.38	NA	3.46	13.0	20.0	19.0	8.05	2.40	4.54	16.7	2.62	3.86	2.31	22.8	2.15	2.17	2.01	2.30	6.37	5.55	9.14	NA	2.31	4.48	737
												MDC	19.8	27.2	8.14	11.2	NA	4.99	15.9	31.7	34.2	10.9	3.81	7.43	27.3	5.04	6.58	3.69	39.0	3.72	3.73	3.22	3.47	11.2	9.15	15.2	NA	4.05	7.24	1160
Furr 16-22D	Separator	39.4166	-107.9751	SE SE	22	7S	95W	6th	16-22D	12/17/2008	12:13	Qualifier	U	U	U	U	NA	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	6.57	10.3	0.498	-6.79	NA	-5.81	-30.8	-26	-3.97	6.13	-1.31	-1.39	-2.9	2.66	-2.31	-1.74	-19.8	1.70	0.0278	1.50	1.43	0.715	-6.94	0.437	NA	-1.18	-4.79	-2410
												Uncertainty (±)	10.1	22.4	5.76	5.66	NA	2.79	26.3	24.1	20.4	6.34	2.20	6.31	16.2	2.31	11.2	1.90	32.4	2.33	1.92	2.25	1.97	5.84	6.17	8.57	NA	2.44	7.67	690
												MDC	16.6	37.9	9.76	8.29	NA	3.75	36.6	35.6	29.3	9.09	3.71	8.90	25.9	4.37	18.0	2.90	52.2	4.23	3.12	4.07	3.69	9.84	8.75	14.1	NA	3.96	8.56	852
										4/14/2009	11:00	Qualifier	U	U	U	U	NA	U	U	U	U	UI	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	3.93	-10.6	0.632	-1.06	NA	0.308	3.77	13.1	3.89	0.00	-1.36	-0.631	17.5	-0.322	0.121	-0.996	-12.4	1.67	-0.601	-1.09	-0.177	-2.33	2.46	-9.25	NA	-0.574	0.757	-1490
												Uncertainty (±)	9.67	10.2	4.64	5.56	NA	2.84	10.5	16.5	18.5	7.94	1.87	3.96	16.0	2.39	3.24	2.14	18.0	1.88	1.75	2.02	2.26	5.99	5.39	7.58	NA	1.87	3.70	638
												MDC	15.5	16.5	7.82	9.28	NA	4.25	17.9	29.4	29.1	9.5	2.97	6.02	24.6	3.87	5.52	3.39	29.5	3.50	2.87	3.11	3.74	9.37	9.62	12.0	NA	3.14	6.42	930
										6/24/2009	11:40	Qualifier	UI	U	U	U	NA	U	U	U	U	UI	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	0.00	4.88	1.84	-1.85	NA	2.04	2.77	7.48	23.9	0.00	0.623	0.679	3.99	-0.793	-2.91	0.326	-3.56	-0.387	1.67	-0.27	1.11	-2.98	-2.66	4.97	NA	0.672	-3.15	-942
												Uncertainty (±)	13.4	18.6	5.43	5.60	NA	2.80	11.1	17.5	17.0	8.10	2.02	3.85	14.2	2.85	4.31	2.05	21.4	1.99	1.81	1.91	2.17	6.66	5.60	8.54	NA	2.03	3.95	660
												MDC	18.5	32.1	9.49	9.05	NA	4.43	18.6	29.9	32.2	9.55	3.35	6.38	23.8	4.43	6.48	3.56	35.9	3.26	3.13	3.17	3.92	10	8.84	14.6	NA	3.51	5.66	990
22-9-16 (Furr 16-22D Duplicate)	Separator	39.4166	-107.9751	SE SE	22	7S	95W	6th	16-22D	6/24/2009	12:50	Qualifier	UI	U	U	U	NA	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	UI
												Result	0.00	-7.85	-0.11	1.08	NA	1.47	4.08	-10.9	12.5	9.42	-1.9	0.752	-7.86	1.40	3.40	-1.36	22.9	-0.561	-1.08	-1.94	0.580	0.102	-6.16	5.08	NA	-2.51	2.09	0.00
												Uncertainty (±)	17.5	5.75	5.97	6.51	NA	3.42	13.8	23.3	21.1	8.32	2.06	4.24	13.9	3.34	4.75	2.68	22.7	2.22	1.98	2.55	2.65	7.95	8.04	7.50	NA	2.35	5.68	604
												MDC	16.0	8.49	10.1	11.2	NA	5.29	23.6	37.8	36.9	12.4	3.26	6.28	22.6	5.94	8.72	4.19	41.1	3.67	2.97	3.99	4.55	11.8	11.9	13.0	NA	3.76	9.96	1140
Field Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Field Blank	6/24/2009	12:05	Qualifier	U	U	U	U	NA	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NA	U	U	U
												Result	-8.32	3.60	0.111	-2.66	NA	-0.91	3.20	-4.91	5.91	4.43	-0.423	-0.568	12.1	-0.56	-2.09	1.43	-8.03	-1.11	0.120	-1.26	0.371	-0.384	0.803	2.42	NA	-1.23	3.90	-1010
												Uncertainty (±)	8.01	12.5	4.60	4.95	NA	2.56	10.4	16.7	15.1	6.78	1.87	4.52	14.9	2.02	3.46	1.82	18.0	1.87	1.88	2.27	2.34	5.78	5.26	7.63	NA	1.88	3.71	578
												MDC	11.9	19.1	7.84	8.02	NA	4.26	17.7	27.4	25.8	7.83	3.07	6.59	24.8	3.36	5.38	3.26	30.0	2.98	3.17	3.02	3.97	9.85	8.95	13.1	NA	3.10	7.00	871

Samples were all analyzed by GEL Laboratories, LLC in Charleston, SC

Four Rows:

1) Qualifier — The laboratory data qualifers are designated by one or two letters to provide information about the reported results.
2) Result — Results are the level of activity reported for the individual produced water sample.
3) Uncertainty (±) — The margin of error, or range of activity, when added to the result.
4) MDC — The laboratory minimum detectable concentration (MDC) for the analytical method. If the result is less than the reporting limits the radionuclide is reported as 'not detected' (U).

The qualifiers used in the laboratory reports are listed below:
U - Result is less than the sample specific Minimum Detectable Concentration (MDC) or Minimum Detectable Activity (MDA), Method Detection Limit (MDL), Limits of Detection (LOD), total propogated uncertainty (TPU), or laboratory reporting limit (RL).
UI - Gamma Spectroscopy Uncertain Identification
NS - Not Sampled (Furr 16-22B was shut-in on April 14, 2009 and was not sampled)
NA - Not Analyzed
N/A - Not Applicable

Note: Values shown in blue represent a detection. The gamma emitting radionuclides that were detected are naturally occurring potassium-40 (^{40}K), lead-212 (^{212}Pb), lead-214 (^{214}Pb), and bismuth-214 (^{214}Bi) in a few of the samples.

TABLE 5

GAMMA SPECTROSCOPY RESULTS FOR PRODUCED WATER SAMPLES
Furr 16-22B and Furr 16-22D Tier II Wells
Laramie Energy II - Rulison Field, Garfield County, Colorado

(Table Continued)

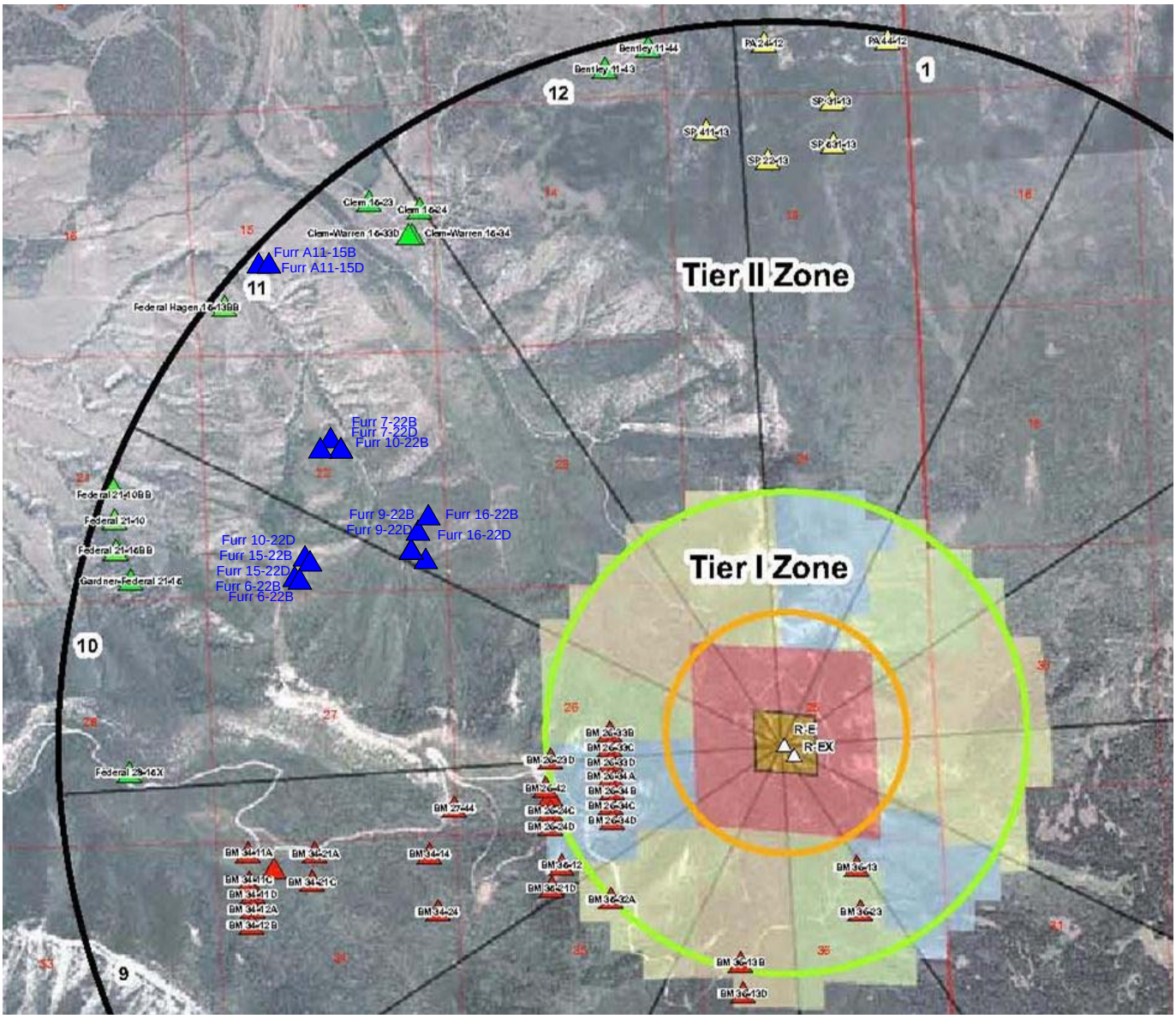
WELL NAME/No.	Sample Collection Point	Latitude/ Longitude	QTR/QTR	SEC	TWP	RNG	P.M.	SAMPLE ID	DATE SAMPLED	TIME SAMPLED	Gamma Emitting Radionuclides	Pb-210 Result (pCi/L)	Pb-212 Result (pCi/L)	Pb-214 Result (pCi/L)	Mn-54 Result (pCi/L)	Hg-203 Result (pCi/L)	Nd-147 Result (pCi/L)	Np-239 Result (pCi/L)	Nb-94 Result (pCi/L)	Nb-95 Result (pCi/L)	K-40 Result (pCi/L)	Pa-234m Result (pCi/L)	Pm-144 Result (pCi/L)	Pm-146 Result (pCi/L)	Ra-228 Result (pCi/L)	Ru-106 Result (pCi/L)	Ag-110m Result (pCi/L)	Na-22 Result (pCi/L)	Sc-46 Result (pCi/L)	Tl-208 Result (pCi/L)	Th-227 Result (pCi/L)	Th-230 Result (pCi/L)	Th-234 Result (pCi/L)	Sn-113 Result (pCi/L)	U-235 Result (pCi/L)	U-238 Result (pCi/L)	Y-88 Result (pCi/L)	Zn-65 Result (pCi/L)	Zr-95 Result (pCi/L)
Furr 16-22B	Separator	39.4167 -107.97507	SE SE	22	7S	95W	6th	16-22B	12/17/2008	12:54	Qualifier	U	U	U	U	U	U	U	U	U	U	NA	U	U	U	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	31.4	-3.14	3.30	0.333	2.44	-16.7	3.69	0.251	-1.36	27.2	NA	-0.00461	0.616	3.91	13.6	-1.81	-0.146	NA	-0.272	NA	802	134	-0.35	-19.5	134	-0.221	-0.378	1.72
											Uncertainty (±)	347	4.74	6.03	1.84	2.87	58.5	12.9	1.97	3.27	34.0	NA	2.04	2.29	15.7	17.4	1.83	2.00	NA	2.57	NA	5220	128	2.97	16.4	128	2.39	4.28	4.19
											MDC	517	6.62	8.61	3.10	5.04	97.2	21.3	3.33	5.21	27.3	NA	3.42	4.02	15.6	31.4	2.75	3.31	NA	3.92	NA	1300	140	4.84	23.2	140	3.97	7.16	7.26
									4/14/2009	NS	Qualifier	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
											Result																													
											Uncertainty (±)																														
											MDC																													
									6/24/2009	11:55	Qualifier	U	U	U	U	U	U	U	U	U		NA	U	U	U	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	-65.5	2.59	9.75	1.64	-0.51	4.09	-15.1	1.99	0.896	95.1	NA	-1.01	-0.297	11.6	2.67	0.102	-0.128	NA	2.41	NA	-268	-77	-3.23	21.8	-77	-2.46	-5.41	1.65
											Uncertainty (±)	522	5.83	6.13	2.15	2.55	24.1	17.2	2.05	2.55	26.1	NA	2.28	2.95	14.6	20.1	2.15	1.98	NA	3.01	NA	2030	149	2.72	18.7	149	2.80	5.73	4.08
											MDC	799	8.40	10.2	3.95	4.35	41.0	27.8	3.72	4.34	41.7	NA	3.60	4.95	19.8	33.8	3.58	3.26	NA	4.34	NA	1890	231	4.19	28.8	231	4.02	8.22	7.01
Furr 16-22D	Separator	39.4166 -107.97512	SE SE	22	7S	95W	6th	16-22D	12/17/2008	12:13	Qualifier	U	U	U	U	U	U	U	U	U		NA	U	U	U	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	-315	0.140	7.30	0.566	-0.0842	63.1	10.1	-2.03	3.15	82.8	NA	-1.15	-0.113	6.57	-6.7	-0.317	-2.18	NA	-0.229	NA	320	115	-0.121	10.6	115	0.554	-4.33	-0.501
											Uncertainty (±)	648	5.38	5.73	2.14	2.90	59.3	15.1	2.06	3.29	39.1	NA	2.59	2.46	10.1	19.6	1.82	2.18	NA	2.73	NA	2430	182	3.01	20.6	182	2.54	5.20	4.21
											MDC	1070	7.16	9.15	3.69	4.89	111	25.4	3.16	6.06	32.2	NA	3.66	4.03	16.6	32.5	3.04	3.16	NA	4.30	NA	2230	293	4.98	23.5	293	4.38	7.61	7.01
									4/14/2009	11:00	Qualifier	U	U	UI	U	U	U	U	U	U	U	NA	U	U	U	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	-190	0.756	0.00	1.22	1.25	10.4	10.2	0.598	-1.38	27.8	NA	0.421	-0.895	3.93	-21.9	2.41	0.825	NA	0.916	NA	910	-2.78	-0.26	1.04	-2.78	0.687	-6.48	0.509
											Uncertainty (±)	240	4.68	7.21	2.00	2.13	20.0	12.8	1.92	2.84	47.5	NA	2.04	2.45	9.67	21.7	1.99	1.91	NA	2.61	NA	5900	110	2.50	17.0	110	2.17	5.04	3.95
											MDC	357	7.16	9.00	3.62	3.78	34.8	22.2	3.27	3.64	32.3	NA	3.44	4.01	15.5	31.0	3.65	3.41	NA	4.26	NA	1170	158	4.22	23.8	158	3.88	7.36	6.59
									6/24/2009	11:40	Qualifier	U	U	UI	U	U	U	U	U	U	U	NA	U	U	UI	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	415	0.247	0.00	-0.416	-1.31	-2.3	1.70	-0.993	-0.866	33.1	NA	1.40	-0.968	0.00	1.56	-0.974	-1.45	NA	3.03	NA	504	-69.2	0.553	-2.75	-69.2	-0.959	-3.13	-4.78
											Uncertainty (±)	718	5.19	6.52	2.05	2.07	21.6	13.8	1.99	2.15	42.0	NA	1.95	2.71	13.4	16.6	1.92	2.05	NA	4.48	NA	3400	173	2.72	19.0	173	2.20	4.53	4.59
											MDC	1270	6.93	9.41	3.37	3.38	35.0	23.0	3.23	3.48	39.0	NA	3.52	4.36	18.5	28.7	3.11	3.12	NA	4.78	NA	1970	267	4.61	25.9	267	3.31	6.72	6.11
22-9-16	Separator	39.4166 -107.97512	SE SE	22	7S	95W	6th	16-22D	6/24/2009	12:50	Qualifier	U	U	UI	U	U	U	U	U	U		NA	U	U	UI	U	U	U	NA	U	NA	U	U	U	U	U	U	U	U
											Result	-0.942	5.17	0.00	0.182	-1.71	-19.8	-0.0838	0.0467	3.94	62.6	NA	-0.737	-1.41	0.00	1.13	0.131	-2.2	NA	1.37	NA	-828	-17.7	-1.27	-21.5	-17.7	0.0911	-5.15	5.90
											Uncertainty (±)	57.6	6.75	7.63	2.48	2.81	27.3	13.4	2.41	2.78	44.7	NA	2.47	3.07	17.5	20.4	2.45	2.86	NA	4.60	NA	5300	57.2	2.96	19.1	57.2	3.03	6.71	4.85
											MDC	94.2	9.10	11.2	4.27	4.33	42.5	22.6	3.99	5.25	34.4	NA	3.96	4.98	16.0	34.1	4.09	4.24	NA	3.75	NA	837	96.1	4.87	24.0	96.1	5.16	9.02	8.95
Field Blank	N/A	N/A N/A	N/A	N/A	N/A	N/A	N/A	Field Blank	6/24/2009	12:05	Qualifier	U	U	U	U	U	U	U	U	U	UI	NA	U	U	U	U	U	U	NA	U	NA	UI	U	U	U	U	U	U	U
											Result	-309	0.613	-0.377	-0.0957	-1.74	-23.8	6.22	-0.303	2.83	0.00	NA	-0.444	-0.0827	-8.32	1.73	-0.887	0.212	NA	1.56	NA	0.00	15.5	-0.823	-0.877	15.5	-0.723	-0.977	3.86
											Uncertainty (±)	329	4.61	4.57	1.81	2.71	20.1	14.5	1.73	2.26	27.1	NA	1.98	2.37	8.01	16.1	1.74	1.87	NA	3.47	NA	10600	128	2.37	18.5	128	2.14	3.71	3.51
											MDC	492	7.21	7.46	3.07	3.68	29.5	24.9	2.80	4.13	29.0	NA	3.20	3.99	11.9	27.0	2.73	3.16	NA	4.00	NA	1350	152	3.92	26.0	152	3.41	6.02	6.38

Samples were all analyzed by GEL Laboratories, LLC in Charleston, SC

Four Rows:
1) Qualifier The laboratory data qualifers are designated by one or two letters to provide information about the reported results.
2) Result Results are the level of activity reported for the individual produced water sample.
3) Uncertainty (The margin of error, or range of activity, when added to the result.
4) MDC The laboratory minimum detectable concentration (MDC) for the analytical method.
If the result is less than the reporting limits the radionuclide is reported as 'not detected' (U).

The qualifiers used in the laboratory reports are listed below:
U - Result is less than the sample specific Minimum Detectable Concentration (MDC) or Minimum Detectable Activity (MDA), Method Detection Limit (MDL), Limits of Detection (LOD), total propogated uncertainty (TPU), or laboratory reporting limit (RL).
UI - Gamma Spectroscopy Uncertain Identification
NS - Not Sampled (Furr 16-22B was shut-in on April 14, 2009 and was not sampled)
NA - Not Analyzed
N/A - Not Applicable

Note: Values shown in blue represent a detection. The gamma emitting radionuclides that were detected are naturally occurring potassium-40 (^{40}K), lead-212 (^{212}Pb), lead-214 (^{214}Pb), and bismuth-214 (^{214}Bi) in a few of the samples.



Furr 16-22B & Furr 16-22D Quarterly Sampling – Garfield County Colorado

Legend:

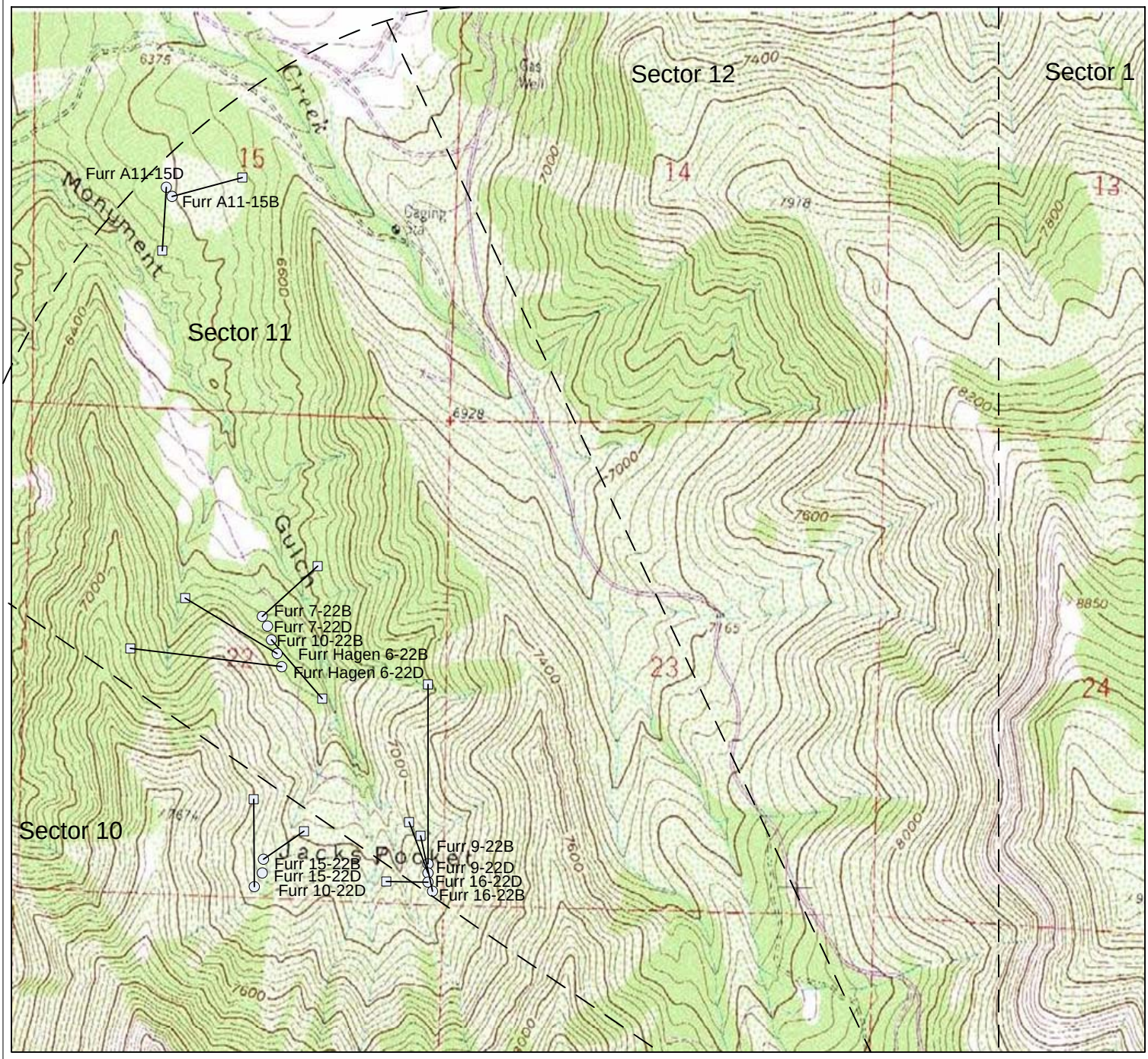
- Existing Laramie II Well
- Existing EnCana Well
- Existing Williams Well
- Existing Noble Well
- Project Rulison Well
- Project Rulison Lot 11
- 3 Mile Radius Tier II Zone Wells
- 1 Mile Radius – Tier I Zone Wells
- ½ Mile Radius
- 25 Section, Township, Range
- Monitoring Sectors (1 through 12)

N

0 0.5 1 Miles

Base Map Adapted from URS 3rd Quarter Report 2008 (November 2008)

PROJECT NO: 008-2362	Laramie Energy II Gas Well Locations Project Rulison Area	OLSSON ASSOCIATES	4690 Table Mountain Dr. #200 Golden, CO 80403 TEL 303.237.2072 FAX 303.237-2659	FIGURE
DRAWN BY: JWH				1
DATE: 10/23/09				



Furr 16-22B & Furr 16-22D Quarterly Sampling – Garfield County Colorado

PROJECT NO: 008-2362	Laramie Energy II Rulison Area Gas Wells	OLSSON ASSOCIATES	4690 Table Mountain Dr. #200 Golden, CO 80403 TEL 303.237.2072 FAX 303.237.2659	FIGURE
DRAWN BY: JWH				2
DATE: 10/23/09				

APPENDIX A

ISOTECH LABORATORIES INC.

SAMPLE RESULTS

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #:	165100	Job #:	11610
Sample Name/Number:	16-22D		
Company:	Cordilleran, Div. of Olsson Assoc.		
Date Sampled:	6/24/2009		
Container:	Steel tank		
Field/Site Name:	Laramie 2 Area Well Monitoring		
Location:	Furr Hagen		
Formation/Depth:			
Sampling Point:			
Date Received:	6/29/2009	Date Reported:	8/11/2009

Component	Chemical mol. %	Delta C-13 per mil	Delta D per mil	C-14 conc. pMC	Tritium TU
Carbon Monoxide	nd				
Hydrogen Sulfide	nd				
Helium	0.0038				
Hydrogen	0.0040				
Argon	nd				
Oxygen	0.0272				
Nitrogen	0.16				
Carbon Dioxide	2.88				
Methane	89.50			< 0.4	< 11.7
Ethane	5.15				
Ethylene	nd				
Propane	1.43				
Iso-butane	0.296				
N-butane	0.261				
Iso-pentane	0.0994				
N-pentane	0.0656				
Hexanes +	0.121				

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 1066
Specific gravity, calculated: 0.636

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. % Chemical analysis based on standards accurate to within 2%

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #:	165101	Job #:	11610
Sample Name/Number:	22-9-16		
Company:	Cordilleran, Div. of Olsson Assoc.		
Date Sampled:	6/24/2009		
Container:	Steel tank		
Field/Site Name:	Laramie 2 Area Well Monitoring		
Location:	Furr Hagen		
Formation/Depth:			
Sampling Point:			
Date Received:	6/29/2009	Date Reported:	8/11/2009

Component	Chemical mol. %	Delta C-13 per mil	Delta D per mil	C-14 conc. pMC	Tritium TU
Carbon Monoxide	nd				
Hydrogen Sulfide	nd				
Helium	0.0033				
Hydrogen	0.0040				
Argon	nd				
Oxygen	0.0144				
Nitrogen	0.10				
Carbon Dioxide	3.36				
Methane	89.07			< 0.5	< 12.8
Ethane	5.17				
Ethylene	nd				
Propane	1.42				
Iso-butane	0.297				
N-butane	0.263				
Iso-pentane	0.101				
N-pentane	0.0666				
Hexanes +	0.133				

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 1063
Specific gravity, calculated: 0.640

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. % Chemical analysis based on standards accurate to within 2%

ISOTECH®
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Water Analysis

Lab Number: 165053 Job Number: 11602

Submitter Sample Name: 16-22B

Submitter Sample ID:

Submitter Job #:

Company: Cordilleran, Div. of Olsson Assoc.

Field or Site: Laramie 2 Area Well Monitoring

Location: Furr Hagen

Depth/Formation:

Container Type: Plastic Bottle

Sample Collected: 6/24/2009 Results Reported: 7/16/2009

Delta D of water	na
Delta O-18 of water	na
Tritium content of water	< 13.7 TU
Delta C-13 of DIC	na
Carbon-14 content of DIC	na
Delta N-15 of nitrate	na
Delta O-18 of nitrate	na
Delta S-34 of sulfate	na
Delta O-18 of sulfate	na

Remarks:

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Water Analysis

Lab Number: 165054 Job Number: 11602

Submitter Sample Name: 16-22D

Submitter Sample ID:

Submitter Job #:

Company: Cordilleran, Div. of Olsson Assoc.

Field or Site: Laramie 2 Area Well Monitoring

Location: Furr Hagen

Depth/Formation:

Container Type: Plastic Bottle

Sample Collected: 6/24/2009 Results Reported: 7/16/2009

Delta D of water	na
Delta O-18 of water	na
Tritium content of water	< 12.0 TU
Delta C-13 of DIC	na
Carbon-14 content of DIC	na
Delta N-15 of nitrate	na
Delta O-18 of nitrate	na
Delta S-34 of sulfate	na
Delta O-18 of sulfate	na

Remarks:

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Water Analysis

Lab Number: 165055 Job Number: 11602

Submitter Sample Name: 22-9-16

Submitter Sample ID:

Submitter Job #:

Company: Cordilleran, Div. of Olsson Assoc.

Field or Site: Laramie 2 Area Well Monitoring

Location: Furr Hagen

Depth/Formation:

Container Type: Plastic Bottle

Sample Collected: 6/24/2009 Results Reported: 7/16/2009

Delta D of water	na
Delta O-18 of water	na
Tritium content of water	< 10.5 TU
Delta C-13 of DIC	na
Carbon-14 content of DIC	na
Delta N-15 of nitrate	na
Delta O-18 of nitrate	na
Delta S-34 of sulfate	na
Delta O-18 of sulfate	na

Remarks:

ISOTECH®
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Water Analysis

Lab Number: 165056 Job Number: 11602

Submitter Sample Name: Field Blank

Submitter Sample ID:

Submitter Job #:

Company: Cordilleran, Div. of Olsson Assoc.

Field or Site: Laramie 2 Area Well Monitoring

Location: Furr Hagen

Depth/Formation:

Container Type: Plastic Bottle

Sample Collected: 6/24/2009 Results Reported: 7/16/2009

Delta D of water	na
Delta O-18 of water	na
Tritium content of water	54.3 ± 3.8 TU
Delta C-13 of DIC	na
Carbon-14 content of DIC	na
Delta N-15 of nitrate	na
Delta O-18 of nitrate	na
Delta S-34 of sulfate	na
Delta O-18 of sulfate	na

Remarks:

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #:	165099	Job #:	11610
Sample Name/Number:	16-22B		
Company:	Cordilleran, Div. of Olsson Assoc.		
Date Sampled:	6/24/2009		
Container:	Steel tank		
Field/Site Name:	Laramie 2 Area Well Monitoring		
Location:	Furr Hagen		
Formation/Depth:			
Sampling Point:			
Date Received:	6/29/2009	Date Reported:	8/11/2009

Component	Chemical mol. %	Delta C-13 per mil	Delta D per mil	C-14 conc. pMC	Tritium TU
Carbon Monoxide	nd				
Hydrogen Sulfide	nd				
Helium	0.0033				
Hydrogen	0.0029				
Argon	nd				
Oxygen	0.0324				
Nitrogen	0.17				
Carbon Dioxide	3.00				
Methane	89.76			< 0.5	< 10.0
Ethane	4.86				
Ethylene	nd				
Propane	1.35				
Iso-butane	0.278				
N-butane	0.248				
Iso-pentane	0.0969				
N-pentane	0.0640				
Hexanes +	0.133				

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 1061
Specific gravity, calculated: 0.634

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. % Chemical analysis based on standards accurate to within 2%

APPENDIX B

GEL LABORATORIES LLC

SAMPLE RESULTS

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171 F 843.766.1178

www.gel.com

July 23, 2009

Mr. James Hix
Cordilleran Compliance Services
4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403

Re: Cordilleran Compliance Services, Inc
Work Order: 232413

Dear Mr. Hix:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on June 25, 2009. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4297.

Sincerely,

Joanne Harley for Amanda Rasco
Project Manager

Purchase Order: Signed Quote
Enclosures

Page: 1 of 1
Project #: 008-2362
GEL Quote #:
COC Number (1):
PO Number: 6

GEL Chain of Custody and Analytical Request

See www.gel.com for GEL's Sample Acceptance SOP

GEL Work Order Number: 232413

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: OLSSON ASSOCIATES - JAMES HIX Phone #: 303.237.2072

Project/Site Name: LARAMIE II AREA WELL MONITORING Fax #: 303.237.2659

Address: 4690 Table Mountain Drive, Suite 200, Golden CO 80403

Collected by: T. DOBRANSKY Send Results

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	Should this sample be considered: TSCA Regulated	Total number of containers	GAB; GAMMA, Sr-90, F99, Total U	Cl 36	<-- Preservative Type (6)
16-22B	6/24/09	1155		N	ML			3	X	X	
16-22D	6/24/09	1140		N	ML			3	X	X	
FIELD BLANK	6/24/09	1205		N	ML			3	X	X	
22-9-16	6/24/09	1250		N	ML			3	X	X	

Comments
Note: extra sample is required for sample specific QC

Page 2 of 44

TAT Requested: Normal: X Rush: _____ Specify: _____ (Subject to Surcharge) Fax Results: Yes / No

Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: *Are there any known hazards applicable to these samples? If so, please list the hazards*

Sample Collection Time Zone
Eastern Pacific
Central Other _____
Mountain

Chain of Custody Signatures

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1		6/24/09	1600		6/25/09	0945
2						
3						

Sample Shipping and Delivery Details

GEL PM: Amanda Rasco
Method of Shipment: Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined

2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite

3.) Field Filtered: For liquid matrices, indicate with a **- Y -** for yes the sample was field filtered or **- N -** for sample was not field filtered.

4.) Matrix Codes: **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, ML=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SL**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal

5.) Sample Analysis Requested: Analytical method requested (i.e. **8260B, 6010B/7470A**) and number of containers provided for each (i.e. *8260B* - 3, *6010B/7470A* - 1).

6.) Preservative Type: **HA** = Hydrochloric Acid, **NI** = Nitric Acid, **SH** = Sodium Hydroxide, **SA** = Sulfuric Acid, **AA** = Ascorbic Acid, **HX** = Hexane, **ST** = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: 11.12 C

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: CORD	**SDG/ARCOC/Work Order:** 232413
Received By: Ricky Albee	**Date Received:** 6/25/09

Suspected Hazard Information	**Yes**	**No**	*If Counts > x2 area background on samples not marked "radioactive", contact the Radiation Safety Group of further investigation.
COC/Samples marked as radioactive?		✓	Maximum Counts Observed*: 80 CPM
Classified Radioactive II or III by RSO?		✓	
COC/Samples marked containing PCBs?		✓	
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
Samples identified as Foreign Soil?		✓	

	Sample Receipt Criteria	**Yes**	**NA**	**No**	**Comments/Qualifiers (Required for Non-Conforming Items)**
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other (describe)
2	Samples requiring cold preservation within 0 ≤ 6 deg. C?		✓		Preservation Method: (ice bags) blue ice dry ice none other (describe) 11°, 12°
3	Chain of custody documents included with shipment?	✓			
4	Sample containers intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other (describe)
5	Samples requiring chemical preservation at proper pH?			✓	Sample ID's, containers affected and observed pH: 16-220 - gallons = pH 3 If Preservation added, Lot#:
6	VOA vials free of headspace (defined as < 6mm bubble)?		✓		Sample ID's and containers affected:
7	Are Encore containers present?			✓	(If yes, immediately deliver to Volatiles laboratory)
8	Samples received within holding time?	✓			Id's and tests affected:
9	Sample ID's on COC match ID's on bottles?	✓			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?	✓			Sample ID's affected:
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	COC form is properly signed in relinquished/received sections?	✓			

Comments: FedEx 9660 0451 3085 - 12°
9660 0451 3096 - 11°
* All samples except Field Blank are biphasic with thick layer of oil at top.

PM (or PMA) review: Initials _____ Date 6/25/09

Subject: Re: Samples received 6/25/09
From: Amanda Rasco <amanda.rasco@gel.com>
Date: Thu, 25 Jun 2009 15:42:58 -0400
To: James Hix <jhix@oaconsulting.com>

Thank you James. Per our conversation, we will decant off the oil layer and discard it. We will provide pricing for oil matrix for future reference. Let me knwo if you have any questions. Thanks!

James Hix wrote:

> Amanda,
>
> Please analyze the aqueous phase of the produced water samples for gamma spectroscopy (including ^85 Kr and ^137 Cs), gross alpha, gross beta, ^36 Cl, ^90 Sr, and ^99 Tc.
> James
>
> James W. Hix, PG|* ***Olsson Associates*** *
>
> 4690 Table Moutain Drive, Suite 200 | Golden, CO 80403 | jhix@oaconsulting.com <mailto:jameshix@cordcomp.com>
>
> TEL 303.237.2072 | CELL 303.589.1572 | FAX 303.237.2659
>
> OA Email Logo
>
> *From:* Amanda Rasco [mailto:amanda.rasco@gel.com]
> *Sent:* Thursday, June 25, 2009 10:44 AM
> *To:* James Hix
> *Cc:* Ann Skradski; LaToya Hughes
> *Subject:* Samples received 6/25/09
>
> James,
> All of the samples received today (with the exception of the Field Blank) have a thick oil layer. Do you want us to analyze both layers? Please let me know how you'd like us to proceed with this analysis. Let me know if you have any questions.
>
> Thanks,
> Amanda
>
> --
> ~~~~~~
>
> Amanda J. Rasco
> Project Manager
> GEL Laboratories, LLC
> 2040 Savage Road
> Charleston, SC (USA) 29407
> Direct: 843.769.7373
> Main: 843.556.8171 x4297
> Fax: 843.766.1178
> E-mail: Amanda.Rasco@gel.com
> Web: www.gel.com

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~~~~~~

Amanda J. Rasco
Project Manager
GEL Laboratories, LLC
2040 Savage Road
Charleston, SC (USA) 29407
Direct: 843.769.7373
Main: 843.556.8171 x4297
Fax: 843.766.1178
E-mail: Amanda.Rasco@gel.com
Web: www.gel.com
~~~~~~

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

CORD001 Cordilleron Compliance Services, Inc

Client SDG: 232413 GEL Work Order: 232413

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

UI Gamma Spectroscopy−−Uncertain identification

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the detection limit.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Amanda Rasco.

Reviewed by J M Hanley

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22B
Sample ID: 232413001
Matrix: Misc Liquid
Collect Date: 24−JUN−09 11:55
Receive Date: 25−JUN−09
Collector: Client

Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Actinium−228	U	11.6	+/−14.6	19.8		pCi/L		KXG3 07/02/09	1237	881902	1
Americium−241	U	−3.81	+/−16.1	27.2		pCi/L					
Antimony−124	U	−0.143	+/−4.82	8.14		pCi/L					
Antimony−125	U	3.25	+/−6.38	11.2		pCi/L					
Barium−133	U	−7.26	+/−3.46	4.99		pCi/L					
Barium−140	U	−19.4	+/−13.0	15.9		pCi/L					
Beryllium−7	U	−14.5	+/−20.0	31.7		pCi/L					
Bismuth−212	U	18.6	+/−19.0	34.2		pCi/L					
Bismuth−214	U	8.74	+/−8.05	10.9		pCi/L					
Cerium−139	U	−2.29	+/−2.40	3.81		pCi/L					
Cerium−141	U	1.36	+/−4.54	7.43		pCi/L					
Cerium−144	U	−7.7	+/−16.7	27.3		pCi/L					
Cesium−134	U	3.36	+/−2.62	5.04		pCi/L					
Cesium−136	U	0.283	+/−3.86	6.58		pCi/L					
Cesium−137	U	−0.784	+/−2.31	3.69	5.00	pCi/L					
Chromium−51	U	−1.22	+/−22.8	39.0		pCi/L					
Cobalt−56	U	0.205	+/−2.15	3.72		pCi/L					
Cobalt−57	U	1.31	+/−2.17	3.73		pCi/L					
Cobalt−58	U	−1.14	+/−2.01	3.22		pCi/L					
Cobalt−60	U	−1.26	+/−2.30	3.47		pCi/L					
Europium−152	U	2.57	+/−6.37	11.2		pCi/L					
Europium−154	U	−0.359	+/−5.55	9.15		pCi/L					
Europium−155	U	−2.93	+/−9.14	15.2		pCi/L					
Iridium−192	U	0.868	+/−2.31	4.05		pCi/L					
Iron−59	U	−1.35	+/−4.48	7.24		pCi/L					
Krypton−85	U	−911	+/−737	1160		pCi/L					
Lead−210	U	−65.5	+/−522	799		pCi/L					
Lead−212	U	2.59	+/−5.83	8.40		pCi/L					
Lead−214	U	9.75	+/−6.13	10.2		pCi/L					
Manganese−54	U	1.64	+/−2.15	3.95		pCi/L					
Mercury−203	U	−0.51	+/−2.55	4.35		pCi/L					
Neodymium−147	U	4.09	+/−24.1	41.0		pCi/L					
Neptunium−239	U	−15.1	+/−17.2	27.8		pCi/L					
Niobium−94	U	1.99	+/−2.05	3.72		pCi/L					
Niobium−95	U	0.896	+/−2.55	4.34		pCi/L					
Potassium−40		95.1	+/−26.1	41.7		pCi/L					
Promethium−144	U	−1.01	+/−2.28	3.60		pCi/L					
Promethium−146	U	−0.297	+/−2.95	4.95		pCi/L					

Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22B
Sample ID: 232413001
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Radium−228	U	11.6	+/−14.6	19.8		pCi/L					
Ruthenium−106	U	2.67	+/−20.1	33.8		pCi/L					
Silver−110m	U	0.102	+/−2.15	3.58		pCi/L					
Sodium−22	U	−0.128	+/−1.98	3.26		pCi/L					
Thallium−208	U	2.41	+/−3.01	4.34		pCi/L					
Thorium−230	U	−268	+/−2030	1890		pCi/L					
Thorium−234	U	−77	+/−149	231		pCi/L					
Tin−113	U	−3.23	+/−2.72	4.19		pCi/L					
Uranium−235	U	21.8	+/−18.7	28.8		pCi/L					
Uranium−238	U	−77	+/−149	231		pCi/L					
Yttrium−88	U	−2.46	+/−2.80	4.02		pCi/L					
Zinc−65	U	−5.41	+/−5.73	8.22		pCi/L					
Zirconium−95	U	1.65	+/−4.08	7.01		pCi/L					
Rad Gas Flow Proportional Counting											
GFPC, Chlorine−36 liquid "As Received"											
Chlorine−36	U	125	+/−136	229	100	pCi/L		DXM 07/22/09 2	1645	887147	2
GFPC, Gross A/B, liquid "As Received"											
Alpha		21.8	+/−13.3	20.2	5.00	pCi/L		DXF3 07/15/09	1253	884613	3
Beta		31.9	+/−11.6	18.1	5.00	pCi/L					
GFPC, Sr90, liquid "As Received"											
Strontium−90	U	−0.98	+/−0.861	1.93	2.00	pCi/L		JXR1 07/09/09	1102	882093	4
Rad Liquid Scintillation Analysis											
Liquid Scint Tc99, Liquid "As Received"											
Technetium−99	U	−8.79	+/−13.0	22.8	50.0	pCi/L		BXF1 07/13/09	0043	883037	5
Rad Total Uranium											
KPA, Total U, Liquid "As Received"											
Total Uranium	U	−0.0389	+/−0.0302	0.0766	1.00	ug/L		KXG3 07/15/09	1352	881905	6

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 901.1	
2	GL−RAD−A−033	
3	EPA 900.0	
4	EPA 905.0 Modified	
5	DOE EML HASL−300, Tc−02−RC Modified	
6	ASTM D 5174	

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22B
Sample ID: 232413001
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Potassium Chloride Carrier	GFPC, Chlorine−36 liquid "As Received"			93.9	(25%−125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			62.5	(25%−125%)
Technetium−99m Tracer	Liquid Scint Tc99, Liquid "As Received"			99.5	(15%−125%)

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22D
Sample ID: 232413002
Matrix: Misc Liquid
Collect Date: 24−JUN−09 11:40
Receive Date: 25−JUN−09
Collector: Client

Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Actinium−228	UI	0.00	+/−13.4	18.5		pCi/L		KXG3 07/02/09	1238	881902	1
Americium−241	U	4.88	+/−18.6	32.1		pCi/L					
Antimony−124	U	1.84	+/−5.43	9.49		pCi/L					
Antimony−125	U	−1.85	+/−5.60	9.05		pCi/L					
Barium−133	U	2.04	+/−2.80	4.43		pCi/L					
Barium−140	U	2.77	+/−11.1	18.6		pCi/L					
Beryllium−7	U	7.48	+/−17.5	29.9		pCi/L					
Bismuth−212	U	23.9	+/−17.0	32.2		pCi/L					
Bismuth−214	UI	0.00	+/−8.10	9.55		pCi/L					
Cerium−139	U	0.623	+/−2.02	3.35		pCi/L					
Cerium−141	U	0.679	+/−3.85	6.38		pCi/L					
Cerium−144	U	3.99	+/−14.2	23.8		pCi/L					
Cesium−134	U	−0.793	+/−2.85	4.43		pCi/L					
Cesium−136	U	−2.91	+/−4.31	6.48		pCi/L					
Cesium−137	U	0.326	+/−2.05	3.56	5.00	pCi/L					
Chromium−51	U	−3.56	+/−21.4	35.9		pCi/L					
Cobalt−56	U	−0.387	+/−1.99	3.26		pCi/L					
Cobalt−57	U	1.67	+/−1.81	3.13		pCi/L					
Cobalt−58	U	−0.27	+/−1.91	3.17		pCi/L					
Cobalt−60	U	1.11	+/−2.17	3.92		pCi/L					
Europium−152	U	−2.98	+/−6.66	10.0		pCi/L					
Europium−154	U	−2.66	+/−5.60	8.84		pCi/L					
Europium−155	U	4.97	+/−8.54	14.6		pCi/L					
Iridium−192	U	0.672	+/−2.03	3.51		pCi/L					
Iron−59	U	−3.15	+/−3.95	5.66		pCi/L					
Krypton−85	U	−942	+/−660	990		pCi/L					
Lead−210	U	415	+/−718	1270		pCi/L					
Lead−212	U	0.247	+/−5.19	6.93		pCi/L					
Lead−214	UI	0.00	+/−6.52	9.41		pCi/L					
Manganese−54	U	−0.416	+/−2.05	3.37		pCi/L					
Mercury−203	U	−1.31	+/−2.07	3.38		pCi/L					
Neodymium−147	U	−2.3	+/−21.6	35.0		pCi/L					
Neptunium−239	U	1.70	+/−13.8	23.0		pCi/L					
Niobium−94	U	−0.993	+/−1.99	3.23		pCi/L					
Niobium−95	U	−0.866	+/−2.15	3.48		pCi/L					
Potassium−40	U	33.1	+/−42.0	39.0		pCi/L					
Promethium−144	U	1.40	+/−1.95	3.52		pCi/L					
Promethium−146	U	−0.968	+/−2.71	4.36		pCi/L					

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22D
Sample ID: 232413002
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Radium−228	UI	0.00	+/−13.4	18.5		pCi/L					
Ruthenium−106	U	1.56	+/−16.6	28.7		pCi/L					
Silver−110m	U	−0.974	+/−1.92	3.11		pCi/L					
Sodium−22	U	−1.45	+/−2.05	3.12		pCi/L					
Thallium−208	U	3.03	+/−4.48	4.78		pCi/L					
Thorium−230	U	504	+/−3400	1970		pCi/L					
Thorium−234	U	−69.2	+/−173	267		pCi/L					
Tin−113	U	0.553	+/−2.72	4.61		pCi/L					
Uranium−235	U	−2.75	+/−19.0	25.9		pCi/L					
Uranium−238	U	−69.2	+/−173	267		pCi/L					
Yttrium−88	U	−0.959	+/−2.20	3.31		pCi/L					
Zinc−65	U	−3.13	+/−4.53	6.72		pCi/L					
Zirconium−95	U	−4.78	+/−4.59	6.11		pCi/L					
Rad Gas Flow Proportional Counting											
GFPC, Chlorine−36 liquid "As Received"											
Chlorine−36	U	70.4	+/−117	201	100	pCi/L		DXM 07/22/09 2	1646	887147	2
GFPC, Gross A/B, liquid "As Received"											
Alpha		27.1	+/−12.4	17.4	5.00	pCi/L		DXF3 07/15/09	1253	884613	3
Beta		61.7	+/−16.3	25.2	5.00	pCi/L					
GFPC, Sr90, liquid "As Received"											
Strontium−90	U	−0.586	+/−0.826	1.61	2.00	pCi/L		JXR1 07/09/09	1102	882093	4
Rad Liquid Scintillation Analysis											
Liquid Scint Tc99, Liquid "As Received"											
Technetium−99	U	−9.54	+/−16.1	28.0	50.0	pCi/L		BXF1 07/13/09	0135	883037	5
Rad Total Uranium											
KPA, Total U, Liquid "As Received"											
Total Uranium	U	0.00	+/−0.00	0.0766	1.00	ug/L		KXG3 07/15/09	1355	881905	6

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 901.1	
2	GL−RAD−A−033	
3	EPA 900.0	
4	EPA 905.0 Modified	
5	DOE EML HASL−300, Tc−02−RC Modified	
6	ASTM D 5174	

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 16−22D
Sample ID: 232413002
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Potassium Chloride Carrier	GFPC, Chlorine−36 liquid "As Received"			88.3	(25%−125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			71.2	(25%−125%)
Technetium−99m Tracer	Liquid Scint Tc99, Liquid "As Received"			81.2	(15%−125%)

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Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
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Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: Field Blank
Sample ID: 232413003
Matrix: Misc Liquid
Collect Date: 24−JUN−09 12:05
Receive Date: 25−JUN−09
Collector: Client

Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Actinium−228	U	−8.32	+/−8.01	11.9		pCi/L		KXG3 07/02/09	1238	881902	1
Americium−241	U	3.60	+/−12.5	19.1		pCi/L					
Antimony−124	U	0.111	+/−4.60	7.84		pCi/L					
Antimony−125	U	−2.66	+/−4.95	8.02		pCi/L					
Barium−133	U	−0.91	+/−2.56	4.26		pCi/L					
Barium−140	U	3.20	+/−10.4	17.7		pCi/L					
Beryllium−7	U	−4.91	+/−16.7	27.4		pCi/L					
Bismuth−212	U	5.91	+/−15.1	25.8		pCi/L					
Bismuth−214	U	4.43	+/−6.78	7.83		pCi/L					
Cerium−139	U	−0.423	+/−1.87	3.07		pCi/L					
Cerium−141	U	−0.568	+/−4.52	6.59		pCi/L					
Cerium−144	U	12.1	+/−14.9	24.8		pCi/L					
Cesium−134	U	−0.56	+/−2.02	3.36		pCi/L					
Cesium−136	U	−2.09	+/−3.46	5.38		pCi/L					
Cesium−137	U	1.43	+/−1.82	3.26	5.00	pCi/L					
Chromium−51	U	−8.03	+/−18.0	30.0		pCi/L					
Cobalt−56	U	−1.11	+/−1.87	2.98		pCi/L					
Cobalt−57	U	0.120	+/−1.88	3.17		pCi/L					
Cobalt−58	U	−1.26	+/−2.27	3.02		pCi/L					
Cobalt−60	U	0.371	+/−2.34	3.97		pCi/L					
Europium−152	U	−0.384	+/−5.78	9.85		pCi/L					
Europium−154	U	0.803	+/−5.26	8.95		pCi/L					
Europium−155	U	2.42	+/−7.63	13.1		pCi/L					
Iridium−192	U	−1.23	+/−1.88	3.10		pCi/L					
Iron−59	U	3.90	+/−3.71	7.00		pCi/L					
Krypton−85	U	−1010	+/−578	871		pCi/L					
Lead−210	U	−309	+/−329	492		pCi/L					
Lead−212	U	0.613	+/−4.61	7.21		pCi/L					
Lead−214	U	−0.377	+/−4.57	7.46		pCi/L					
Manganese−54	U	−0.0957	+/−1.81	3.07		pCi/L					
Mercury−203	U	−1.74	+/−2.71	3.68		pCi/L					
Neodymium−147	U	−23.8	+/−20.1	29.5		pCi/L					
Neptunium−239	U	6.22	+/−14.5	24.9		pCi/L					
Niobium−94	U	−0.303	+/−1.73	2.80		pCi/L					
Niobium−95	U	2.83	+/−2.26	4.13		pCi/L					
Potassium−40	UI	0.00	+/−27.1	29.0		pCi/L					
Promethium−144	U	−0.444	+/−1.98	3.20		pCi/L					
Promethium−146	U	−0.0827	+/−2.37	3.99		pCi/L					

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: Field Blank
Sample ID: 232413003
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Radium−228	U	−8.32	+/−8.01	11.9		pCi/L					
Ruthenium−106	U	1.73	+/−16.1	27.0		pCi/L					
Silver−110m	U	−0.887	+/−1.74	2.73		pCi/L					
Sodium−22	U	0.212	+/−1.87	3.16		pCi/L					
Thallium−208	U	1.56	+/−3.47	4.00		pCi/L					
Thorium−230	UI	0.00	+/−10600	1350		pCi/L					
Thorium−234	U	15.5	+/−128	152		pCi/L					
Tin−113	U	−0.823	+/−2.37	3.92		pCi/L					
Uranium−235	U	−0.877	+/−18.5	26.0		pCi/L					
Uranium−238	U	15.5	+/−128	152		pCi/L					
Yttrium−88	U	−0.723	+/−2.14	3.41		pCi/L					
Zinc−65	U	−0.977	+/−3.71	6.02		pCi/L					
Zirconium−95	U	3.86	+/−3.51	6.38		pCi/L					
Rad Gas Flow Proportional Counting											
GFPC, Chlorine−36 liquid "As Received"											
Chlorine−36		258	+/−158	256	100	pCi/L		DXM2 07/22/09	1646	887147	2
GFPC, Gross A/B, liquid "As Received"											
Alpha	U	−1.14	+/−1.63	4.26	5.00	pCi/L		DXF3 07/15/09	1253	884613	3
Beta	U	−1.12	+/−2.54	4.97	5.00	pCi/L					
GFPC, Sr90, liquid "As Received"											
Strontium−90	U	−0.498	+/−0.784	1.54	2.00	pCi/L		JXR1 07/13/09	1216	882093	4
Rad Liquid Scintillation Analysis											
Liquid Scint Tc99, Liquid "As Received"											
Technetium−99	U	−10.4	+/−12.6	22.1	50.0	pCi/L		BXF1 07/13/09	0228	883037	5
Rad Total Uranium											
KPA, Total U, Liquid "As Received"											
Total Uranium	U	0.00	+/−0.00	0.0766	1.00	ug/L		KXG3 07/15/09	1358	881905	6

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 901.1	
2	GL−RAD−A−033	
3	EPA 900.0	
4	EPA 905.0 Modified	
5	DOE EML HASL−300, Tc−02−RC Modified	
6	ASTM D 5174	

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
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Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: Field Blank
Sample ID: 232413003
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Potassium Chloride Carrier	GFPC, Chlorine−36 liquid "As Received"			74.7	(25%−125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			71.2	(25%−125%)
Technetium−99m Tracer	Liquid Scint Tc99, Liquid "As Received"			103	(15%−125%)

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
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Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 22−9−16
Sample ID: 232413004
Matrix: Misc Liquid
Collect Date: 24−JUN−09 12:50
Receive Date: 25−JUN−09
Collector: Client

Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Actinium−228	UI	0.00	+/−17.5	16.0		pCi/L		KXG3 07/02/09	1238	881902	1
Americium−241	U	−7.85	+/−5.75	8.49		pCi/L					
Antimony−124	U	−0.11	+/−5.97	10.1		pCi/L					
Antimony−125	U	1.08	+/−6.51	11.2		pCi/L					
Barium−133	U	1.47	+/−3.42	5.29		pCi/L					
Barium−140	U	4.08	+/−13.8	23.6		pCi/L					
Beryllium−7	U	−10.9	+/−23.3	37.8		pCi/L					
Bismuth−212	U	12.5	+/−21.1	36.9		pCi/L					
Bismuth−214	U	9.42	+/−8.32	12.4		pCi/L					
Cerium−139	U	−1.9	+/−2.06	3.26		pCi/L					
Cerium−141	U	0.752	+/−4.24	6.28		pCi/L					
Cerium−144	U	−7.86	+/−13.9	22.6		pCi/L					
Cesium−134	U	1.40	+/−3.34	5.94		pCi/L					
Cesium−136	U	3.40	+/−4.75	8.72		pCi/L					
Cesium−137	U	−1.36	+/−2.68	4.19	5.00	pCi/L					
Chromium−51	U	22.9	+/−22.7	41.1		pCi/L					
Cobalt−56	U	−0.561	+/−2.22	3.67		pCi/L					
Cobalt−57	U	−1.08	+/−1.98	2.97		pCi/L					
Cobalt−58	U	−1.94	+/−2.55	3.99		pCi/L					
Cobalt−60	U	0.580	+/−2.65	4.55		pCi/L					
Europium−152	U	0.102	+/−7.95	11.8		pCi/L					
Europium−154	U	−6.16	+/−8.04	11.9		pCi/L					
Europium−155	U	5.08	+/−7.50	13.0		pCi/L					
Iridium−192	U	−2.51	+/−2.35	3.76		pCi/L					
Iron−59	U	2.09	+/−5.68	9.96		pCi/L					
Krypton−85	UI	0.00	+/−604	1140		pCi/L					
Lead−210	U	−0.942	+/−57.6	94.2		pCi/L					
Lead−212	U	5.17	+/−6.75	9.10		pCi/L					
Lead−214	UI	0.00	+/−7.63	11.2		pCi/L					
Manganese−54	U	0.182	+/−2.48	4.27		pCi/L					
Mercury−203	U	−1.71	+/−2.81	4.33		pCi/L					
Neodymium−147	U	−19.8	+/−27.3	42.5		pCi/L					
Neptunium−239	U	−0.0838	+/−13.4	22.6		pCi/L					
Niobium−94	U	0.0467	+/−2.41	3.99		pCi/L					
Niobium−95	U	3.94	+/−2.78	5.25		pCi/L					
Potassium−40		62.6	+/−44.7	34.4		pCi/L					
Promethium−144	U	−0.737	+/−2.47	3.96		pCi/L					
Promethium−146	U	−1.41	+/−3.07	4.98		pCi/L					

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 22−9−16 Project: CORD00100
Sample ID: 232413004 Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
Gammaspec, Gamma, Liquid "As Received"											
Radium−228	UI	0.00	+/−17.5	16.0		pCi/L					
Ruthenium−106	U	1.13	+/−20.4	34.1		pCi/L					
Silver−110m	U	0.131	+/−2.45	4.09		pCi/L					
Sodium−22	U	−2.2	+/−2.86	4.24		pCi/L					
Thallium−208	U	1.37	+/−4.60	3.75		pCi/L					
Thorium−230	U	−828	+/−5300	837		pCi/L					
Thorium−234	U	−17.7	+/−57.2	96.1		pCi/L					
Tin−113	U	−1.27	+/−2.96	4.87		pCi/L					
Uranium−235	U	−21.5	+/−19.1	24.0		pCi/L					
Uranium−238	U	−17.7	+/−57.2	96.1		pCi/L					
Yttrium−88	U	0.0911	+/−3.03	5.16		pCi/L					
Zinc−65	U	−5.15	+/−6.71	9.02		pCi/L					
Zirconium−95	U	5.90	+/−4.85	8.95		pCi/L					
Rad Gas Flow Proportional Counting											
GFPC, Chlorine−36 liquid "As Received"											
Chlorine−36	U	168	+/−126	207	100	pCi/L		DXM 07/22/09 2	1646	887147	2
GFPC, Gross A/B, liquid "As Received"											
Alpha		20.8	+/−11.4	17.1	5.00	pCi/L		DXF3 07/15/09	1253	884613	3
Beta		35.5	+/−10.9	16.5	5.00	pCi/L					
GFPC, Sr90, liquid "As Received"											
Strontium−90	U	−0.318	+/−0.594	1.32	2.00	pCi/L		JXR1 07/09/09	1200	882093	4
Rad Liquid Scintillation Analysis											
Liquid Scint Tc99, Liquid "As Received"											
Technetium−99	U	3.11	+/−24.0	41.0	50.0	pCi/L		BXF1 07/13/09	0320	883037	5
Rad Total Uranium											
KPA, Total U, Liquid "As Received"											
Total Uranium	U	0.00	+/−0.00	0.0766	1.00	ug/L		KXG3 07/15/09	1400	881905	6

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 901.1	
2	GL−RAD−A−033	
3	EPA 900.0	
4	EPA 905.0 Modified	
5	DOE EML HASL−300, Tc−02−RC Modified	
6	ASTM D 5174	

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Certificate of Analysis

Company : Cordilleran Compliance Services
Address : 4690 Table Mountain Drive
Suite 200
Golden, Colorado 80403
Report Date: July 23, 2009
Contact: Mr. James Hix
Project: **Cordilleran Compliance Services, Inc**

Client Sample ID: 22−9−16
Sample ID: 232413004
Project: CORD00100
Client ID: CORD001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Surrogate/Tracer recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Potassium Chloride Carrier	GFPC, Chlorine−36 liquid "As Received"			97.6	(25%−125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			69.0	(25%−125%)
Technetium−99m Tracer	Liquid Scint Tc99, Liquid "As Received"			55.4	(15%−125%)

QC Summary

Report Date: July 23, 2009

Cordilleran Compliance Services
4690 Table Mountain Drive
Suite 200
Golden, Colorado
Contact: **Mr. James Hix**

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch 881902											
QC1201873000 232413001 DUP											
Actinium-228	U	11.6 +/-14.6	U	10.7 +/-12.9	pCi/L	8.36		N/A	KXG3	07/02/09	16:46
Americium-241	U	-3.81 +/-16.1	U	13.9 +/-19.5	pCi/L	351		N/A			
Antimony-124	U	-0.143 +/-4.82	U	3.25 +/-5.10	pCi/L	218		N/A			
Antimony-125	U	3.25 +/-6.38	U	-1.14 +/-5.05	pCi/L	417		N/A			
Barium-133	U	-7.26 +/-3.46	U	1.03 +/-2.88	pCi/L	266		N/A			
Barium-140	U	-19.4 +/-13.0	U	7.23 +/-10.9	pCi/L	438		N/A			
Beryllium-7	U	-14.5 +/-20.0	U	2.40 +/-18.8	pCi/L	279		N/A			
Bismuth-212	U	18.6 +/-19.0	U	-3.0 +/-15.5	pCi/L	277		N/A			
Bismuth-214	U	8.74 +/-8.05	U	1.25 +/-7.43	pCi/L	150		N/A			
Cerium-139	U	-2.29 +/-2.40	U	-1.15 +/-1.87	pCi/L	66.6		N/A			
Cerium-141	U	1.36 +/-4.54	U	-1.01 +/-3.66	pCi/L	1350		N/A			
Cerium-144	U	-7.7 +/-16.7	U	10.7 +/-13.9	pCi/L	1230		N/A			
Cesium-134	U	3.36 +/-2.62	U	-1.59 +/-2.83	pCi/L	561		N/A			
Cesium-136	U	0.283 +/-3.86	U	-0.751 +/-3.91	pCi/L	442		N/A			
Cesium-137	U	-0.784 +/-2.31	U	-1.86 +/-2.22	pCi/L	81.3		N/A			
Chromium-51	U	-1.22 +/-22.8	U	2.99 +/-18.7	pCi/L	475		N/A			
Cobalt-56	U	0.205 +/-2.15	U	1.00 +/-1.87	pCi/L	132		N/A			
Cobalt-57	U	1.31 +/-2.17	U	0.207 +/-1.87	pCi/L	145		N/A			
Cobalt-58	U	-1.14 +/-2.01	U	-1.77 +/-2.14	pCi/L	43.2		N/A			
Cobalt-60	U	-1.26	U	-0.587	pCi/L	73.2		N/A			

QC Summary

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
		+/-2.30		+/-2.00						
Europium-152	U	2.57	U	-1.46	pCi/L	724		N/A	KXG3	07/02/09 16:46
		+/-6.37		+/-6.71						
Europium-154	U	-0.359	U	1.31	pCi/L	351		N/A		
		+/-5.55		+/-5.06						
Europium-155	U	-2.93	U	7.67	pCi/L	448		N/A		
		+/-9.14		+/-8.21						
Iridium-192	U	0.868	U	-0.431	pCi/L	596		N/A		
		+/-2.31		+/-1.93						
Iron-59	U	-1.35	U	0.418	pCi/L	378		N/A		
		+/-4.48		+/-3.92						
Krypton-85	U	-911	U	-1900	pCi/L	70.5		N/A		
		+/-737		+/-736						
Lead-210	U	-65.5	U	43.1	pCi/L	971		N/A		
		+/-522		+/-686						
Lead-212	U	2.59	U	3.98	pCi/L	42.2		N/A		
		+/-5.83		+/-5.29						
Lead-214	U	9.75	UI	0.00	pCi/L	2.71		N/A		
		+/-6.13		+/-9.36						
Manganese-54	U	1.64	U	0.304	pCi/L	137		N/A		
		+/-2.15		+/-1.99						
Mercury-203	U	-0.51	U	-0.501	pCi/L	1.68		N/A		
		+/-2.55		+/-2.32						
Neodymium-147	U	4.09	U	4.81	pCi/L	16.1		N/A		
		+/-24.1		+/-22.0						
Neptunium-239	U	-15.1	U	14.9	pCi/L	29900		N/A		
		+/-17.2		+/-14.2						
Niobium-94	U	1.99	U	-2.06	pCi/L	12700		N/A		
		+/-2.05		+/-1.80						
Niobium-95	U	0.896	U	1.07	pCi/L	17.6		N/A		
		+/-2.55		+/-2.16						
Potassium-40		95.1		77.3	pCi/L	20.7		(0% - 100%)		
		+/-26.1		+/-42.2						
Promethium-144	U	-1.01	U	1.85	pCi/L	683		N/A		
		+/-2.28		+/-1.94						
Promethium-146	U	-0.297	U	2.42	pCi/L	256		N/A		
		+/-2.95		+/-2.64						
Radium-228	U	11.6	U	10.7	pCi/L	8.36		N/A		
		+/-14.6		+/-12.9						
Ruthenium-106	U	2.67	U	-18.4	pCi/L	268		N/A		
		+/-20.1		+/-17.4						
Silver-110m	U	0.102	U	2.12	pCi/L	182		N/A		
		+/-2.15		+/-2.03						
Sodium-22	U	-0.128	U	0.126	pCi/L	21200		N/A		

QC Summary

Workorder: 232413

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
		+/-1.98		+/-1.85						
Thallium-208	U	2.41	U	0.930	pCi/L	88.5		N/A	KXG3	07/02/09 16:46
		+/-3.01		+/-2.59						
Thorium-230	U	-268	U	-940	pCi/L	111		N/A		
		+/-2030		+/-6120						
Thorium-234	U	-77	U	50.8	pCi/L	974		N/A		
		+/-149		+/-221						
Tin-113	U	-3.23	U	0.919	pCi/L	359		N/A		
		+/-2.72		+/-2.58						
Uranium-235	U	21.8	U	-29.7	pCi/L	1310		N/A		
		+/-18.7		+/-17.4						
Uranium-238	U	-77	U	50.8	pCi/L	974		N/A		
		+/-149		+/-221						
Yttrium-88	U	-2.46	U	-1.88	pCi/L	26.9		N/A		
		+/-2.80		+/-2.81						
Zinc-65	U	-5.41	U	-1.81	pCi/L	99.8		N/A		
		+/-5.73		+/-4.76						
Zirconium-95	U	1.65	U	-0.068	pCi/L	217		N/A		
		+/-4.08		+/-4.56						
QC1201873002 LCS										
Actinium-228			U	40.0	pCi/L					07/02/09 13:59
				+/-35.1						
Americium-241	1240			1230	pCi/L		99.8	(75%-125%)		
				+/-214						
Antimony-124			U	2.69	pCi/L					
				+/-7.58						
Antimony-125			U	10.6	pCi/L					
				+/-23.8						
Barium-133			U	2.64	pCi/L					
				+/-10.2						
Barium-140			U	5.00	pCi/L					
				+/-26.0						
Beryllium-7			U	1.39	pCi/L					
				+/-71.9						
Bismuth-212			U	-16.2	pCi/L					
				+/-59.3						
Bismuth-214			U	13.2	pCi/L					
				+/-14.9						
Cerium-139			U	4.23	pCi/L					
				+/-6.40						
Cerium-141			U	0.244	pCi/L					
				+/-10.8						
Cerium-144			U	-29.7	pCi/L					
				+/-48.9						

QC Summary

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
Cesium-134			U	2.67 +/-9.33	pCi/L					
Cesium-136			U	-5.69 +/-15.3	pCi/L				KXG3	07/02/09 13:59
Cesium-137	438			429 +/-36.2	pCi/L		97.9	(75%-125%)		
Chromium-51			U	36.7 +/-60.9	pCi/L					
Cobalt-56			U	-3.48 +/-7.24	pCi/L					
Cobalt-57				30.6 +/-11.4	pCi/L					
Cobalt-58			U	4.96 +/-8.10	pCi/L					
Cobalt-60	538			494 +/-52.1	pCi/L		91.7	(75%-125%)		
Europium-152			U	-4.49 +/-23.2	pCi/L					
Europium-154			U	24.4 +/-19.4	pCi/L					
Europium-155			U	9.74 +/-25.8	pCi/L					
Iridium-192			U	-3.97 +/-7.25	pCi/L					
Iron-59			U	17.2 +/-20.5	pCi/L					
Krypton-85			U	-1180 +/-2100	pCi/L					
Lead-210			U	-689 +/-1790	pCi/L					
Lead-212			U	2.20 +/-13.8	pCi/L					
Lead-214			U	-8.58 +/-17.5	pCi/L					
Manganese-54			U	-5.18 +/-8.23	pCi/L					
Mercury-203			U	7.28 +/-7.39	pCi/L					
Neodymium-147			U	20.7 +/-54.3	pCi/L					
Neptunium-239			U	-4.94 +/-51.7	pCi/L					
Niobium-94			U	5.27 +/-6.90	pCi/L					
Niobium-95			U	-3.43	pCi/L					

QC Summary

Workorder: 232413

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
				+/-8.27						
Potassium-40			U	44.6	pCi/L				KXG3	07/02/09 13:59
				+/-49.6						
Promethium-144			U	-1.59	pCi/L					
				+/-6.61						
Promethium-146			U	2.59	pCi/L					
				+/-11.4						
Radium-228			U	40.0	pCi/L					
				+/-35.1						
Ruthenium-106			U	10.5	pCi/L					
				+/-67.2						
Silver-110m				20.8	pCi/L					
				+/-10.1						
Sodium-22			U	7.23	pCi/L					
				+/-7.03						
Thallium-208			U	1.13	pCi/L					
				+/-8.89						
Thorium-230			U	2550	pCi/L					
				+/-16600						
Thorium-234			U	-420	pCi/L					
				+/-491						
Tin-113			U	-3.53	pCi/L					
				+/-9.61						
Uranium-235			U	9.56	pCi/L					
				+/-48.3						
Uranium-238			U	-420	pCi/L					
				+/-491						
Yttrium-88			U	3.17	pCi/L					
				+/-4.60						
Zinc-65			U	-11.2	pCi/L					
				+/-22.3						
Zirconium-95			U	-2.91	pCi/L					
				+/-13.9						
QC1201872999 MB										
Actinium-228			U	2.89	pCi/L					07/22/09 05:27
				+/-8.58						
Americium-241			U	8.93	pCi/L					
				+/-13.9						
Antimony-124			U	-3.15	pCi/L					
				+/-5.28						
Antimony-125			U	1.49	pCi/L					
				+/-5.07						
Barium-133			U	-0.486	pCi/L					
				+/-2.39						

QC Summary

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
Barium-140			U	1.38 +/-21.4	pCi/L					
Beryllium-7			U	1.76 +/-19.5	pCi/L				KXG3	07/22/09 05:27
Bismuth-212			U	0.703 +/-13.9	pCi/L					
Bismuth-214			U	-3.09 +/-5.60	pCi/L					
Cerium-139			U	-0.543 +/-1.73	pCi/L					
Cerium-141			U	-0.914 +/-3.88	pCi/L					
Cerium-144			U	3.40 +/-11.6	pCi/L					
Cesium-134			U	-0.145 +/-2.16	pCi/L					
Cesium-136			U	3.73 +/-6.55	pCi/L					
Cesium-137			U	-1.66 +/-2.80	pCi/L					
Chromium-51			U	11.5 +/-22.6	pCi/L					
Cobalt-56			U	1.19 +/-2.21	pCi/L					
Cobalt-57			U	-0.0684 +/-1.48	pCi/L					
Cobalt-58			U	-1.49 +/-1.93	pCi/L					
Cobalt-60			U	0.0287 +/-1.78	pCi/L					
Europium-152			U	-3.97 +/-5.47	pCi/L					
Europium-154			U	2.10 +/-5.15	pCi/L					
Europium-155			U	-0.942 +/-6.22	pCi/L					
Iridium-192			U	-0.528 +/-1.92	pCi/L					
Iron-59			U	-1.15 +/-4.22	pCi/L					
Krypton-85			UI	0.00 +/-508	pCi/L					
Lead-210			U	436 +/-553	pCi/L					
Lead-212			U	0.912	pCi/L					

QC Summary

Workorder: 232413

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec										
Batch 881902										
				+/-5.02						
Lead-214			U	-1.63	pCi/L				KXG3	07/22/09 05:27
				+/-5.30						
Manganese-54			U	0.574	pCi/L					
				+/-1.75						
Mercury-203			U	0.00672	pCi/L					
				+/-2.37						
Neodymium-147			U	1.42	pCi/L					
				+/-37.7						
Neptunium-239			U	0.0869	pCi/L					
				+/-10.7						
Niobium-94			U	0.594	pCi/L					
				+/-1.79						
Niobium-95			U	1.68	pCi/L					
				+/-2.30						
Potassium-40			U	-3.17	pCi/L					
				+/-24.5						
Promethium-144			U	0.283	pCi/L					
				+/-1.85						
Promethium-146			U	1.16	pCi/L					
				+/-2.36						
Radium-228			U	2.89	pCi/L					
				+/-8.58						
Ruthenium-106			U	-2.02	pCi/L					
				+/-19.8						
Silver-110m			U	-3.12	pCi/L					
				+/-2.09						
Sodium-22			U	0.871	pCi/L					
				+/-1.82						
Thallium-208			U	-2.47	pCi/L					
				+/-2.73						
Thorium-230			U	-901	pCi/L					
				+/-5800						
Thorium-234			U	2.36	pCi/L					
				+/-127						
Tin-113			U	0.482	pCi/L					
				+/-2.34						
Uranium-235			U	7.53	pCi/L					
				+/-11.8						
Uranium-238			U	2.36	pCi/L					
				+/-127						
Yttrium-88			U	-0.627	pCi/L					
				+/-2.05						
Zinc-65			U	-0.366	pCi/L					

QC Summary

Workorder: **232413**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gamma Spec											
Batch 881902											
					+/-4.10						
Zirconium-95				U	2.86	pCi/L				KXG3	07/22/09 05:27
					+/-3.35						
Rad Gas Flow											
Batch 882093											
QC1201873412 232413004 DUP											
Strontium-90		U	-0.318	U	-0.287	pCi/L	0.00		N/A	JXR1	07/09/09 16:57
			+/-0.594		+/-0.388						
QC1201873414 LCS											
Strontium-90	65.1				75.0	pCi/L		115	(75%-125%)		07/09/09 16:57
					+/-4.27						
QC1201873411 MB											
Strontium-90				U	-0.409	pCi/L					07/09/09 12:00
					+/-0.641						
QC1201873413 232413004 MS											
Strontium-90	130	U	-0.318		87.5	pCi/L		67.2*	(75%-125%)		07/10/09 12:13
			+/-0.594		+/-6.64						
Batch 884613											
QC1201879377 232413004 DUP											
Alpha			20.8		20.8	pCi/L	0.115		(0% - 100%)	DXF3	07/15/09 12:54
			+/-11.4		+/-13.3						
Beta			35.5		62.2	pCi/L	54.7		(0% - 100%)		
			+/-10.9		+/-13.2						
QC1201879380 LCS											
Alpha	117				134	pCi/L		115	(75%-125%)		07/15/09 12:54
					+/-13.3						
Beta	390				404	pCi/L		104	(75%-125%)		
					+/-15.6						
QC1201879376 MB											
Alpha				U	-0.713	pCi/L					07/15/09 12:54
					+/-1.53						
Beta				U	2.81	pCi/L					
					+/-2.95						
QC1201879378 232413004 MS											
Alpha	1170		20.8		551	pCi/L		45.4*	(75%-125%)		07/15/09 12:54
			+/-11.4		+/-104						
Beta	3900		35.5		1340	pCi/L		33.4*	(75%-125%)		
			+/-10.9		+/-96.3						
QC1201879379 232413004 MSD											
Alpha	1170		20.8		374	pCi/L	38.4*	30.2*	(0%-20%)		07/15/09 12:54
			+/-11.4		+/-90.6						
Beta	3900		35.5		1610	pCi/L	18.3	40.3*	(0%-20%)		
			+/-10.9		+/-104						
Batch 887147											
QC1201885824 232413004 DUP											

QC Summary

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 887147										
Chlorine-36		U 168 +/-126	U	160 +/-156	pCi/L	5.05			N/A DXM2	07/22/09 16:50
QC1201885826 LCS										
Chlorine-36	47900			37800 +/-2030	pCi/L		79	(75%-125%)		07/23/09 08:47
QC1201885823 MB										
Chlorine-36			U	76.5 +/-141	pCi/L					07/22/09 16:50
QC1201885825 232413004 MS										
Chlorine-36	47900	U 168 +/-126		59600 +/-2490	pCi/L		124	(75%-125%)		07/22/09 15:15
Rad Liquid Scintillation										
Batch 883037										
QC1201875646 232413001 DUP										
Technetium-99		U -8.79 +/-13.0	U	-6.03 +/-13.1	pCi/L	0.00			N/A BXF1	07/13/09 05:07
QC1201875648 LCS										
Technetium-99	1300			1300 +/-36.3	pCi/L		100	(75%-125%)		07/13/09 06:53
QC1201875645 MB										
Technetium-99			U	0.511 +/-13.1	pCi/L					07/13/09 04:13
QC1201875647 232413001 MS										
Technetium-99	1300	U -8.79 +/-13.0		1260 +/-31.5	pCi/L		97.4	(75%-125%)		07/13/09 06:01
Rad Total U										
Batch 881905										
QC1201873014 232413002 DUP										
Total Uranium		U 0.00 +/-0.00	U	-0.0275 +/-0.00414	ug/L	0.00			N/A KXG3	07/15/09 14:05
QC1201873016 LCS										
Total Uranium	25.0			20.0 +/-1.59	ug/L		80.2	(75%-125%)		07/15/09 14:14
QC1201873017 LCS										
Total Uranium	2.50			2.16 +/-0.0755	ug/L		86.4	(75%-125%)		07/15/09 14:15
QC1201873013 MB										
Total Uranium			U	-0.0951 +/-0.00329	ug/L					07/15/09 14:03
QC1201873015 232413002 MS										
Total Uranium	25.0	U 0.00 +/-0.00		24.7 +/-2.03	ug/L		98.9	(75%-125%)		07/15/09 14:10

Notes:
The Qualifiers in this report are defined as follows:

** Analyte is a surrogate compound

QC Summary

Workorder: **232413**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

<	Result is less than value reported
>	Result is greater than value reported
A	The TIC is a suspected aldol-condensation product
B	For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
F	Estimated Value
H	Analytical holding time was exceeded
J	Value is estimated
M	M if above MDC and less than LLD
M	Matrix Related Failure
N/A	RPD or %Recovery limits do not apply.
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
UI	Gamma Spectroscopy--Uncertain identification
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

COMPANY − WIDE NONCONFORMANCE REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
13−JUL−09	Radiochemistry	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
GFPC	EPA 905.0 Modified	Liquid	CORD
Batch ID:	**Sample Numbers:**		
882093	See Below		

Potentially affected work order(s)(SDG): 232413

Application Issues:

Failed Recovery for MS/PS

Sample improperly preserved

Specification and Requirements Nonconformance Description:	NRG Disposition:
1. The matrix spike, 1201873413, did not meet recovery requirements due to the matrix being non−homogeneous. The sample matrix was a miscellaneous liquid.	1. Reporting results.
2. Sample 232413002 was received improperly preserved. The sample aliquot was acidified per client request.	2. Reporting results.

Originator's Name:

Mary Mizzell 13−JUL−09

Data Validator/Group Leader:

Layota Yom 13−JUL−09

COMPANY − WIDE NONCONFORMANCE REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
16−JUL−09	Radiochemistry	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
GFPC	EPA 900.0	Liquid	CORD
Batch ID:	**Sample Numbers:**		
884613	See Below		

Potentially affected work order(s)(SDG): 232413

Application Issues:

Failed Recovery for MS/PS

Sample improperly preserved

Failed Recovery for MSD/PSD

Specification and Requirements Nonconformance Description:	NRG Disposition:
1. The matrix spike, 1201879378, and matrix spike duplicate, 121879379, did not meet beta recovery requirements due to the matrix. Results were similar to previous prep.	1. Reporting results.
2. Sample 232413002 was received improperly preserved. Sample aliquot was preserved.	2. Reporting results.

Originator's Name:

Mary Mizzell 16−JUL−09

Data Validator/Group Leader:

Nat Long 16−JUL−09

COMPANY − WIDE NONCONFORMANCE REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
23−JUL−09	Radiochemistry	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
GFPC	GL−RAD−A−033	Liquid	CORD, URSC
Batch ID:	**Sample Numbers:**		
887147	See Below		

Potentially affected work order(s)(SDG): 232413,233616

Application Issues:

RDL less than MDA

Container scanning event for custody missed

Specification and Requirements Nonconformance Description:	NRG Disposition:
1. Samples 232413001, 232413002, 232413004, 233616001, 233616002, 1201885823 and 1201885824 did not meet the required detection limit due to reduced sample aliquots. Sample aliquots were reduced due to the matrix of the samples. The samples were counted for 500 minutes. 2. Samples 232413001, 232413002, 232413003, 232413004, 233616001, and 233616002 were not scanned into batch. Sample custody was maintained at all times.	1. Reporting results. 2. Reporting results. Analyst has been instructed on proper scanning procedure.

Originator's Name:

Nat Long 23−JUL−09

Data Validator/Group Leader:

Heather McCarty 23−JUL−09

Method/Analysis Information

Product:	**Gammaspec, Gamma, Liquid**
Analytical Method:	EPA 901.1
Analytical Batch Number:	881902

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201872999	Method Blank (MB)
1201873000	232413001(16-22B) Sample Duplicate (DUP)
1201873002	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 17.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volumes in this batch.

Designated QC
The following sample was used for QC: 232413001 (16-22B).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Sample 1201872999 (MB) was recounted due to a suspected blank false positive.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 714741 was generated due to Sample improperly preserved. 1. Sample 232413002 was received improperly preserved. Per client instruction, sample was preserved and then analyzed. 1. Reporting results.

Additional Comments
Additional comments were not required for this sample set.

Qualifier information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Data rejected due to high counting uncertainty.	Actinium-228	232413004	22-9-16
		Radium-228	232413004	22-9-16
UI	Data rejected due to low abundance.	Actinium-228	232413002	16-22D
		Bismuth-214	232413002	16-22D
		Krypton-85	232413004	22-9-16
			1201872999	MB for batch 881902
		Lead-214	232413002	16-22D
			232413004	22-9-16
			1201873000	16-22B(232413001DUP)
		Radium-228	232413002	16-22D
UI	Data rejected due to no valid peak.	Potassium-40	232413003	Field Blank
		Thorium-230	232413003	Field Blank

Method/Analysis Information

Product:	**GFPC, Gross A/B, liquid**
Analytical Method:	EPA 900.0
Analytical Batch Number:	884613

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201879376	Method Blank (MB)
1201879377	232413004(22-9-16) Sample Duplicate (DUP)
1201879378	232413004(22-9-16) Matrix Spike (MS)
1201879379	232413004(22-9-16) Matrix Spike Duplicate (MSD)
1201879380	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV# 12.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The discrimination settings are calibrated in beta discriminating mode to reduce beta to alpha crosstalk.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 232413004 (22-9-16).

QC Information
Samples 1201879378 (22-9-16) and 1201879379 (22-9-16) did not meet the alpha recovery requirement due to the matrix of the sample. The samples are similar in results.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Samples were reprepped due to low recovery.

Chemical Recoveries
All chemical recoveries meet the required acceptance limits for this sample set.

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 712086 was generated due to Failed Recovery for MS/PS, Sample improperly preserved and Failed Recovery for MSD/PSD. 1. The matrix spike, 1201879378, and matrix spike duplicate, 121879379, did not meet beta recovery requirements due to the matrix. Results were similar to previous prep. 2. Sample 232413002 was received improperly preserved. Sample aliquot was preserved. 1. Reporting results. 2. Reporting results.

Additional Comments
Additional comments were not required for this sample set.

Qualifier information

Manual qualifiers were not required.

Method/Analysis Information

Product:	**GFPC, Sr90, liquid**
Analytical Method:	EPA 905.0 Modified
Analytical Batch Number:	882093

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201873411	Method Blank (MB)
1201873412	232413004(22-9-16) Sample Duplicate (DUP)
1201873413	232413004(22-9-16) Matrix Spike (MS)
1201873414	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-004 REV# 13.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 232413004 (22-9-16).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Sample 1201873413 (22-9-16) was recounted due to low recovery. Sample 232413003 (Field Blank) was recounted due to a detector lock out condition.

Chemical Recoveries
All chemical recoveries meet the required acceptance limits for this sample set.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 710904 was generated due to Failed Recovery for MS/PS and Sample improperly preserved. 1. The matrix spike, 1201873413, did not meet recovery requirements due to the matrix being non-homogeneous. The sample matrix was a miscellaneous liquid. 2. Sample 232413002 was received improperly preserved. The sample aliquot was acidified per client request. 1. Reporting results. 2. Reporting results.

Additional Comments
Additional comments were not required for this sample set.

Qualifier information

Manual qualifiers were not required.

Method/Analysis Information

Product:	**GFPC, Chlorine-36 liquid**
Analytical Method:	GL-RAD-A-033
Analytical Batch Number:	887147

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201885823	Method Blank (MB)
1201885824	232413004(22-9-16) Sample Duplicate (DUP)
1201885825	232413004(22-9-16) Matrix Spike (MS)
1201885826	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-033 REV# 7.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 232413004 (22-9-16).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time

All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Sample 1201885826 (LCS) was recounted due to low recovery. Samples were reprepped due to high blank activity. Samples were reprepped due to low recovery.

Chemical Recoveries
All chemical recoveries meet the required acceptance limits for this sample set.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 714698 was generated due to RDL less than MDA and Container scanning event for custody missed. 1. Samples 232413001, 232413002, 232413004, 233616001, 233616002, 1201885823 and 1201885824 did not meet the required detection limit due to reduced sample aliquots. Sample aliquots were reduced due to the matrix of the samples. The samples were counted for 500 minutes. 2. Samples 232413001, 232413002, 232413003, 232413004, 233616001, and 233616002 were not scanned into batch. Sample custody was maintained at all times. 1. Reporting results. 2. Reporting results. Analyst has been instructed on proper scanning procedure.

Additional Comments
Samples 1201885824 (22-9-16), 1201885825 (22-9-16), 232413001 (16-22B), 232413002 (16-22D) and 232413004 (22-9-16) had high net weights due to natural chlorine interference. The samples were run without the addition of carrier in order to determine the interference. The net weights were adjusted accordingly. Sample 232413003 (Field Blank) has a activity that is greater than the MDA due to statistical variance. The sample was previously prepped twice with activity less than MDA. First prep result was 254.5283 pCi/L with a MDA of 361.4888 pCi/L. The second prep result was -360.7444 pCi/L with a MDA of 377.4564 pCi/L. The results are not reported due to QC failures. Sample 232413003 (Field Blank) was counted using gamma spectroscopy to verify result. The gamma spectroscopy results show no interference from silver or iodine. The gamma spectroscopy results are included in the raw data.

Qualifier information

Manual qualifiers were not required.

Method/Analysis Information

Product:	**Liquid Scint Tc99, Liquid**
Analytical Method:	DOE EML HASL-300, Tc-02-RC Modified
Analytical Batch Number:	883037

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201875645	Method Blank (MB)
1201875646	232413001(16-22B) Sample Duplicate (DUP)
1201875647	232413001(16-22B) Matrix Spike (MS)
1201875648	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-005 REV# 18.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 232413001 (16-22B).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Miscellaneous Information:

NCR Documentation

Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 714752 was generated due to Sample improperly preserved. 1. Sample 232413002 was received improperly preserved. Per client instruction, sample was preserved and then analyzed. 1. Reporting results.

Additional Comments
Additional comments were not required for this sample set.

Qualifier information

Manual qualifiers were not required.

Method/Analysis Information

Product:	**KPA, Total U, Liquid**
Analytical Method:	ASTM D 5174
Analytical Batch Number:	881905

Sample ID	Client ID
232413001	16-22B
232413002	16-22D
232413003	Field Blank
232413004	22-9-16
1201873013	Method Blank (MB)
1201873014	232413002(16-22D) Sample Duplicate (DUP)
1201873015	232413002(16-22D) Matrix Spike (MS)
1201873016	Laboratory Control Sample (LCS)
1201873017	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-023 REV# 14.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The calibration for Total Uranium is performed prior to each analysis and is located in the raw data section.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume in this batch.

Designated QC
The following sample was used for QC: 232413002 (16-22D).

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Sample Re-prep/Re-analysis
Samples 1201873014 (16-22D), 232413001 (16-22B), 232413002 (16-22D), 232413003 (Field Blank) and 232413004 (22-9-16) failed R2 and/or lifetime, were treated with a post-spike, and reanalyzed to test for quenching. No evidence of quenching was found, so initial results are reported.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following NCR was generated for this SDG:
NCR 714762 was generated due to Sample improperly preserved. 1. Sample 232413002 was received improperly preserved. Per client instruction, sample was preserved and then analyzed. 1. Reporting results.

Additional Comments
Additional comments were not required for this sample set.

Qualifier information

Manual qualifiers were not required.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the

data package.

The following data validator verified the information presented in this case narrative:

Reviewer/Date: Andrew G. McCarty 7/23/09

List of current GEL Certifications as of 23 July 2009

State	Certification
Arizona	AZ0668
Arkansas	88−0651
CLIA	42D0904046
California − NELAP	01151CA
Colorado	GEL
Connecticut	PH−0169
Dept. of Navy	NFESC 413
EPA Region 5	WG−15J
Florida − NELAP	E87156
Georgia	E87156 (FL/NELAP)
Georgia DW	967
Hawaii	N/A
ISO 17025	2567.01
Idaho	SC00012
Illinois − NELAP	200029
Indiana	C−SC−01
Kansas − NELAP	E−10332
Kentucky	90129
Louisiana − NELAP	03046
Maryland	270
Massachusetts	M−SC012
Nevada	SC00012
New Jersey − NELAP	SC002
New Mexico	FL NELAP E87156
New York − NELAP	11501
North Carolina	233
North Carolina DW	45709
Oklahoma	9904
Pennsylvania − NELAP	68−00485
South Carolina	10120001/10120002
Tennessee	TN 02934
Texas − NELAP	T104704235−07B−TX
U.S. Dept. of Agriculture	S−52597
Utah − NELAP	GEL
Vermont	VT87156
Virginia	00151
Washington	C1641

APPENDIX C

Furr 16-22B and Furr 16-22D WELL PRODUCTION DATA

COGIS - Monthly Well Production

PRODUCTION DATA REPORT -- GIS

API #:	**05-045-12741**	Location:	**SESE 22 7S 95W 6**
Field:	**WILDCAT**	Field Code:	**99999**
Facility Name:	**FURR**	Facility #:	**16-22 B**
Operator Name:	**LARAMIE ENERGY II, LLC**	Operator #:	**10232**

PRODUCTION YEAR: All

							OIL						Water Prod	Water (psig)	
							BOM	Produced	Sold	Adj.	EOM	Gravity		Tbg.	Csg.
Year	Month	Formation	Sidetrack	Well Status	Days Prod	Product	GAS						Water Disp. Code	Gas (psig)	
							Prod	Flared	Used	Shrinkage	Sold	BTU		Tbg.	Csg.
2007	Jul	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jan	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	May	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jun	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jul	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Aug	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Sep	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Oct	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Nov	WILLIAMS FORK - CAMEO	00	PR	28	Oil -> Gas ->	24,271	9		398	9 23,873	1,077	1,134 M		
2008	Dec	WILLIAMS FORK - CAMEO	00	PR	28	Oil -> Gas ->	9 30,197	86	49	1,062	46 29,135	54.6 1,077	2,541 M		
2009	Jan	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	46 25,263	80	81	847	45 24,416	54.5 1,072	1,523 M		
2009	Feb	WILLIAMS FORK - CAMEO	00	PR	23	Oil -> Gas ->	45 17,410	36	46	337	35 17,073	54.5 1,074	854 M		
2009	Mar	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	35 19,040	60	44	870	51 18,170	56.6 1,075	955 M		
2009	Apr	WILLIAMS FORK - CAMEO	00	PR	29	Oil -> Gas ->	51 15,316	44	43	215	52 15,101	54.9 1,093	606 M		
2009	May	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	52 15,023	28	41	340	39 14,683	53.6 1,092	584 M		
2009	Jun	WILLIAMS FORK - CAMEO	00	PR	30	Oil -> Gas ->	39 14,339	39	44		34 14,339	54.0 1,071	461 M		

COGIS - Monthly Well Production

PRODUCTION DATA REPORT -- GIS

API #:	**05-045-12611**	Location:	**SESE 22 7S 95W 6**
Field:	**WILDCAT**	Field Code:	**99999**
Facility Name:	**FURR**	Facility #:	**16-22 D**
Operator Name:	**LARAMIE ENERGY II, LLC**	Operator #:	**10232**

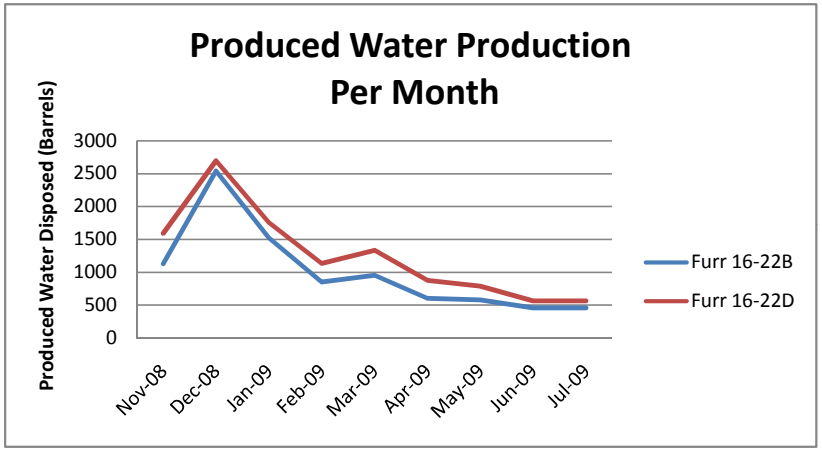
PRODUCTION YEAR: All

							OIL						Water Prod	Water (psig)	
							BOM	Produced	Sold	Adj.	EOM	Gravity		Tbg.	Csg.
Year	Month	Formation	Sidetrack	Well Status	Days Prod	Product	GAS						Water Disp. Code	Gas (psig)	
							Prod	Flared	Used	Shrinkage	Sold	BTU		Tbg.	Csg.
2007	Jul	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jan	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	May	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jun	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Jul	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Aug	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Sep	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Oct	WILLIAMS FORK - CAMEO	00	WO		Oil -> Gas ->									
2008	Nov	WILLIAMS FORK - CAMEO	00	PR	28	Oil -> Gas ->	34,070	13		559	13 33,511	1,077	1,592 M		
2008	Dec	WILLIAMS FORK - CAMEO	00	PR	28	Oil -> Gas ->	13 32,020	88	52	1,126	49 30,894	55.6 1,077	2,694 M		
2009	Jan	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	49 29,132	97	94	976	52 28,156	54.5 1,072	1,757 M		
2009	Feb	WILLIAMS FORK - CAMEO	00	PR	24	Oil -> Gas ->	52 23,124	57	62	448	47 22,676	54.5 1,074	1,134 M		
2009	Mar	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	47 26,621	85	61	1,217	71 25,404	56.6 1,075	1,335 M		
2009	Apr	WILLIAMS FORK - CAMEO	00	PR	30	Oil -> Gas ->	71 22,233	67	63	312	75 21,921	54.9 1,093	879 M		
2009	May	WILLIAMS FORK - CAMEO	00	PR	31	Oil -> Gas ->	75 20,276	33	55	459	53 19,817	53.6 1,092	789 M		
2009	Jun	WILLIAMS FORK - CAMEO	00	PR	30	Oil -> Gas ->	53 17,675	44	55		42 17,675	54.0 1,071	568 M		

Laramie Energy II, LLC
FURR 16-22 B and FURR 16-22D Gas Wells

	Produced Water (Barrels)													
Well Name	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
Furr 16-22B		1134	2541	1523	854	955	606	584	461	461					
Furr 16-22D		1592	2694	1757	1134	1335	879	789	568	569					

Data from the COGCC Online Database

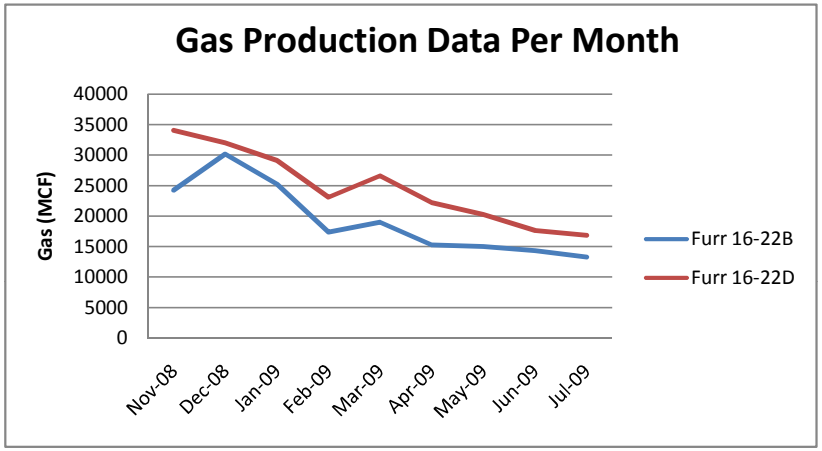


Laramie Energy II, LLC
FURR 16-22 B and FURR 16-22D Gas Wells

Gas Volumes in MCF

Well Name	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
Furr 16-22B		24271	30197	25263	17410	19040	15316	15023	14339	13307					
Furr 16-22D		34070	32020	29132	23124	26621	22233	20276	17675	16882					

Data from the COGCC Online Database



MCF - Thousand Cubic Feet

APPENDIX D

DATA VERIFICATION AND VALIDATION REPORT

RADIOCHEMISTRY DATA QUALITY REVIEW REPORT
Gas Flow Proportional Counting (GFPC) and Liquid Scintillation (LSC),
Uranium in Water by Pulsed-Laser Phosphorimetry (ASTM-D-5174)

SDG: 232413 (GEL)

PROJECT: Garfield County CO, Rulison Project for Olsson Assoc. Golden CO

LABORATORY: GEL Laboratories, LLC, Charleston, South Carolina

SAMPLE MATRIX: Water

SAMPLING DATE (Mo/Yr): June, 2009

NO.SAMPLES: 4, including 1 field blank

ANALYSES REQUESTED: GEL: GFPC for Cl-36, gross alpha/beta, and Sr-90; LSC for Tc-99, Total U by PLP.

SAMPLE NUMBERS: 16-22B, 16-22D, 22-9-16, Field Blank

DATA REVIEWER: John Huntington_____

QA REVIEWER: Diane Short & Associates, Inc.____INITIALS/DATE:_____

Telephone Logs included Yes____ No __X___

Contractual Violations Yes____ No __X___

The project Quality Assurance Project Plan (QAPP), the EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, 2004, the laboratory Standard Operating Procedure (SOP), and the EPA Radiochemistry Methods (current updates) have been referenced by the reviewer to perform this data validation review. The review includes evaluation of calibration, holding times and QC for all samples and a 10% review of the calculation algorithms. General comments regarding the data/ analytical quality are part of the review when raw data are submitted. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of the project Manager.

I. DELIVERABLES

All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes ___X_ No___
The following is noted:
The GEL Laboratories data package did not include raw data. Only summary QC results were provided. Gross alpha/beta was determined using EPA 900.0, Cl-36 by GL-RAD-A-033, Sr-90 by EPA 905.0, Tc-99 by DOE EML HASL-300, Tc-02-RC Modified, and total uranium by ASTM D-5174.

For the GEL data, a Level II review is conducted.

Please note: In addition to these data, tritium results from Isotech laboratories was reported. Only sample results were present with no QC. Therefore, it was not possible to validate the Isotech data.

II. ANALYTICAL REPORT FORMS

1. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes _X___ No____

2. Holding Times
A. The contract holding times were met for all analyses.
Yes __X__ No____

B. Samples were properly preserved, or applicable preservative was used.
Yes _X___ No____
Sample 16-22D was received at a pH of 3. The sample containers were pre-preserved but the buffering capacity of the water (these are production water from gas wells) was such that the resulting pH was above 2. The laboratory added preservative to bring the sample pH into the acceptance range. This is permissible per 40CFR and should have no impact on the results. No qualifiers are added.

In addition, the samples were received at 11 and 12 deg C. The laboratory notes this in the sample receiving documentation. However, chilling to < 6 deg C is not required for radiological testing by 40 CFR. No qualifiers are applied.

The laboratory noted that all samples except the field blank contained a thick layer of a light nonaqueous phase liquid (LNAPL). They requested guidance from the client and were instructed to decant the oil phase and analyze the aqueous phase only. Thus the analytical results pertain only to that phase of the sample.

3. Chains of Custody (COC)
A. Chains of Custody (COC) were reviewed and all fields were complete, signatures were present and cross outs were clean and initialed.
Yes __X__ No ____

III. CALIBRATION AND STANDARDIZATION

1. Daily counting efficiency (Base Efficiency) for all methods was achieved.
Yes _____ No____ NA__X__
The GEL Laboratories data package did not include the raw data.

2. The calibration data include a plot of the counting efficiency obtained versus the various weights of salts spiked with a known DPM of the standard; The "best fit" curve or a computer fit equation with the estimated standard deviation meet the method calibration criteria. At least one complete self-absorption curve exists for one detector per array and the efficiency for the standard curve of $\geq$ 3 standards agree within 95% confidence level.
Yes _____ No_____ NA __X__
GEL data: This documentation is not part of the data package.

3. Reliability of the daily QC check standards are within a 2 to 3 sigma control limit of the mean count of long term counting
Yes ____ No_____ NA__X__
GEL data: Calibration documentation is not part of the data package.

4. The most recent background count duration is at least as long as the sample duration and this background total is within 99% confidence level or 2 to 3 sigma of the average of the last ten background checks on that detector.
Yes _____ No_____ NA__X__
Durations are not part of the data package.

5. The attenuation was with the (beta x r2) limits as appropriate to the method.
Yes _____ No ____ NA_X_
Not part of the data package.

6. There is documentation to verify that the standards are NIST traceable or the equivalent.
Yes _____ No_____ NA__X__
GEL data: This documentation is not part of the data package.

7. Quench factors were reported and noted as acceptable.
Yes ____ No____ NA__X__
GEL: Quench factors are not reported as part of the data package.

IV. DETECTION AND REPORTING LIMITS

1. Minimal detection concentrations (MDC) with efficiencies were established for all analytes every six months or whenever a significant background or instrument response is expected (e.g., detector change).
Yes ___X___ No _____ NA_____
Gross Alpha/Beta, GEL: The observed MDC (DL) is higher than the normal MDC (RL). Previous results have included comments that this occurs due to a non-homogeneous matrix (oily liquid). In

this case there are detected levels of gross alpha and beta. No qualification is required.

Cl-36, GEL: for the Cl-36 analysis the laboratory provides a nonconformance report stating that the RDL is less than MDA due to reduced aliquots. No qualification is applied.

2. The laboratory reported the results with uncertainties that included all uncertainties associated with the preparation and analytical procedures.
Yes __X_ No____
Samples where uncertainties are greater than the result or the result has been reported as estimated "J" may have unrealistically low MDC values. The uncertainties are multiplied by 1.65. If the result is greater than the reported MDC, the isotope has been qualified UJQ for an unrealistically low MDC. If the value calculated is less than the reported MDA, the activity result is qualified JQ estimated below the MDC.

No such instances are observed and no qualifiers are applied.

V. MATRIX SPIKE
1. Matrix spike (MS) was analyzed for every analysis performed and for every 20 samples or for every matrix whichever is more frequent.
Yes _X__ No ____
Gross alpha/beta – GEL: An MS/MSD is reported on sample 22-9-16.
Sr-90 – GEL: A matrix spike was conducted on sample 22-9-16.
Cl-36 – GEL: A matrix spike was conducted on sample 22-9-16.
Tc-99 – GEL: A matrix spike was conducted on sample 16-22B.
Total Uranium: A matrix spike was analyzed on sample 16-22D.

2. The MS percent recoveries were within the limits defined in the contract or a guidance limit of 75-125%.
Yes ____ No _X___
Gross alpha/beta – GEL: The MS recovery for alpha was 45.4%, 38.4% for the MSD.
The MS recovery for beta was 33.4%, 40.3% for the MSD. The parent sample for gross alpha/beta is qualified as JMS38 for alpha, JMS33 for beta.
Sr-90 – GEL: There was a low MS recovery at 67.2%. The parent sample is qualified as JMS67.
Gross alpha/beta – GEL: The recovery was in control.
Cl-36 – GEL: The recovery was in control.
Total Uranium: The recovery was in control.

3. The samples used for qualification are client samples.
Yes __X_ No___

VI. MATRIX DUPLICATE
1. The matrix spike duplicate relative percent difference of the percent recoveries were within the limits defined in the contract or the CLP 20% for water and 35% for soil, or $\pm$ RL for results < 5 x RL ($\pm$ 2x RL for soils).

Yes ____ No __X___ NA_____
Matrix duplicates were analyzed using the same samples as were used for the matrix spikes.

Gross alpha/beta – GEL: The matrix duplicate for alpha is in control. The RPD for the gross beta is 55% and the DER is 2.53. The sample and the matrix duplicate have levels that are less than 5x the RL, and the absolute difference of the results is > 2x RL. Therefore the parent sample is qualified as JD to indicate that the precision of this analysis may be out of normal limits on this sample.
Sr-90 – GEL: The matrix duplicate is in control.
Cl-36 – GEL: The matrix duplicate is in control.
Tc-99 – GEL: The matrix duplicate is in control.
Total Uranium: The matrix duplicate is in control.

2. Or met the Duplicate Error Ratio (DER) criteria calculations which account for the 2 sigma efficiency values. DER limit is 1.
Yes ____ No __X__ NA ____
See DER note above.

VII. LABORATORY CONTROL SAMPLE
1. Laboratory Control Sample (LCS) was analyzed for every analysis performed and for every 20 samples or for every matrix, whichever is more frequent
Yes __X__ No____

2. The LCS %R for each analyte (background corrected) met the established control limits or the method limits of 75-125%.
Yes __X__ No ____

3. The LCSD %R for each analyte (background corrected) met the established control limits or the method limits of 75-125%.
Yes ____ No ____ NA__X__
LCSDs are not reported.

4. The duplicate relative percent difference of the percent recoveries were within the limits.
Yes ____ No _____ NA__X__

VIII. BLANKS
1. Low-level activities of isotopes were reported for laboratory preparation blanks and met the MDC or background CPM criteria
Yes _X__ No_____
For LSC methods, the MDC of the prep blank shall be less than the calibration MDC or the sample MDC whichever is reported. If all sample results in a batch are reported as detected, then the prep blank MDC must be less than the activity of the lowest MDC in the batch.

For the GFPC methods, if a sample activity is < 5 x MDC, the activity of the prep blank shall be

equivalent to zero when the measurement uncertainty is considered or shall be less than the MDC. If the sample activity is > 5 x MDC, the activity of the prep blank shall be equivalent to zero when the measurement uncertainty is considered. This is determined from the Normalized Absolute Difference (NAD).

The impact of the blank contamination may be evaluated where appropriate by calculating the Normalized Absolute Difference (NAD) for the Method Blank and subsequent evaluation criteria as defined in the Army Corp. guidance section III and elsewhere. When the NAD is found to be greater than 1.96 but less than 2.58, the sample results are qualified JMB# where # represents the isotopes blank activity. Such results are considered to be estimated and possibly undetected values due to the presence of blank contamination.

GEL, gross alpha/beta: The GEL report provides results for the method blank but does not provide an MDC. MCD levels are provided for samples, and no sample result is >5x MDC. The method blank is reported as a non-detect. Therefore no qualifications are required for method blank levels.
GEL, Sr-90: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Cl-36: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Tc-99: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Total U: Uranium is not detected in these samples. The results for the method blank are reported as a non-detect. No qualifiers are required. Samples do show detected levels of total uranium.

NOTE: One of the samples is a field blank, and no analytes are detected. No qualifiers are added due to field blank outliers.

2. The cross talk summary was acceptable and indicated no interferences
Yes ___ No_____ NA__X__
This information is not available in the GEL data packages.

IX. CHEMICAL YIELD SUMMARY
Chemical Yield (Tracer) Summary was analyzed to monitor the accuracy of percent samples recoveries and the percent recoveries were within the control limits.
Yes __X__ No ____ NA ____
GEL: Chemical yield recoveries are reported for Cl-36, Sr-90, and Tc-99. The recoveries reported are within limits.

X. FIELD QC
1. If Field duplicates or Performance Check Compounds were identified, they met the RPD or % recovery criteria for the project. Guidelines of 35% RPD for water were used unless the reported results are < 5 x Reporting Limit (RL) in which case 2 x RL difference is acceptable.

Yes __X_ No____ NA ____
Sample ID 22-9-16 is a field duplicate for the 16-22D sample. The RPD for gross beta was 53% but the result was < 5x RL and the absolute difference is < 2RL. Therefore the field duplicate is in control for this parameter. All others are fully in control.

2. For low level data, the following DER calculations can be applied.
The Normalized Absolute Difference for isotopes with activities ≤ 5X the MDC is considered for data validation rather than the Relative Percent Difference (RPD). If the NAD calculated is 1.96 < x > 3.29 the results for all samples have been qualified JD# where # represents the NAD calculated. If the NAD calculated were greater than 3.29 the results would be rejected. If the results are less than 1.96 no qualification has been made. Where results are greater than 5X the MDC the RPD is considered for data validation.
Yes___ No___ NA__X_

XI. CALCULATIONS
The calculation algorithm has been checked for 10% of the submitted data packages and accuracy of the reported results is verified.
Yes _____ No _____ NA__X__
Data for calculation checks are not provided in the GEL data package.

XII. OVERALL ASSESSMENT OF THE CASE
The data are considered fully useable for project purposes with consideration of the follow qualification or comments.

Deliverables
The following is noted:
The GEL Laboratories data package did not include raw data. Only summary QC results were provided. Gross alpha/beta was determined using EPA 900.0, Cl-36 by GL-RAD-A-033, Sr-90 by EPA 905.0, Tc-99 by DOE EML HASL-300, Tc-02-RC Modified, and total uranium by ASTM D-5174.

For the GEL data, a Level II review is conducted.

Please note: In addition to these data, tritium results from Isotech laboratories was reported. Only sample results were present with no QC. Therefore, it was not possible to validate the Isotech data.

Sample preservation and Chain of Custody
Sample 16-22D was received at a pH of 3. The sample containers were pre-preserved but the buffering capacity of the water (these are production water from gas wells) was such that the resulting pH was above 2. The laboratory added preservative to bring the sample pH into the acceptance range. This is permissible per 40CFR and should have no impact on the results. No qualifiers are added.

In addition, the samples were received at 11 and 12 deg C. The laboratory notes this in the sample

receiving documentation. However, chilling to < 6 deg C is not required for radiological testing by 40 CFR. No qualifiers are applied.

The laboratory noted that all samples except the field blank contained a thick layer of a light nonaqueous phase liquid (LNAPL). They requested guidance from the client and were instructed to decant the oil phase and analyze the aqueous phase only. Thus the analytical results pertain only to that phase of the sample.

Detection and Reporting Limits:
Gross Alpha/Beta, GEL: The observed MDC (DL) is higher than the normal MDC (RL). Previous results have included comments that this occurs due to a non-homogeneous matrix (oily liquid). In this case there are detected levels of gross alpha and beta. No qualification is required.

Cl-36, GEL: for the Cl-36 analysis the laboratory provides a nonconformance report stating that the RDL is less than MDA due to reduced aliquots. No qualification is applied.

Matrix Spikes
Gross alpha/beta – GEL: An MS/MSD is reported on sample 22-9-16. The MS recovery for alpha was 45.4%, 38.4% for the MSD. The MS recovery for beta was 33.4%, 40.3% for the MSD. The parent sample for gross alpha/beta is qualified as JMS38 for alpha, JMS33 for beta.
Sr-90 – GEL: A matrix spike was conducted on sample 22-9-16. There was a low MS recovery at 67.2%. The parent sample is qualified as JMS67.
Cl-36 – GEL: A matrix spike was conducted on sample 22-9-16. The recovery was in control.
Tc-99 – GEL: A matrix spike was conducted on sample 16-22B. The recovery was in control.
Total Uranium: A matrix spike was analyzed on sample 16-22D. The recovery was in control.

Matrix Duplicate
Matrix duplicates were analyzed using the same samples as were used for the matrix spikes.

Gross alpha/beta – GEL: The matrix duplicate for alpha is in control. The RPD for the gross beta is 55% and the DER is 2.53. The sample and the matrix duplicate have levels that are less than 5x the RL, and the absolute difference of the results is > 2x RL. Therefore the parent sample is qualified as JD to indicate that the precision of this analysis may be out of normal limits on this sample.
Sr-90 – GEL: The matrix duplicate is in control.
Cl-36 – GEL: The matrix duplicate is in control.
Tc-99 – GEL: The matrix duplicate is in control.
Total Uranium: The matrix duplicate is in control.

Preparation Blanks
For LSC methods, the MDC of the prep blank shall be less than the calibration MDC or the sample MDC whichever is reported. If all sample results in a batch are reported as detected, then the prep blank MDC must be less than the activity of the lowest MDC in the batch.

For the GFPC methods, if a sample activity is < 5 x MDC, the activity of the prep blank shall be equivalent to zero when the measurement uncertainty is considered or shall be less than the MDC. If the sample activity is > 5 x MDC, the activity of the prep blank shall be equivalent to zero when the measurement uncertainty is considered. This is determined from the Normalized Absolute Difference (NAD).

The impact of the blank contamination may be evaluated where appropriate by calculating the Normalized Absolute Difference (NAD) for the Method Blank and subsequent evaluation criteria as defined in the Army Corp. guidance section III and elsewhere. When the NAD is found to be greater than 1.96 but less than 2.58, the sample results are qualified JMB# where # represents the isotopes blank activity. Such results are considered to be estimated and possibly undetected values due to the presence of blank contamination.

GEL, gross alpha/beta: The GEL report provides results for the method blank but does not provide an MDC. MCD levels are provided for samples, and no sample result is >5x MDC. The method blank is reported as a non-detect. Therefore no qualifications are required for method blank levels.
GEL, Sr-90: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Cl-36: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Tc-99: Sample results are all non-detects and the method blank is reported as a non-detect. No qualifications are required.
GEL, Total U: Uranium is not detected in these samples. The results for the method blank are reported as a non-detect. No qualifiers are required. Samples do show detected levels of total uranium.

Field Blanks
One of the samples is a field blank, and no analytes are detected. No qualifiers are added due to field blank outliers.

Field Duplicates
Sample ID 22-9-16 is a field duplicate for the 16-22D sample. The RPD for gross beta was 53% but the result was < 5x RL and the absolute difference is < 2RL. Therefore the field duplicate is in control for this parameter. All others are fully in control.

RADIOCHEMISTRY QUALITY REVIEW REPORT
GAMMA SPECTROMETRY

SDG: 232413 (GEL)

PROJECT: Garfield County CO, Rulison Project for Olsson Assoc. Golden CO

LABORATORY: GEL Laboratories, LLC, Charleston, South Carolina

SAMPLE MATRIX: Water

SAMPLING DATE (Mo/Yr): June, 2009

NO.SAMPLES: 4, including 1 field blank

ANALYSES REQUESTED**:** Ac-228, Ag-110m, Am-241, Ba-133, Ba-140, Be-7, Bi-212, Bi-214, Ce-139, Ce-141, Ce-144, Co-56, Co-57, Co-58, Co-60, Cr-51, Cs-134, Cs-136, Cs-137, Eu-152, Eu-154, Eu-155, Fe-59, Fe-59, Hg-203, K-40, Kr-85, Mn-54, Na-22, Nb-94, Nb-95, Nd-117, Np-239, Pb-210, Pb-212, Pb-214, Pm-144, Pm-146, Ra-228, Ru-106, Sb-124, Sb-125, Sn-113, Th-230, Th-234, Tl-208, U-235, U-238, Y-88, Zn-65, Zr-95

SAMPLE NUMBERS: 16-22B, 16-22D, 22-9-16, Field Blank

DATA REVIEWER: John Huntington

QA REVIEWER Diane Short & Associates, Inc. Initials/ Date

Telephone Logs included Yes____ No _X___

Contractual Violations Yes____ No __X__

The project Quality Assurance Project Plan (QAPP), the EPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, (SOP), the EPA method 901.1 and the Paragon Standard Operating Procedure SOPS noted in the report have been used by the reviewer to perform this data validation review. Only a limited number of the Data Validation QC items apply to radiochemical analyses. The remaining QC items have been taken from the Paragon Method QC. The EPA qualifiers have been expanded to include a descriptor code and value to define QC violations and their values, per the approval of EPA. All chains of custody, calibrations, QC Forms have been validated and qualifiers added from the QC data on the Forms and an overview of the raw data.

I. DELIVERABLES

A. All deliverables were present as specified in the Statement of Work (SOW) or in the project contract.
Yes ___X_ No___
The following is noted:
The GEL Laboratories data package did not include raw data. Only summary QC results were provided. The method used is EPA 901.1
For the GEL data, a Level II review is conducted.

B. The Analytical Report or Data Sheets are present and complete for all requested analyses.
Yes _X___ No____

II. INSTRUMENTATION

A. The detector range is appropriate for the samples being analyzed.
Yes ___ No___ NA _X_
Not part of this review level.

B. The system resolution is within the 1332 KeV range for Co-60.
Yes ___ No___ NA _X_
Not part of this review level.

C. The resolution is within the 3 KeV range for Co-60.
Yes ___ No___ NA _X_
Not part of this review level.

III. STANDARDS

A. Standards were NIST traceable or equivalent.
Yes ___ No___ NA _X_
Not part of this review level.

B. Standards for efficiency checks are counted at least once a month for each detector.
Yes ___ No___ NA _X_
Not part of this review level.

C. The check source standard has not shifted more than 2 channels from the centroid position.
Yes ___ No___ NA _X_
Not part of this review level.

D. Samples are counted for a duration long enough to achieve the RDL.
Yes ___ No___ NA _X_
Not part of this review level.

E. Background counts for the same duration as the sample runs are submitted and acceptable.
Yes ___ No___ NA _X_
Not part of this review level.

F. Each standard is measured for peak resolution as full-width at half-maximum height

(FWHM) and absolute counting efficiency and all center column readings (bounds test) "Pass".
Yes ___ No___ NA _X_
Not part of this review level.

G. The MDA was checked for 10% of the samples and is $\leq$ RDL.
Yes __X_ No____

IV. BLANKS
A. The method blank was analyzed at the required frequency.
Yes _X___ No____
And the results were within the required control limits. When average blanks or instrument background is subtracted to determine net counts, the net blank must be < 2 sigma uncertainty.

Yes __X__ No ____NA___
GEL: All results are reported as ND. No blank corrections are required.

Krypton-85 was reported by the laboratory as "UI" in the method blank due to low abundance. This analyte may suffer from a negative bias. It was not detected in associated samples, but was flagged in the same way for sample 22-9-16. The sample result has been qualified as JQ.

B. Field Blanks are identified and results are below the detection limit or < 2 x IDL.
Yes __X__ No ____

V. SPIKE SAMPLE RECOVERY
A. A matrix (pre-digestion) spike sample was analyzed for each digestion group and/ or matrix or as required in the SOW.
Yes ____No _X___
GEL: No MS was prepared. The laboratory has not commented about the reason.

The spiking of the large sample size (~500g) required for these analyses usually prohibits the spiking of radioactive compounds. The acceptable QC sample for accuracy for this analysis is the Laboratory Control Sample (LCS).

B. And the Matrix spike percent recoveries were within the required control limits of 75 – 125%
Yes ____No____ NA__X___

VI. DUPLICATES
A. Matrix (pre-digestion) duplicate samples were analyzed at the required frequency.
Yes __X__ No ____

B. And met the Duplicate Error Ratio (DER) criteria calculations which account for the 2 sigma efficiency values. DER limit is 1.0 (the DOE limit is 1.42)
Yes ____ No __X__
Some analytes did not meet the DER limit, as shown below. These are all non-detected results in both the sample and the duplicate, and no qualifiers are added.

The only detected analyte is K-40, which is within acceptance limits of RPD and DER.

Client Sample	Lab Sample ID	Analyte	Lab Flag	DER
16-22B	1201873000	Ag-110m	U	1.34
16-22B	1201873000	Am-241	U	1.37
16-22B	1201873000	Ba-133	U	3.60
16-22B	1201873000	Ba-140	U	3.08
16-22B	1201873000	Be-7	U	1.21
16-22B	1201873000	Bi-212	U	1.73
16-22B	1201873000	Bi-214	U	1.34
16-22B	1201873000	Ce-144	U	1.66
16-22B	1201873000	Cs-134	U	2.52
16-22B	1201873000	Eu-155	U	1.69
16-22B	1201873000	Kr-85	U	1.86
16-22B	1201873000	Nb-94	U	2.91
16-22B	1201873000	Np-239	U	2.63
16-22B	1201873000	Pm-144	U	1.87
16-22B	1201873000	Pm-146	U	1.34
16-22B	1201873000	Ru-106	U	1.55
16-22B	1201873000	Sb-125	U	1.06
16-22B	1201873000	Sn-113	U	2.17
16-22B	1201873000	U-235	U	3.95

C. If suspected "hot particles" were found, were samples re-analyzed.
Yes____ No __X__
No hot particles found, sample results low or BDL.

VII. LABORATORY CONTROL SAMPLE
A. An LCS was analyzed at the required frequency.
Yes __X__ No____
The laboratory used a subset of the nuclide target list in the LCS. Am-241, Co-60, and Cs-137 were spiked.

B. The LCS was within a control limit of 80-120% for water and 70 – 130% for soil.
Yes _X___ No____

C. The LCS uncertainty calculation verifies that the observed value of the LCS is within 3 sigma control limits of the expected LCS value and the relative percent error does not exceed 5 %.
Yes _X___ No____

VIII. DETECTION LIMITS
A. Detection limits met the method limits.

Yes __X__ No____

The instrument detection limit was within an isotope-specific limit for the calibration standards and QC samples.

The test for detection of a radionuclide includes two distinct steps, first to evaluate if it is > MDC, then to determine if the sample result is > the TPU. All results in this case are less than the MDC. In cases where the sample result is < the TPU, the result is not considered to be different from zero. If it is above the TPU the result could be high enough to represent detection below the MDC.

Negative results that have absolute values above the TPU could potentially indicate a low bias due to shifting background.

The laboratory has flagged a number of results with "UI" to indicate that they suffer from some type of detection issue. The issues cited by the laboratory are summarized in the table below. These results could potentially suffer from negative bias and are qualified as JQ.

Client Sample	Analyte	Result	RL	Flag	Laboratory Issue	Qualifier
16-22D	Ac-228	0	18.5	UI	Low abundance	JQ
16-22D	Bi-214	0	9.55	UI	Low abundance	JQ
16-22D	Pb-214	0	9.41	UI	Low abundance	JQ
16-22D	Ra-228	0	18.5	UI	Low abundance	JQ
22-9-16	Ac-228	0	16	UI	High counting uncertainty	JQ
22-9-16	Kr-85	0	1140	UI	Low abundance	JQ
22-9-16	Pb-214	0	11.2	UI	Low abundance	JQ
22-9-16	Ra-228	0	16	UI	High counting uncertainty	JQ
Field Blank	K-40	0	29	UI	No valid peak	JQ
Field Blank	Th-230	0	1350	UI	No valid peak	JQ

In addition, three results show high negative values greater than the MDC, and also greater than the TPU. These results could suffer from some negative bias and are qualified JQ.

Client Sample	Analyte	Result	RL	Flag	Qualifier
16-22B	Ba-133	-7.26	4.99	U	JQ
16-22B	Ba-140	-19.4	15.9	U	JQ
Field Blank	Kr-85	-1010	871	U	JQ

B. The energy of the identified peaks are within 2 KeV of the library energy of the radionuclide.
Yes____ No____ NA___X_
No raw data were provided for the GEL samples and results were all non-detect.

C. Decay-corrected results have been reports appropriately for the short half-life results

Yes____ No____ NA__X_
This could not be determined from the data provided from GEL. Past reports have indicated the reporting from GEL of decay corrected results with the following comment: "Decay correction is necessary for short half-life isotopes which are not in equilibrium with the parent isotope, thus the measured radionuclide has decayed to a lower level prior to analysis and would require correction back to collection. However, for virtually all isotopes of interest, the isotopes are in equilibrium and the decay is matched by its production from the parent isotope decay. Thus, decay correction would result in a high biased activity." In all reported results in past reported provided to the reviewer, the decay correction did not impact the use of the data, nor the accuracy of the reported result. This would be particularly true of the GEL results which are low level and considered to be 'J' estimated values.

D. Tentatively Identified Radionuclides (TIR)
TIRs were reported and correctly identified from the library search.
Yes____ No_____ N__X_
No TIRs are reported.

IX. PREPARATION AND ANALYSIS LOGS
A. All samples were prepared or analyzed within the required holding times referencing the SOW (time of sample receipt to preparation/distillation).
Yes _X___ No____

B. All samples were analyzed within the EPA Method recommended holding times (time of sample collection to date of analysis).
Yes __X__ No____
No 40 CFR limits exist for radchem, so method limits were referenced. All samples were analyzed within 90 days of collection.

X. CHAINS OF CUSTODY
A. All chains of custody were complete with initials, dates, times and any changes are crossed out with one line and initialed.
Yes __X_ No ___

B. Samples arrived intact, at the proper pH (< 2) and temperature.
Yes __X_ No____
Sample 16-22D was received at a pH of 3. The sample containers were pre-preserved but the buffering capacity of the water (these are production water from gas wells) was such that the resulting pH was above 2. The laboratory added preservative to bring the sample pH into the acceptance range. This is permissible per 40CFR and should have no impact on the results. No qualifiers are added.

In addition, the samples were received at 11 and 12 deg C. The laboratory notes this in the sample receiving documentation. However, chilling to < 6 deg C is not required for radiological testing by 40 CFR. No qualifiers are applied.

The laboratory noted that all samples except the field blank contained a thick layer of a light nonaqueous phase liquid (LNAPL). They requested guidance from the client and were instructed to decant the oil phase and analyze the aqueous phase only. Thus the analytical results pertain only to that phase of the sample.

XI. FIELD QC

Field QC samples were identified and have met a guidance limit of CLP 30% for water and 50% for soil, or ± 2 x RL (water) or 3.5 x RL (soil) for results < 5 x RL. Or for radiochemistry, the results relative to the 2 sigma counting error (uncertainty) may be used. The difference between the 2 results is compared against the uncertainty for each sample result. DER of > 1 is to be discussed. No qualifiers are applied.

Yes __X__ No____

Sample ID 22-9-16 is a field duplicate for the 16-22D sample. It is in control for gamma spec results.

Potassium-40 is detected in the field duplicate at a level < 5xRL but not in the sample. The difference between the two measured results, however, is < 2RL so the field duplicate criteria are still met.

XII. OVERALL ASSESSMENT OF THE CASE

The data are considered fully useable for project purposes with consideration of the follow qualification or comments.

Deliverables:

The following is noted:

The GEL Laboratories data package did not include raw data. Only summary QC results were provided. Gamma was determined using EPA 901.1. A Level II review is conducted.

Sample Preservation and Chain of Custody:

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