Cameco

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February 26, 2010

**ATTN: Document Control Desk**

Mr. Keith J. McConnell, Deputy Director
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Mailstop T8-F5
Washington, DC 20555-0001

RE: NRC License SUA-1548, Docket No. 40-8964, Semi-Annual Effluent and Environmental Monitoring Report, July 1 through December 31, 2009

Dear Mr. McConnell:

In accordance with 10 CFR 40.65 and per License Condition No. 12.2 of Source Materials License SUA-1548, please find enclosed the Semi-Annual Effluent and Environmental Monitoring Report for the period July 1 through December 31, 2009. Two copies of this report are also being forwarded to Mr. Douglas Mandeville, USNRC Headquarters and Mr. Arthur Howell, Director, Division of Nuclear Materials Safety, Region IV.

If you have questions regarding the report, please contact Angelo Kallas at (307) 358-6541, ext. 474.

Sincerely,

Thomas P. Young
Vice-President, Operations
Cameco Resources

Attachments: Semi-Annual Effluent and Environmental Monitoring Report

TY/kg

cc: A. Kallas w/atta J. Brister w/atta D. Mandeville, USNRC w/2 atta
A. Howell, DDNMS w/atta File SR 4.6.4.1w/atta

# POWER RESOURCES, INC.
# D/B/A CAMECO RESOURCES

# USNRC SOURCE MATERIAL LICENSE NO. SUA-1548

# DOCKET NO. 40-8964

# SEMI-ANNUAL EFFLUENT AND ENVIRONMENTAL MONITORING REPORT

# FOR THE PERIOD

# JULY 1 THROUGH DECEMBER 31, 2009

# TABLE OF CONTENTS

## 1.0 RESULTS FROM EMPLOYEE URINALYSES IF AN EXPOSURE EXCEEDS ACTION LEVELS DESCRIBED IN THE OPERATIONS PLAN OF THE APPROVED LICENSE APPLICATION

No bio-assays exceeded the action level of 15 µg/L uranium during the report period.

## 2.0 INJECTION RATES, RECOVERY RATES, AND INJECTION TRUNK-LINE PRESSURES FOR EACH SATELLITE FACILITY

Tables 1A through 1D of Attachment A contain rate and pressure data at the satellite facilities for the period of the report.

### 2.1 Satellite No. 1

Satellite No. 1 did not operate during the report period since restoration activities in the A and B Wellfield are complete. Therefore, no injection or recovery rates are available for the report period, as shown in Table 1A.

### 2.2 Satellite No. 2, Satellite No. 3, Central Processing Plant, Satellite SR-1, Satellite SR-2,

The injection rates, recovery rates, and injection pressure data for these facilities are contained in Tables 1B, 1C, and 1D, respectively. The injection rates represent the total recovery rates minus the purge (clean-out circuit) flow. The purge from Satellite No. 2 and No. 3 is treated for uranium and radium removal and pumped to Purge Storage Reservoir No. 2 (PSR-2) prior to disposal by irrigation at the Satellite No. 2 Land Application Facility (Irrigator #2). As of September 23, 2009 a selenium treatment facility has been in operation at a location southwest of Satellite No. 2. The selenium treatment facility receives the waste water after uranium and radium removal to remove selenium. Treated water is then pumped to PSR-2 for temporary storage prior to disposal via land application at Irrigator #2. Purge from Satellites SR-1 and SR-2 and the Smith Ranch Central Processing Plant (CPP) is disposed of by deep well injection through permitted waste disposal wells.

## 3.0 RESULTS OF EFFLUENT AND ENVIRONMENTAL MONITORING INCLUDING WATER QUALITY ANALYSES AND MONITORING REQUIRED BY THE WDEQ PERMIT FOR THE OPERATING IRRIGATION SYSTEMS

### 3.1 Stack Emission Surveys

When the Central Processing Facility (CPF) at the Highland Uranium Project is operational, Cameco Resources (CR) monitors the Yellowcake Dryer and Packaging scrubber exhaust stacks to determine the emission rate of particulates, uranium, radium, and thorium. During the report period, the Highland CPF remained on non-operating

standby status and is anticipated to maintain that status during several upcoming report periods. All yellowcake processing activities (elution, precipitation, drying, and packaging) were conducted at the Smith Ranch CPP. The dryers at the Smith Ranch CPP are zero emission vacuum dryers that do not require emission stack testing. Therefore, no stack tests were conducted during the report period.

3.2 Air Particulate, Radon, and Gamma Radiation Monitoring

CR maintains an air monitoring program at six separate locations on and around the licensed area. The air monitoring stations are used to monitor air particulates, passive radon gas, and passive gamma radiation. Two of these stations (AS-4 and AS-5) are used to monitor downwind conditions of the Highland CPF and are operated only when yellowcake processing operations are active at the Highland CPF. One additional station (AS-6), will be used to monitor conditions downwind of the Reynolds Ranch Satellite Facility once the facility is constructed and becomes operational. The stations are located as follows:

- Air Station No. 1 (AS-1; Dave's Water Well): This station monitors background conditions, upwind of both the Smith Ranch and HUP wellfields and yellowcake processing facilities.

- Air Station No. 2 (AS-2; Smith Ranch Restricted Area): This station monitors conditions downwind of the Smith Ranch CPP Restricted Area Boundary.

- Air Station No. 3 (AS-3; Vollman Ranch): This station monitors the nearest downwind resident to the Smith Ranch CPP Restricted Area as well as background conditions for the Highland Central Plant Restricted Area.

- Air Station No. 4 (AS-4; Overlook): This station monitors conditions downwind of the Highland CPF at the Restricted Area Boundary. This monitoring station is only operated when yellowcake processing operations are active at the Highland CPF.

- Air Station No. 5 (AS-5; Fowler Ranch): This station monitors conditions at the nearest downwind residence to the Highland CPF. This monitoring station is only operated when yellowcake processing operations are active at the Highland CPF.

- Air Station No. 6 (AS-6; Reynolds Ranch Satellite Area): This station will monitors conditions downwind of the Reynolds Ranch Satellite Facility once the facility is constructed and becomes operational.

Monitoring at stations AS-4 and AS-5 was not conducted during the report period since the Highland CPF remains on standby status. Monitoring of conditions at AS-4 and AS-5 will only resume if the Highland CPF becomes operational. In addition, monitoring at

station AS-6 was not conducted during the report period since the Reynolds Ranch Satellite Facility has not been constructed. Monitoring of conditions at AS-6 will commence during construction of the facility and before it becomes operational.

Table 2 shows the air particulate and radon data collected at stations AS-1 through AS-3 during the report period. Review of data collected during the report period shows that the concentrations of all parameters are significantly less than the 10 CFR 20, Appendix B, Effluent Concentration Limits.

Table 3 shows the gamma radiation data collected at stations AS-1 through AS-3 during the report period. Review of data collected during the report period showed a slightly higher gamma radiation level at background monitoring station AS-1 for the 4th Quarter 2009, but still within the normal range or previous.

## 3.3 Water Sampling Data

### 3.3.1 *Groundwater and Surface Water Monitoring Stations*

During the report period, monitoring was completed at 20 water wells (Stations GW-1 through GW-20) and 10 stock ponds (Stations SW-1 through SW-10). Water samples are collected from the water wells and stock ponds on a quarterly basis for analysis of uranium and radium-226. Table 4 provides the analytical data for samples collected during the report period. A review of data collected during the report period shows that five stock ponds (Stations SW- 1, 2, 3, 4, and 10) remained dry during the entire report period and six water wells (GW- 5, 6, 8, 9, 12, and 18) did not run during the report period. A review of data collected from twelve water wells and five stock ponds that were sampled during the report period show that the concentrations of uranium and radium-226 are well below the 10 CFR 20, Appendix B, Effluent Concentration Limits of 3.0E-07 µCi/mL and 6.0E-08 µCi/mL, respectively.

## 3.4 Wastewater Land Application Facilities Monitoring

### 3.4.1 *Soil and Vegetation Sampling*

In accordance with the approved license application and the WDEQ permits for the Satellite No. 1 and Satellite No. 2 Wastewater Land Application Facilities, soil and vegetation sampling of the irrigation areas is conducted in late summer of each year. The soil and vegetation data are collected to monitor and evaluate any adverse effects to the irrigation areas. The 2009 soil and vegetation sampling at the irrigation areas was conducted in August 2009, and results are shown in Tables 5, 6, 7A and 7B.

### 3.4.2 *Irrigation Fluid*

CR monitors the treated irrigation fluid that is disposed of at both irrigation facilities per the approved license application and the WDEQ Wastewater Land Application permits.

Grab samples are collected at the irrigator pivot during each month of operation and analyzed for various parameters. As noted in Table 8, Irrigator 1 did not operate during the report period.

Irrigation fluid data collected at Satellite No. 2 is provided in Table 9. A review of the data indicates that the concentration of uranium in the monthly grab samples were slightly greater than the 10 CFR 20, Appendix B, Effluent Concentration Limit of 3.0 E-7 µCi/ml, but less than the estimate provided in the original license application for the facility (1.4E-6 µCi/ml). The concentrations of radium-226 were less than the 10 CFR 20, Appendix B, Effluent Concentration Limit of 6.0E-08 µCi/ml, and, with the exception of the August 2009 sampling event, less than the estimate provided in the original license application for the facility (3.0E-9 µCi/ml). The August 2009 sampling event had a radium-226 concentration of 4.1E-9 µCi/ml, slightly greater than the original estimate.

3.4.3 *Radium Treatment Systems*

CR collects grab samples each month to ensure that the radium-226 treatment systems are adequately treating wastewater from Satellites No. 2 and No. 3 prior to discharge into PSR-2. The monthly radium-226 grab samples for Satellite No. 2 and No. 3 are collected at the discharge points of the radium treatment system at each facility. The results of this monitoring are included in Tables 10A and 10B. Review of the monitoring data shows that all radium-226 concentrations were below the 10 CFR 20, Appendix B, Effluent Concentration Limit of 6.0E-8 µCi/ml (60 pCi/L) at both Satellite No. 2 and Satellite No. 3 during the report period.

3.4.4 *Satellite No. 1 Purge Storage Reservoir Monitor Well*

A shallow monitor well, located southwest of the Purge Storage Reservoir No. 1 (PSR-1) is monitored at least weekly for potential seepage from the reservoir. There was no evidence of seepage during the report period. PSR-1 was dry for the entire period and it is not anticipated that water will be diverted to PSR-1 in the near future. It is unlikely there will be any seepage from PSR-1 in the following report periods.

3.4.5 *Satellite No. 2 Purge Storage Reservoir Shallow Wells*

Water levels are measured on a quarterly basis and ground water samples are required on a semi-annual basis from the two shallow monitoring wells located adjacent to PSR-2. CR conducts quarterly sampling of both wells. Shallow Wells No. 1 and No. 2 are located adjacent to the south and east sides of the reservoir, respectively. During the report period, monitoring was conducted on September 3 and November 12, 2009, as shown in Table 11.

## 4.0 ANNUAL DOSE TO THE PUBLIC (2009)

10 CFR 20.1301 requires that each NRC licensee conduct their operations in such a manner that the total effective dose equivalent (TEDE) to members of the public does not exceed 0.1 rem

(100 mrem) in a year, and that the dose from external sources in any unrestricted area does not exceed 0.002 rem (2 mrem) in any one hour.

Additionally, 10 CFR 20.1302 requires that each NRC licensee annually show compliance with the above described dose limits by demonstrating one of the following:

1) Show by actual measurement or calculation that the TEDE to the public does not exceed 100 mrem; or
2) Show that the annual average concentrations of radioactive effluents released at the restricted area boundary do not exceed the values in Table 2 of Appendix B to 10 CFR 20 and that the external dose to an individual continuously present in an unrestricted area would not exceed 2 mrem in an hour and 50 mrem in a year.

Table 12 compares the 2009 annual average concentrations of radioactive effluents from the Smith Ranch-Highland Uranium Project to the 10 CFR 20, Table 2 limits of Appendix B. The table also shows the calculated TEDE at an unrestricted area sampling location (Vollman-Nearest Downwind Residence) and a Restricted Area location (Fenceline) assuming a person was continuously in the area for the entire year. As shown in Table 12, all measured concentrations of radioactive effluents are less than the Table 2 limits of Appendix B, confirming compliance with 10 CFR 20.1302(b)(2)(i) and (ii). Additionally, the calculated TEDE for the two locations confirms compliance with 10 CFR 20.1302(b)(1).

## 5.0 SAFETY AND ENVIRONMENTAL EVALUATIONS

All safety and environmental evaluations made by the Safety and Environmental Review Panel (SERP) and resulting changed pages to the Operations Plan and Reclamation Plan of the approved license must be submitted on an annual basis. The completed SERP evaluations are provided in Attachment B. During the period July 1 through December 31, 2009, PRI completed the following Safety and Environmental Evaluations:

- Resin Traps dated August 11, 2009
- Addition of a Gas/Liquid Ratio Meter dated September 3-4, 2009

## 6.0 GAS HILLS, RUTH AND NORTH BUTTE ISL PROJECTS

The Gas Hills, Ruth and North Butte ISL Projects are licensed for commercial ISL uranium recovery activities as satellite facilities to the Smith Ranch-Highland Uranium Project. The projects remained non-operational during the report period, therefore, no effluent or environmental monitoring was conducted during the report period nor is it required by the NRC. Activities conducted during the report period consisted of quarterly inspections of the Ruth evaporation ponds in accordance with License Condition 10.2.2 of SUA-1548. Inspection of the perimeter fence, pond embankments, and pond liners yielded no deficiencies during the report period.

# ATTACHMENT A

# DATA TABLES 1-12

## TABLE 1A

## SATELLITE NO.1 INJECTION RATES, RECOVERY RATES, INJECTION PRESSURES
## 2009

| MONTH | Injection Pressure (PSI) RO #1 | RO #2 | RO #3 | Grounwater Sweep GPM | Radium Ponds GPM | RO Feed GPM | Injection GPM | RO Concentrate GPM | Purge Flow GPM |
|---|---|---|---|---|---|---|---|---|---|
| Jul-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aug-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sep-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## TABLE 1B

## AVERAGE INJECTION RATES (GPM)
## 2009

| MONTH | Satellite No. 2 | Satellite No. 3 | Central Processing Plant | Satellite SR-1 | Satellite SR-2 |
|---|---|---|---|---|---|
| Jul-09 | 1,720 | 3,169 | 1,487 | 3,007 | 2,475 |
| Aug-09 | 1,957 | 3,180 | 1,490 | 2,866 | 2,265 |
| Sep-09 | 1,982 | 3,263 | 1,482 | 3,092 | 2,339 |
| Oct-09 | 1,996 | 3,456 | 1,496 | 3,094 | 2,081 |
| Nov-09 | 1,951 | 3,469 | 1,497 | 3,120 | 2,145 |
| Dec-09 | 1,906 | 3,954 | 1,497 | 3,074 | 2,831 |

## TABLE 1C

## AVERAGE RECOVERY RATES (GPM)
## 2009

| MONTH | Satellite No. 2 | Satellite No. 3 | Central Processing Plant | Satellite SR-1 | Satellite SR-2 |
|---|---|---|---|---|---|
| Jul-09 | 1,744 | 3,189 | 1,500 | 3,033 | 2,490 |
| Aug-09 | 1,982 | 3,200 | 1,505 | 2,894 | 2,279 |
| Sep-09 | 2,007 | 3,283 | 1,495 | 3,119 | 2,353 |
| Oct-09 | 2,021 | 3,482 | 1,507 | 3,116 | 2,093 |
| Nov-09 | 1,976 | 3,498 | 1,508 | 3,142 | 2,155 |
| Dec-09 | 1,931 | 3,986 | 1,511 | 3,101 | 2,845 |

## TABLE 1D

## INJECTION TRUNK LINE PRESSURES (PSI)
## 2009

| MONTH | Satellite No. 2 | Satellite No. 3 | Central Processing Plant | Satellite SR-1 | Satellite SR-2 |
|---|---|---|---|---|---|
| Jul-09 | 87 | 111 | 155 | 87 | 170 |
| Aug-09 | 101 | 104 | 148 | 83 | 163 |
| Sep-09 | 99 | 93 | 151 | 86 | 161 |
| Oct-09 | 101 | 88 | 150 | 88 | 156 |
| Nov-09 | 93 | 104 | 147 | 86 | 155 |
| Dec-09 | 100 | 126 | 148 | 84 | 180 |

TABLE 2

AIR SAMPLING DATA
ENVIRONMENTAL MONITORING SITES
3rd & 4th Quarters 2009

| SAMPLE LOCATION | SAMPLE PERIOD | RADIONUCLIDE (µCi/ml) | CONCENTRATION (µCi/ml) | ERROR EST. +/- (µCi/ml) | L.L.D. (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT % |
|---|---|---|---|---|---|---|---|
| **AS-1** | | | | | | | |
| **DAVE'S WATER WELL** | 3rd | U-Nat | 1.13E-16 | N/A | 1.00E-16 | 9.00E-14 | 0.1 |
| Air Station | Quarter | Th-230 | <LLD | 8.22E-17 | 1.00E-16 | 3.00E-14 | |
| Background | | Ra-226 | 2.19E-16 | 9.75E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| Site | | Pb-210 | 1.31E-14 | 2.09E-15 | 2.00E-15 | 6.00E-13 | 2.2 |
| | 4th | U-Nat | 1.72E-16 | N/A | 1.00E-16 | 9.00E-14 | 0.2 |
| | Quarter | Th-230 | <LLD | 4.12E-17 | 1.00E-16 | 3.00E-14 | |
| | | Ra-226 | 7.18E-17 | 3.56E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| | | Pb-210 | 6.35E-15 | 1.17E-15 | 2.00E-15 | 6.00E-13 | 1.1 |
| | | Rn-222 | 1.30E-09 | | 3.00E-10 | 1.00E-08 | 13.0 |
| **AS-2** | | | | | | | |
| **FENCE LINE** | 3rd | U-Nat | 1.20E-15 | N/A | 1.00E-16 | 9.00E-14 | 1.3 |
| Air Station | Quarter | Th-230 | <LLD | 4.03E-17 | 1.00E-16 | 3.00E-14 | |
| Restricted Area | | Ra-226 | 1.52E-16 | 6.63E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| Boundary | | Pb-210 | 1.68E-14 | 2.13E-15 | 2.00E-15 | 6.00E-13 | 2.8 |
| | 4th | U-Nat | 3.11E-16 | N/A | 1.00E-16 | 9.00E-14 | 0.3 |
| | Quarter | Th-230 | <LLD | 3.14E-17 | 1.00E-16 | 3.00E-14 | |
| | | Ra-226 | 9.95E-17 | 3.73E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| | | Pb-210 | 8.37E-15 | 1.13E-15 | 2.00E-15 | 6.00E-13 | 1.4 |
| | | Rn-222 | 4.10E-09 | | 3.00E-10 | 1.00E-08 | 41.0 |
| **AS-3** | | | | | | | |
| **VOLLMAN RANCH** | 3rd | U-Nat | 3.10E-16 | N/A | 1.00E-16 | 9.00E-14 | 0.3 |
| Air Station | Quarter | Th-230 | <LLD | 5.35E-17 | 1.00E-16 | 3.00E-14 | |
| Downwind Nearest | | Ra-226 | 1.17E-16 | 6.51E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| Residence | | Pb-210 | 2.20E-14 | 2.38E-15 | 2.00E-15 | 6.00E-13 | 3.7 |
| | 4th | U-Nat | 2.59E-16 | N/A | 1.00E-16 | 9.00E-14 | 0.3 |
| | Quarter | Th-230 | 1.59E-17 | 4.57E-17 | 1.00E-16 | 3.00E-14 | 0.1 |
| | | Ra-226 | 4.81E-17 | 3.15E-17 | 1.00E-16 | 9.00E-13 | 0.0 |
| | | Pb-210 | 9.38E-15 | 1.21E-15 | 2.00E-15 | 6.00E-13 | 1.6 |
| | | Rn-222 | 1.40E-09 | | 3.00E-10 | 1.00E-08 | 14.0 |
| **AS-4** | | **STANDBY** | | | | | |
| **HUP RESTRICTED AREA** | | **STATUS** | | | | | |
| **AS-5** | | **STANDBY** | | | | | |
| **FOWLER RANCH** | | **STATUS** | | | | | |
| **AS-6** | | **NOT** | | | | | |
| **REYNOLDS SATELLITE** | | **CONSTRUCTED** | | | | | |

## TABLE 3

## DIRECT RADIATION (GAMMA) MEASUREMENT DATA
## ENVIRONMENTAL MONITORING SITES
## 3rd & 4th QUARTERS 2009

| SAMPLE LOCATION | SAMPLE PERIOD | EXPOSURE RATE (mR/qtr) |
|---|---|---|
| **AS-1 DAVE'S WATER WELL** | | 37 |
| Air Station | 3rd Quarter | |
| Background | | |
| Site | 4th Quarter | 39 |
| **AS-2 FENCE LINE** | 3rd Quarter | 47 |
| Air Station | | |
| Restricted Area | 4th Quarter | 48 |
| Boundary | | |
| **AS-3 VOLLMAN'S RANCH** | | |
| Air Station | 3rd Quarter | 44 |
| Downwind | | |
| Nearest Residence | 4th Quarter | 37 |
| **AS-4 HUP RESTRICTED AREA** | **STANDBY STATUS** | |
| **AS-5 FOWLER RANCH** | **STANDBY STATUS** | |
| **AS-6 REYNOLDS SATELLITE** | **NOT CONSTRUCTED** | |
| **CONTROL** | 3rd Quarter | 47 |
| | 4th Quarter | 50 |

TABLE 4

WATER SAMPLING DATA
ENVIRONMENTAL MONITORING SITES
3rd & 4th QUARTERS 2009

| SAMPLE LOCATION | SAMPLE DATE | RADIONUCLIDE | CONCENTRATION (mg/L) | CONCENTRATION (pCi/L) | ERROR EST. +/- (pCi/L) | CONCENTRATION (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT |
|---|---|---|---|---|---|---|---|---|
| **SW-1** | 3rd Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| Stock Pond | | Ra-226 | | | | | 6.0E-08 | |
| Section 3 | | | | | | | | |
| T35N, R74W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-2** | 3rd Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| Stock Pond | | Ra-226 | | | | | 6.0E-08 | |
| Section 2 | | | | | | | | |
| T35N, R74W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-3** | 3rd Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| Stock Pond | | Ra-226 | | | | | 6.0E-08 | |
| Section 35 | | | | | | | | |
| T36N, R74W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-4** | 3rd Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| Stock Pond | | Ra-226 | | | | | 6.0E-08 | |
| Section 36 | | | | | | | | |
| T36N, R74W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-5** | 3rd Quarter | U-Nat | 0.0013 | | | 8.8E-10 | 3.0E-07 | 0.3 |
| Stock Pond | | Ra-226 | | 0.21 | 0.14 | 2.1E-10 | 6.0E-08 | 0.4 |
| Section 21 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-6** | 3rd Quarter | U-Nat | 0.0005 | | | 3.4E-10 | 3.0E-07 | 0.1 |
| Stock Pond | | Ra-226 | | 0.52 | 0.20 | 5.2E-10 | 6.0E-08 | 0.9 |
| Section 22 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |

TABLE 4

WATER SAMPLING DATA
ENVIRONMENTAL MONITORING SITES
3rd & 4th QUARTERS 2009

| SAMPLE LOCATION | SAMPLE DATE | RADIONUCLIDE | CONCENTRATION (mg/L) | CONCENTRATION (pCi/L) | ERROR EST. +/- (pCi/L) | CONCENTRATION (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT |
|---|---|---|---|---|---|---|---|---|
| **SW-7** | 3rd Quarter | U-Nat | 0.0005 | | | 3.4E-10 | 3.0E-07 | 0.1 |
| Stock Pond | | Ra-226 | | 0.19 | 0.16 | 1.9E-10 | 6.0E-08 | 0.3 |
| Section 22 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-8** | 3rd Quarter | U-Nat | 0.001 | | | 6.8E-10 | 3.0E-07 | 0.2 |
| Stock Pond | | Ra-226 | | 0.23 | 0.16 | 2.3E-10 | 6.0E-08 | 0.4 |
| Section 18 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-9** | 3rd Quarter | U-Nat | 0.0004 | | | 2.7E-10 | 3.0E-07 | 0.1 |
| Stock Pond | | Ra-226 | | 0.03 | 0.13 | 3.0E-11 | 6.0E-08 | 0.1 |
| Section 18 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **SW-10** | 3rd Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| Stock Pond | | Ra-226 | | | | | 6.0E-08 | |
| Section 19 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | DRY | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-1** | 3rd Quarter | U-Nat | 0.0281 | | | 1.9E-08 | 3.0E-07 | 6.3 |
| Windmill | | Ra-226 | | 1.70 | 0.25 | 1.7E-09 | 6.0E-08 | 2.8 |
| Section 1 | | | | | | | | |
| T35N, R74W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-2** | 3rd Quarter | U-Nat | 0.0432 | | | 2.9E-08 | 3.0E-07 | 9.7 |
| Water Well | | Ra-226 | | 0.88 | 0.19 | 8.8E-10 | 6.0E-08 | 1.5 |
| Section 35 | | | | | | | | |
| T36N, R74W | 4th Quarter | U-Nat | 0.0379 | | | 2.6E-08 | 3.0E-07 | 8.6 |
| | | Ra-226 | | 0.73 | 0.21 | 7.3E-10 | 6.0E-08 | 1.2 |

**TABLE 4**

**WATER SAMPLING DATA**
**ENVIRONMENTAL MONITORING SITES**
**3rd & 4th QUARTERS 2009**

| SAMPLE LOCATION | SAMPLE DATE | RADIONUCLIDE | CONCENTRATION (mg/L) | CONCENTRATION (pCi/L) | ERROR EST. +/- (pCi/L) | CONCENTRATION (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT |
|---|---|---|---|---|---|---|---|---|
| **GW-3** | 3rd Quarter | U-Nat | 0.118 | | | 8.0E-08 | 3.0E-07 | 26.6 |
| Windmill | | Ra-226 | | 2.20 | 0.31 | 2.2E-09 | 6.0E-08 | 3.7 |
| Section 27 | | | | | | | | |
| T36N, R74W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-4** | 3rd Quarter | U-Nat | 0.0726 | | | 4.9E-08 | 3.0E-07 | 16.4 |
| Windmill | | Ra-226 | | 0.67 | 0.20 | 6.7E-10 | 6.0E-08 | 1.1 |
| Section 23 | | | | | | | | |
| T36N, R74W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-5** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Windmill | | Ra-226 | | | | | 6.0E-08 | |
| Section 30 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-6** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Windmill | | Ra-226 | | | | | 6.0E-08 | |
| Section 28 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-8** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Windmill | | Ra-226 | | | | | 6.0E-08 | |
| Section 23 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-9** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Windmill | | Ra-226 | | | | | 6.0E-08 | |
| Section 14 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |

**TABLE 4**

**WATER SAMPLING DATA**
**ENVIRONMENTAL MONITORING SITES**
**3rd & 4th QUARTERS 2009**

| SAMPLE LOCATION | SAMPLE DATE | RADIONUCLIDE | CONCENTRATION (mg/L) | CONCENTRATION (pCi/L) | ERROR EST. +/- (pCi/L) | CONCENTRATION (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT |
|---|---|---|---|---|---|---|---|---|
| **GW-10** | 3rd Quarter | U-Nat | 0.0053 | | | 3.6E-09 | 3.0E-07 | 1.2 |
| Water Well | | Ra-226 | | 0.49 | 0.14 | 4.9E-10 | 6.0E-08 | 0.8 |
| Section 14 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-11** | 3rd Quarter | U-Nat | 0.0011 | | | 7.4E-10 | 3.0E-07 | 0.2 |
| Water Well | | Ra-226 | | 0.05 | 0.09 | 5.0E-11 | 6.0E-08 | 0.1 |
| Section 11 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-12** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Water Well | | Ra-226 | | | | | 6.0E-08 | |
| Section 7 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-13** | 3rd Quarter | U-Nat | 0.0168 | | | 1.1E-08 | 3.0E-07 | 3.8 |
| Water Well | | Ra-226 | | 2.10 | 0.28 | 2.1E-09 | 6.0E-08 | 3.5 |
| Section 9 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | 0.0024 | | | 1.6E-09 | 3.0E-07 | 0.5 |
| | | Ra-226 | | 0.83 | 0.22 | 8.3E-10 | 6.0E-08 | 1.4 |
| **GW-14** | 3rd Quarter | U-Nat | 0.0016 | | | 1.1E-09 | 3.0E-07 | 0.4 |
| Water Well | | Ra-226 | | 2.00 | 0.27 | 2.0E-09 | 6.0E-08 | 3.3 |
| Section 10 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-15** | 3rd Quarter | U-Nat | 0.0179 | | | 1.2E-08 | 3.0E-07 | 4.0 |
| Water Well | | Ra-226 | | 1.60 | 0.25 | 1.6E-09 | 6.0E-08 | 2.7 |
| Section 15 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | 0.0182 | | | 1.2E-08 | 3.0E-07 | 4.1 |
| | | Ra-226 | | 0.70 | 0.20 | 7.0E-10 | 6.0E-08 | 1.2 |

**TABLE 4**

**WATER SAMPLING DATA**
**ENVIRONMENTAL MONITORING SITES**
**3rd & 4th QUARTERS 2009**

| SAMPLE LOCATION | SAMPLE DATE | RADIONUCLIDE | CONCENTRATION (mg/L) | CONCENTRATION (pCi/L) | ERROR EST. +/- (pCi/L) | CONCENTRATION (µCi/ml) | 10 CFR 20 App. B, Table 2 Values (µCi/ml) | % EFF. CONC. LIMIT |
|---|---|---|---|---|---|---|---|---|
| **GW-16** | 3rd Quarter | U-Nat | 0.147 | | | 1.0E-07 | 3.0E-07 | 33.2 |
| Water Well | | Ra-226 | | 1.9 | 0.26 | 1.9E-09 | 6.0E-08 | 3.2 |
| Section 11 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | 0.145 | | | 9.8E-08 | 3.0E-07 | 32.7 |
| | | Ra-226 | | 1.2 | 0.23 | 1.2E-09 | 6.0E-08 | 2.0 |
| **GW-17** | 3rd Quarter | U-Nat | 0.0028 | | | 1.9E-09 | 3.0E-07 | 0.6 |
| Water Well | | Ra-226 | | 0.52 | 0.13 | 5.2E-10 | 6.0E-08 | 0.9 |
| Section 8 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-18** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Water Well | | Ra-226 | | | | | 6.0E-08 | |
| Section 2 | | | | | | | | |
| T36N, R72W | 4th Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| | | Ra-226 | | | | | 6.0E-08 | |
| **GW-20** | 3rd Quarter | U-Nat | NOT OPERATING | | | | 3.0E-07 | |
| Water Well | | Ra-226 | | | | | 6.0E-08 | |
| Section 27 | | | | | | | | |
| T36N, R73W | 4th Quarter | U-Nat | <.0003 | | | | 3.0E-07 | |
| | | Ra-226 | | 0.12 | 0.14 | 1.2E-10 | 6.0E-08 | 0.2 |

**TABLE 5**

**SATELLITE No. 1**
**LAND APPLICATION FACILITY (IRRIGATOR 1)**
**ANNUAL SOIL DATA**
**2009**

| SAMPLE ID | SAMPLE DATE | CONDUCTIVITY SAT. PASTE (mmhos/cm) | Sat % | pH SAT. PASTE (std. Units) | CALCIUM SOLUBLE (meq/L) | MAGNESIUM SOLUBLE ( meq/L) | SODIUM SOLUBLE (meq/L) | SAR | ARSENIC ABDTPA (mg/kg-dry) | BARIUM ABDTPA (mg/kg-dry) | POTASSIUM SOLUBLE (mg/kg-dry) | SELENIUM ABDTPA (mg/kg-dry) | URANIUM - NATURAL TOTAL (µCi/g-dry) | BORON ABDTPA (mg/kg-dry) | RADIUM 226 (µCi/g-dry) | TOTAL ERROR ESTIMATE± (pCi/g-dry) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S.E. Location 1 0-6" | 8/28/09 | 0.53 | 37.5 | 6.9 | 2.85 | 1.30 | 1.27 | 0.88 | 0.082 | 1.7 | 340 | 1.070 | 4.34E-05 | 0.70 | 1.40E-06 | 0.3 |
| S.E. Location 1 6-12" | 8/28/09 | 0.29 | 52.3 | 6.6 | 0.69 | 0.34 | 1.78 | 2.49 | 0.036 | 2.3 | 510 | 0.575 | 3.97E-06 | 0.90 | 1.50E-06 | 0.3 |
| S.E. Location 2 0-6" | 8/28/09 | 0.39 | 55.5 | 6.7 | 1.51 | 0.73 | 1.68 | 1.59 | 0.042 | 2.1 | 540 | 0.448 | 5.80E-06 | 1.30 | 1.40E-06 | 0.3 |
| S.E. Location 2 6-12" | 8/28/09 | 1.06 | 61.7 | 6.8 | 5.11 | 2.29 | 3.57 | 1.85 | 0.032 | 1.9 | 460 | 0.294 | 2.96E-06 | 0.60 | 1.40E-06 | 0.3 |
| S.E. Location 3 0-6" | 8/28/09 | 0.26 | 31.1 | 6.9 | 0.70 | 0.34 | 1.51 | 2.10 | 0.036 | 1.1 | 400 | 0.277 | 5.79E-06 | 0.70 | 1.00E-06 | 0.3 |
| S.E. Location 3 6-12" | 8/28/09 | 0.33 | 51.9 | 6.7 | 0.58 | 0.33 | 2.06 | 3.06 | 0.018 | 1.7 | 560 | 0.177 | 4.04E-06 | 0.50 | 1.50E-06 | 0.3 |
| S.W. Location 4 0-6" | 8/28/09 | 0.55 | 58.1 | 6.7 | 1.82 | 0.82 | 2.52 | 2.19 | 0.068 | 2.0 | 540 | 1.230 | 4.91E-05 | 0.70 | 1.40E-06 | 0.3 |
| S.W. Location 4 6-12" | 8/28/09 | 0.72 | 61.6 | 7.5 | 2.23 | 0.95 | 3.50 | 2.77 | 0.040 | 1.8 | 470 | 0.616 | 4.08E-06 | 0.40 | 1.40E-06 | 0.2 |
| S.W. Location 5 0-6" | 8/28/09 | 0.42 | 38.0 | 6.6 | 1.89 | 0.84 | 1.31 | 1.12 | 0.092 | 1.4 | 400 | 0.506 | 2.41E-05 | 0.60 | 1.20E-06 | 0.2 |
| S.W. Location 5 6-12" | 8/28/09 | 0.34 | 59.3 | 6.8 | 0.68 | 0.37 | 2.19 | 3.01 | 0.022 | 1.5 | 520 | 0.243 | 1.61E-06 | 0.80 | 1.30E-06 | 0.2 |
| S.W. Location 6 0-6" | 8/28/09 | 0.44 | 38.9 | 6.5 | 1.22 | 0.58 | 2.32 | 2.44 | 0.047 | 1.8 | 410 | 0.526 | 4.90E-06 | 1.00 | 9.00E-07 | 0.2 |
| S.W. Location 6 6-12" | 8/28/09 | 0.55 | 55.7 | 6.6 | 1.18 | 0.60 | 3.40 | 3.59 | 0.032 | 1.7 | 440 | 0.373 | 2.50E-06 | 1.40 | 1.70E-06 | 0.3 |
| S.W. Location 7 0-6" | 8/28/09 | 1.63 | 51.4 | 6.2 | 11.70 | 5.19 | 3.74 | 1.29 | 0.082 | 1.4 | 560 | 1.030 | 3.87E-05 | 0.70 | 1.80E-06 | 0.3 |
| S.W. Location 7 6-12" | 8/28/09 | 1.53 | 58.9 | 7.1 | 7.56 | 3.27 | 5.68 | 2.44 | 0.046 | 1.7 | 450 | 0.512 | 4.17E-06 | 0.80 | 1.20E-06 | 0.2 |
| N.W. Location 8 0-6" | 8/28/09 | 0.42 | 60.7 | 6.8 | 1.13 | 0.55 | 2.50 | 2.73 | 0.034 | 2.2 | 490 | 0.404 | 4.52E-06 | 0.60 | 1.30E-06 | 0.2 |
| N.W. Location 8 6-12" | 8/28/09 | 0.87 | 57.2 | 7.4 | 2.82 | 1.34 | 4.80 | 3.33 | 0.035 | 2.4 | 330 | 0.425 | 2.12E-06 | 0.70 | 1.60E-06 | 0.3 |
| N.W. Location 9 0-6" | 8/28/09 | 0.57 | 60.6 | 6.8 | 1.79 | 0.91 | 2.93 | 2.52 | 0.050 | 2.3 | 560 | 0.727 | 9.64E-06 | 0.60 | 1.40E-06 | 0.2 |
| N.W. Location 9 6-12" | 8/28/09 | 0.86 | 111.0 | 6.9 | 2.64 | 1.44 | 4.29 | 3.00 | 0.046 | 1.4 | 440 | 0.438 | 3.90E-06 | 0.80 | 1.60E-06 | 0.3 |
| N.W. Location 10 0-6" | 8/28/09 | 0.73 | 44.9 | 6.9 | 3.61 | 1.61 | 2.36 | 1.46 | 0.076 | 1.9 | 590 | 0.604 | 2.78E-05 | 0.60 | 1.70E-06 | 0.3 |
| N.W. Location 10 6-12" | 8/28/09 | 0.58 | 56.5 | 7.7 | 2.26 | 0.81 | 3.24 | 2.61 | 0.035 | 2.5 | 400 | 0.322 | 2.83E-06 | 0.70 | 1.50E-06 | 0.3 |
| N.E. Location 11 0-6" | 8/28/09 | 0.31 | 43.9 | 6.3 | 0.16 | <.08 | 0.27 | 0.78 | 0.046 | 1.9 | 420 | 0.355 | 4.82E-06 | 0.60 | 9.00E-07 | 0.2 |
| N.E. Location 11 6-12" | 8/28/09 | 0.31 | 59.1 | 6.4 | 0.12 | <.08 | 0.36 | 1.19 | 0.027 | 2.2 | 510 | 0.262 | 1.25E-06 | 1.00 | 1.10E-06 | 0.2 |
| N.E Location 12 0-6" | 8/28/09 | 0.71 | 77.7 | 6.3 | 2.74 | 1.35 | 3.26 | 2.28 | 0.087 | 1.6 | 600 | 1.380 | 1.43E-05 | 1.30 | 1.40E-06 | 0.3 |
| N.E. Location 12 6-12" | 8/28/09 | 1.11 | 89.7 | 6.9 | 3.79 | 1.97 | 5.72 | 3.37 | 0.056 | 2.0 | 520 | 0.865 | 8.43E-06 | 0.90 | 2.00E-06 | 0.3 |
| N.E. Location 13 0-6" | 8/28/09 | 0.57 | 58.7 | 6.3 | 2.35 | 1.04 | 2.75 | 2.11 | 0.038 | 2.4 | 490 | 0.316 | 3.86E-06 | 0.70 | 1.40E-06 | 0.3 |
| N.E. Location 13 6-12" | 8/28/09 | 0.69 | 63.2 | 7.0 | 2.89 | 1.10 | 3.57 | 2.53 | 0.027 | 3.6 | 340 | 0.253 | 1.59E-06 | 0.80 | 1.00E-06 | 0.3 |
| N.E. Location 14 0-6" | 8/28/09 | 0.60 | 45.2 | 6.7 | 2.07 | 0.95 | 3.56 | 2.90 | 0.047 | 2.8 | 470 | 0.358 | 4.71E-06 | 0.80 | 1.20E-06 | 0.2 |
| N.E. Location 14 6-12" | 8/28/09 | 0.44 | 38.8 | 6.8 | 0.95 | 0.45 | 2.80 | 3.35 | 0.038 | 1.9 | 290 | 0.176 | 2.07E-06 | 0.40 | 1.20E-06 | 0.2 |
| **Average** | | **0.64** | **56.4** | **6.8** | **2.47** | **1.21** | **2.82** | **2.32** | **0.047** | **2.0** | **466** | **0.527** | **1.02E-05** | **0.77** | **1.37E-06** | |
| Background 0-6" | | 0.41 | 38.0 | 6.2 | 1.73 | 1.23 | 1.03 | 0.85 | 0.057 | 2.2 | 320 | 0.095 | 2.04E-06 | 0.70 | 1.10E-06 | 0.2 |
| Background 6-12" | | 0.50 | 54.4 | 7.1 | 1.57 | 1.25 | 2.29 | 1.93 | 0.034 | 2.6 | 350 | 0.054 | 1.50E-06 | 0.60 | 1.40E-06 | 0.2 |

**TABLE 6**

**SATELLITE No. 2**
**LAND APPLICATION FACILITY (IRRIGATOR 2)**
**ANNUAL SOIL DATA**
**2009**

| SAMPLE ID | SAMPLE DATE | CONDUCTIVITY SAT. PASTE (mmhos/cm) | Sat % | pH SAT. PASTE (std. Units) | CALCIUM SOLUBLE (meq/L) | MAGNESIUM SOLUBLE (meq/L) | SODIUM SOLUBLE (meq/L) | SAR | ARSENIC ABDTPA ( mg/kg-dry) | BARIUM ABDTPA ( mg/kg-dry) | POTASSIUM SOLUBLE (mg/kg-dry) | SELENIUM ABDTPA (mg/kg-dry) | URANIUM TOTAL (µCi/g-dry) | BORON ABDTPA ( mg/kg-dry) | RADIUM 226 ( µCi/g-dry) | TOTAL ERROR ESTIMATE± ( pCi/g-dry) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location 1 0-6" | 8/28/09 | 3.01 | 55.7 | 6.4 | 20.0 | 10.5 | 3.82 | 0.98 | 0.070 | 0.9 | 400 | 0.570 | 8.06E-06 | 1.0 | 1.20E-06 | 0.2 |
| Location 1 6-12" | 8/28/09 | 3.53 | 72.4 | 6.4 | 23.9 | 14.8 | 6.41 | 1.46 | 0.032 | 0.3 | 410 | 0.360 | 2.09E-06 | 0.8 | 1.30E-06 | 0.2 |
| Location 2 0-6" | 8/28/09 | 2.76 | 52.1 | 6.2 | 18.1 | 9.4 | 3.19 | 0.86 | 0.064 | 1.1 | 370 | 0.560 | 2.57E-06 | 0.9 | 1.10E-06 | 0.2 |
| Location 2 6-12" | 8/28/09 | 3.45 | 67.4 | 6.2 | 21.7 | 14.8 | 6.06 | 1.42 | 0.030 | <.02 | 320 | 0.370 | 1.89E-06 | 0.7 | 1.40E-06 | 0.2 |
| Location 3 0-6" | 8/28/09 | 2.31 | 69.7 | 7.1 | 14.2 | 7.1 | 3.57 | 1.09 | 0.070 | 2.2 | 480 | 0.300 | 2.69E-06 | 1.0 | 1.20E-06 | 0.2 |
| Location 3 6-12" | 8/28/09 | 3.54 | 67.3 | 7.5 | 24.0 | 13.5 | 6.67 | 1.54 | 0.038 | 0.8 | 290 | 0.507 | 2.30E-05 | 0.6 | 1.30E-06 | 0.2 |
| Location 4 0-6" | 8/28/09 | 2.44 | 49.2 | 7.0 | 15.6 | 7.1 | 3.28 | 0.97 | 0.044 | 2.6 | 190 | 0.321 | 5.62E-06 | 1.0 | 1.40E-06 | 0.2 |
| Location 4 6-12" | 8/28/09 | 3.33 | 52.6 | 7.4 | 28.9 | 10.3 | 3.08 | 0.69 | 0.026 | 0.9 | 360 | 0.241 | 3.86E-06 | 0.5 | 1.40E-06 | 0.2 |
| Location 5 0-6" | 8/28/09 | 3.45 | 57.8 | 7.0 | 28.7 | 13.2 | 3.42 | 0.75 | 0.046 | 0.4 | 400 | 0.516 | 8.46E-06 | 0.8 | 1.80E-06 | 0.2 |
| Location 5 6-12" | 8/28/09 | 3.49 | 55.5 | 7.0 | 28.6 | 13.0 | 3.64 | 0.80 | 0.043 | 0.8 | 340 | 0.356 | 8.67E-06 | 0.8 | 1.80E-06 | 0.2 |
| Location 6 0-6" | 8/28/09 | 3.17 | 70.6 | 7.1 | 22.1 | 10.6 | 3.90 | 0.96 | 0.032 | 0.9 | 420 | 0.580 | 5.78E-06 | 0.8 | 1.30E-06 | 0.2 |
| Location 6 6-12" | 8/28/09 | 3.57 | 72.7 | 7.2 | 26.7 | 11.7 | 5.92 | 1.35 | 0.033 | 0.9 | 310 | 0.617 | 2.69E-06 | 0.7 | 1.10E-06 | 0.2 |
| Location 7 0-6" | 8/28/09 | 3.54 | 63.4 | 7.2 | 26.4 | 12.3 | 4.10 | 0.93 | 0.036 | 1.1 | 360 | 0.525 | 5.90E-06 | 1.2 | 1.10E-06 | 0.2 |
| Location 7 6-12" | 8/28/09 | 3.23 | 62.2 | 7.4 | 24.2 | 11.5 | 5.35 | 1.27 | 0.032 | 0.8 | 250 | 0.310 | 4.90E-06 | 0.7 | 1.10E-06 | 0.2 |
| Location 8 0-6" | 8/28/09 | 3.42 | 73.2 | 6.9 | 26.9 | 11.8 | 3.46 | 0.79 | 0.078 | 0.9 | 500 | 0.472 | 5.61E-06 | 1.1 | 1.10E-06 | 0.2 |
| Location 8 6-12" | 8/28/09 | 2.98 | 71.8 | 7.0 | 24.9 | 9.8 | 3.59 | 0.86 | 0.055 | 1.0 | 390 | 0.201 | 1.81E-06 | 0.7 | 1.20E-06 | 0.2 |
| Location 9 0-6" | 8/28/09 | 2.63 | 67.6 | 6.8 | 15.9 | 8.4 | 3.30 | 0.95 | 0.063 | 2.4 | 500 | 0.610 | 1.00E-05 | 1.1 | 1.10E-06 | 0.3 |
| Location 9 6-12" | 8/28/09 | 2.68 | 68.8 | 6.6 | 17.8 | 9.5 | 4.25 | 1.15 | 0.036 | 0.9 | 300 | 0.265 | 1.58E-06 | 0.6 | 1.30E-06 | 0.3 |
| Location 10 0-6" | 8/28/09 | 2.34 | 51.5 | 7.0 | 14.1 | 6.7 | 3.54 | 1.10 | 0.029 | 1.0 | 430 | 0.409 | 1.08E-05 | 0.9 | 1.50E-06 | 0.2 |
| Location 10 6-12" | 8/28/09 | 2.41 | 54.5 | 6.9 | 16.2 | 7.5 | 3.11 | 0.90 | 0.040 | 1.6 | 380 | 0.577 | 6.09E-06 | 0.8 | 1.80E-06 | 0.2 |
| Location 11 0-6" | 8/28/09 | 2.62 | 57.5 | 6.7 | 16.2 | 9.1 | 4.08 | 1.15 | 0.042 | 0.9 | 450 | 0.343 | 4.67E-06 | 0.8 | 1.50E-06 | 0.2 |
| Location 11 6-12" | 8/28/09 | 3.24 | 54.4 | 6.6 | 21.9 | 12.6 | 5.08 | 1.22 | 0.034 | 0.5 | 320 | 0.298 | 2.57E-06 | 1.1 | 1.30E-06 | 0.2 |
| Location 12 0-6" | 8/28/09 | 1.99 | 44.7 | 7.0 | 11.7 | 6.1 | 2.30 | 0.77 | 0.037 | 2.5 | 260 | 0.246 | 4.13E-06 | 0.5 | 1.30E-06 | 0.2 |
| Location 12 6-12" | 8/28/09 | 1.22 | 47.0 | 7.1 | 6.1 | 3.0 | 2.40 | 1.13 | 0.027 | 1.6 | 200 | 0.180 | 1.49E-06 | 0.3 | 1.50E-06 | 0.2 |
| Location 13 0-6" | 8/28/09 | 3.92 | 52.7 | 7.2 | 29.0 | 13.0 | 4.74 | 1.03 | 0.051 | 1.9 | 470 | 0.589 | 9.82E-06 | 1.0 | 1.80E-06 | 0.2 |
| Location 13 6-12" | 8/28/09 | 3.64 | 61.3 | 7.1 | 24.4 | 15.9 | 6.73 | 1.50 | 0.025 | 0.5 | 330 | 0.489 | 2.03E-06 | 0.4 | 2.00E-06 | 0.2 |
| Location 14 0-6" | 8/28/09 | 3.15 | 53.7 | 6.8 | 25.6 | 10.7 | 3.20 | 0.75 | 0.041 | 0.7 | 460 | 0.585 | 9.75E-06 | 0.9 | 1.60E-06 | 0.2 |
| Location 14 6-12" | 8/28/09 | 3.24 | 54.4 | 6.9 | 26.1 | 13.1 | 3.03 | 0.68 | 0.040 | 0.5 | 410 | 0.485 | 6.03E-06 | 0.7 | 1.50E-06 | 0.2 |
| Location 15 0-6" | 8/28/09 | 3.91 | 50.2 | 6.8 | 30.2 | 12.9 | 3.83 | 0.82 | 0.067 | 1.3 | 420 | 0.698 | 1.20E-05 | 1.0 | 1.40E-06 | 0.2 |
| Location 15 6-12" | 8/28/09 | 3.65 | 65.3 | 6.7 | 26.2 | 16.5 | 5.15 | 1.11 | 0.025 | 0.4 | 390 | 0.367 | 2.03E-06 | 0.7 | 1.80E-06 | 0.2 |
| Location 16 0-6" | 8/28/09 | 2.19 | 46.5 | 6.4 | 14.0 | 6.6 | 2.41 | 0.75 | 0.063 | 1.1 | 250 | 0.426 | 2.02E-06 | 0.6 | 9.00E-07 | 0.2 |
| Location 16 6-12" | 8/28/09 | 3.05 | 60.3 | 6.3 | 22.2 | 13.1 | 4.30 | 1.02 | 0.039 | 0.2 | 270 | 0.281 | 7.38E-07 | 0.6 | 1.20E-06 | 0.3 |
| **Average** | | **3.03** | **59.5** | **6.9** | **21.6** | **10.8** | **4.09** | **1.02** | **0.043** | **1.1** | **363** | **0.427** | **5.60E-06** | **0.8** | **1.38E-06** | **0.2** |
| Background 0-6" | 8/28/09 | 0.44 | 43.6 | 6.6 | 3.2 | 1.0 | 0.25 | 0.17 | 0.060 | 2.7 | 300 | 0.079 | 7.72E-07 | 0.4 | 1.30E-06 | 0.3 |
| Background 6-12" | 8/28/09 | 0.36 | 53.9 | 7.2 | 2.1 | 1.0 | 0.58 | 0.47 | 0.034 | 3.6 | 230 | 0.050 | 1.07E-06 | 0.5 | 1.20E-06 | 0.2 |

**TABLE 7A**

**SATELLITE NO. 1**
**LAND APPLICATION FACILITY (IRRIGATOR #1)**
**ANNUAL VEGETATION DATA**
**2009**

| SAMPLE SITE<br>SAMPLE DATE | | Quarter 1<br>(NW) | Quarter 2<br>(NE) | Quarter 3<br>(SE) | Quarter 4<br>(SW) | Background |
|---|---|---|---|---|---|---|
| TRACE METALS (mg/kg):<br>SW6020 Dry Ash Extracted | Lower Limit of Detection | | | | | |
| Arsenic | 0.05 | ND | ND | ND | 0.6 | ND |
| Barium | 0.05 | 26.70 | 25.00 | 19.60 | 58.70 | 38.00 |
| Boron | 5 | ND | ND | ND | 9 | 6 |
| Selenium | 0.05 | 12.40 | 8.20 | 18.70 | 10.60 | 1.80 |
| RADIOMETRIC (µCi/kg):<br>E903.0 | | | | | | |
| U-Nat | | 2.3E-04 | 7.0E-05 | 2.4E-04 | 6.4E-03 | 5.0E-05 |
| U-Nat RL | | 3.0E-05 | 3.0E-05 | 3.0E-05 | 3.0E-05 | 3.0E-05 |
| Ra226 | | 1.9E-04 | 1.1E-04 | 1.3E-04 | 1.9E-04 | 1.9E-04 |
| Ra226 ERR. EST. +/- | | 1.2E-05 | 1.0E-05 | 9.7E-06 | 1.2E-05 | 1.3E-05 |
| Ra226 MDC | | 3.7E-06 | 4.7E-06 | 3.7E-06 | 4.1E-06 | 4.3E-06 |

**TABLE 7B**

**SATELLITE NO. 2**
**LAND APPLICATION FACILITY (IRRIGATOR #2)**
**ANNUAL VEGETATION DATA**
**2009**

| SAMPLE SITE<br>SAMPLE DATE | | Quarter 1<br>(NW) | Quarter 2<br>(NE) | Quarter 3<br>(SE) | Quarter 4<br>(SW) | Background |
|---|---|---|---|---|---|---|
| TRACE METALS (mg/kg):<br>SW6020 Dry Ash Extracted | Lower Limit of Detection | | | | | |
| Arsenic | 0.05 | ND | 0.6 | ND | ND | ND |
| Barium | 0.05 | 14.00 | 23.70 | 13.30 | 14.80 | 21.50 |
| Boron | 5 | 17 | 19 | 17 | 19 | 6 |
| Selenium | 0.05 | 14.9 | 19.00 | 15.80 | 16.80 | 2.80 |
| RADIOMETRIC (µCi/kg):<br>E903.0 | | | | | | |
| U-Nat | | 2.0E-02 | 3.0E-02 | 3.3E-02 | 2.7E-02 | 8.5E-04 |
| U-Nat RL | | 3.0E-05 | 3.0E-05 | 3.0E-05 | 3.0E-05 | 3.0E-05 |
| Ra226 | | 8.7E-05 | 8.7E-05 | 9.0E-05 | 9.0E-05 | 7.2E-05 |
| Ra226 ERR. EST. +/- | | 6.5E-06 | 6.1E-06 | 7.5E-06 | 7.2E-06 | 6.6E-06 |
| Ra226 MDC | | 2.4E-06 | 2.1E-06 | 3.1E-06 | 2.9E-06 | 2.9E-06 |

**TABLE 8**

**SATELLITE NO. 1**
**LAND APPLICATION FACILITY (IRRIGATOR NO. 1)**
**MONTHLY IRRIGATION FLUID DATA**
**2009**

**IRRIGATION CYCLE**

**VOLUME (AF)**

| **MAJOR IONS (mg/L)** | Reporting Limit | **Jul-09** | **Aug-09** | **Sep-09** | **Oct-09** | **Nov-09** | **Dec-09** |
|---|---|---|---|---|---|---|---|
| Calcium | 1.0 | | | | | | |
| Magnesium | 1.0 | **Irrigator** | **Irrigator** | **Irrigator** | **Irrigator** | **Irrigator** | **Irrigator** |
| Sodium | 1.0 | **Did** | **Did** | **Did** | **Did** | **Did** | **Did** |
| Potassium | 1.0 | **Not** | **Not** | **Not** | **Not** | **Not** | **Not** |
| Bicarbonate | 1.0 | **Operate** | **Operate** | **Operate** | **Operate** | **Operate** | **Operate** |
| Sulfate | 1.0 | | | | | | |
| Chloride | 1.0 | | | | | | |
| **NON-METALS** | | | | | | | |
| TDS @ 180° C (mg/L) | 10.0 | | | | | | |
| pH (standard units) | 0.01 | | | | | | |
| SAR | 0.01 | | | | | | |
| **TRACE METALS (mg/L)** | | | | | | | |
| Arsenic | 0.001 | | | | | | |
| Barium | 0.10 | | | | | | |
| Boron | 0.10 | | | | | | |
| Selenium | 0.001 | | | | | | |
| **RADIOMETRIC** | | | | | | | |
| U-nat (uCi/mL) | 2.03E-10 | | | | | | |
| Ra-226 (uCi/mL) | 2.00E-10 | | | | | | |
| Ra Err. Est. +/- | | | | | | | |

**TABLE 9**

**SATELLITE NO. 2**
**LAND APPLICATION FACILITY (IRRIGATOR NO. 2)**
**MONTHLY IRRIGATION FLUID DATA**
**2009**

**IRRIGATION CYCLE**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **VOLUME (AF)** | | 30.96 | 50.90 | 38.65 | | | |
| DATE SAMPLED | | **Jul-09** | **Aug-09** | **Sep-09** | **Oct-09** | **Nov-09** | **Dec-09** |
| | Reporting | | | | | | |
| **MAJOR IONS (mg/L)** | Limit | | | | | | |
| Calcium | 1.0 | 327 | 359 | 342 | NOT | NOT | NOT |
| Magnesium | 1.0 | 90 | 104 | 108 | OPERATING | OPERATING | OPERATING |
| Sodium | 1.0 | 71 | 84 | 82 | | | |
| Potassium | 1.0 | 25 | 27 | 28 | | | |
| Bicarbonate | 1.0 | 180 | 136 | 104 | | | |
| Sulfate | 1.0 | 722 | 749 | 768 | | | |
| Chloride | 1.0 | 470 | 499 | 496 | | | |
| **NON-METALS** | | | | | | | |
| TDS @ 180° C (mg/L) | 10.0 | 2240 | 1970 | 2250 | | | |
| pH (standard units) | 0.010 | 7.82 | 8.01 | 8.14 | | | |
| SAR | 0.01 | 0.9 | 3.7 | 3.6 | | | |
| **TRACE METALS (mg/L)** | | | | | | | |
| Arsenic | 0.001 | 0.002 | 0.002 | 0.002 | | | |
| Barium | 0.1 | ND | ND | ND | | | |
| Boron | 0.10 | ND | 0.20 | 0.30 | | | |
| Selenium | 0.001 | 0.305 | 0.171 | 0.111 | | | |
| **RADIOMETRIC** | | | | | | | |
| U-nat (uCi/mL) | 2.03E-10 | 3.95E-07 | 3.74E-07 | 3.28E-07 | | | |
| Ra-226 (uCi/mL) | 2.00E-10 | 1.6E-09 | 4.1E-09 | 1.0E-09 | | | |
| Ra Err. Est. +/- | | 2.5E-10 | 4.7E-10 | 1.9E-10 | | | |

**TABLE 10A**

**SATELLITE NO. 2**
**RADIUM TREATMENT SYSTEM DISCHARGE**
**MONTHLY RADIUM GRAB SAMPLES**
**2009**

| SAMPLE DATE | | Jul-09 | Aug-09 | Sep-09 | Oct-09 | Nov-09 | Dec-09 |
|---|---|---|---|---|---|---|---|
| RADIOMETRIC | Reporting Limit | | | | | | |
| Ra-226 (uCi/mL) | 2.00E-10 | 3.40E-09 | 5.00E-09 | 3.90E-09 | 2.70E-09 | 7.70E-10 | 1.20E-09 |
| Ra Err. Est.+/- | | 3.80E-10 | 5.00E-10 | 3.80E-10 | 3.40E-10 | 2.10E-10 | 2.50E-10 |
| Eff. Con. Limit | 6.00E-08 | | | | | | |

**TABLE 10B**

**SATELLITE NO. 3**
**RADIUM TREATMENT SYSTEM DISCHARGE**
**MONTHLY RADIUM GRAB SAMPLES**
**2009**

| SAMPLE DATE | | Jul-09 | Aug-09 | Sep-09 | Oct-09 | Nov-09 | Dec-09 |
|---|---|---|---|---|---|---|---|
| RADIOMETRIC | Reporting Limit | | | | | | |
| Ra-226 (uCi/mL) | 2.00E-10 | 3.40E-09 | 2.70E-08 | 6.00E-09 | 2.90E-10 | ND | 3.30E-09 |
| Ra Err. Est.+/- | | 3.50E-10 | 8.90E-10 | 3.40E-10 | 1.50E-10 | 1.00E-10 | 3.50E-10 |
| Eff. Con. Limit | 6.00E-08 | | | | | | |

**TABLE 11**

**SATELLITE NO. 2**
**PURGE STORAGE RESERVOIR**
**SHALLOW MONITORING WELLS**
**WATER LEVEL AND WATER QUALITY DATA**
**3rd & 4th QUARTERS 2009**

| SAMPLE SITE | | Shallow Well No. 1 (South) | | Shallow Well No. 2 (East) | |
|---|---|---|---|---|---|
| **SAMPLE DATE** | | 3-Sep-09 | 12-Nov-09 | 3-Sep-09 | 12-Nov-09 |
| **WATER LEVEL (DTW)** | | 12.0 | 13.3 | 9.6 | 11.0 |
| **MAJOR IONS (mg/L)** | Reporting Limit | | | | |
| Bicarbonate | 1.0 | 384 | **NOT** | 366 | 282 |
| Sulfate | 1.0 | 2270 | **ENOUGH** | 2310 | 2440 |
| Chloride | 1.0 | 329 | **WATER TO** | 414 | 368 |
| **NON-METALS** | | | **SAMPLE** | | |
| Cond (µmho/cm) | 1.0 | 4890 | | 5240 | 5070 |
| pH (standard units) | 0.01 | 7.68 | | 7.51 | 7.90 |
| **TRACE METALS (mg/L)** | | | | | |
| Barium | 0.001 | ND | | ND | ND |
| Selenium | 0.0025 | 1.4600 | | 0.0450 | ND |
| **RADIOMETRIC** | | | | | |
| U-nat (uCi/mL) | 6.77E-10 | 5.72E-01 | | 5.99E-02 | ND |
| Ra-226 (uCi/mL) | 2.00E-10 | 1.00E-09 | | 8.90E-10 | 8.10E-10 |
| Ra-226 Err. Est. +/- (uCi/mL) | | 1.90E-10 | | 1.80E-10 | 2.00E-10 |

## TABLE 12

## 2009 DOSE TO PUBLIC CALCULATIONS

| Monitoring Location/Parameter | | Average Concentration/Annual Gamma Dose | Average Concentration/Annual Gamma Dose Above Background | 10 CFR 20 App. B, Table 2 Values | Dose to the Public mrem/yr[1] |
|---|---|---|---|---|---|
| **Dave's Water Well** (Background) | | | | | |
| | Uranium (µCi/ml) | 1.13E-16 | | 9.00E-14 | |
| | Thorium-230 (µCi/ml) | 0.00E+00 | | 2.00E-14 | |
| | Radium-226 (µCi/ml) | 1.71E-16 | | 9.00E-13 | |
| | Lead-210 (µCi/ml) | 1.11E-14 | | 6.00E-13 | |
| | Radon-222 (µCi/ml) | 1.4E-09 | | 1.00E-08 | |
| | Gamma (mrem/yr) | 152 | | -- | |
| | **TEDE (mrem/yr)** | | | | **Background** |
| **Fenceline** (Restricted Area Boundary) | | | | | |
| | Uranium (µCi/ml) | 6.49E-16 | 5.37E-16 | 9.00E-14 | 0.30 |
| | Thorium-230 (µCi/ml) | 1.48E-17 | 1.48E-17 | 2.00E-14 | 0.04 |
| | Radium-226 (µCi/ml) | 1.64E-16 | 0 | 9.00E-13 | 0.00 |
| | Lead-210 (µCi/ml) | 1.31E-14 | 2.07E-15 | 6.00E-13 | 0.17 |
| | Radon-222 (µCi/ml) | 2.6E-09 | 1.20E-09 | 1.00E-08 | 6.00 |
| | Gamma (mrem/yr) | 186 | 3.40E+01 | -- | 34.00 |
| | **TEDE (mrem/yr)** | | | | **40.51** |
| **Vollman** (Nearest Downwind Residence) | | | | | |
| | Uranium (µCi/ml) | 6.53E-16 | 5.40E-16 | 9.00E-14 | 0.30 |
| | Thorium-230 (µCi/ml) | 6.05E-17 | 6.05E-17 | 2.00E-14 | 0.15 |
| | Radium-226 (µCi/ml) | 1.13E-16 | 0 | 9.00E-13 | 0.00 |
| | Lead-210 (µCi/ml) | 1.43E-14 | 3.22E-15 | 6.00E-13 | 0.27 |
| | Radon-222 (µCi/ml) | 1.05E-09 | 0 | 1.00E-08 | 0.00 |
| | Gamma (mrem/yr) | 157 | 5.00E+00 | -- | 5.00 |
| | **TEDE (mrem/yr)** | | | | **5.72** |

Notes:

TEDE — Total Effective Dose Equivalent (mrem/yr)

< 1 — One or more of the Lower Limits of Detection (LLD) used to determine average concentration.

Dose from radionuclides (mrem/yr) = $\frac{\text{Avg concentration above background in µCi/ml) * 50 mrem}}{\text{10 CFR 20 AppB, Table 2 value in µCi/ml}}$

# ATTACHMENT B

# SAFETY AND ENVIRONMENTAL EVALUATIONS (2ND HALF 2009)

Cameco

**CAMECO RESOURCES**
***Smith Ranch-Highland Operation***

# Inter-Office Memo

To: Tom Cannon

From: Dawn Kolkman

Date: 8/11/09

Cc: Arlene Crook, John McCarthy

Subject: ORC/SERP # 0-071609-1 Resin (Scale) Traps

**A. <u>SERP Evaluation Checklist</u>**

(New) Change, Test and Experiment License Condition

a. The licensee may, without obtaining a license amendment pursuant to §40.44, and subject to conditions specified in (b) of this condition:

1) Make changes in the facility as described in the license application (as updated).
2) Make changes in the procedures as described in the license application (as updated), and
3) Conduct test or experiments not described in the license application (as updated).

b. NRC License Condition 9.4b of SUA-1548 requires a license amendment prior to implementing a proposed change, test or experiment. The SERP shall review the Checklist to determine if a license amendment is required prior to implementing a proposed change.

## SERP Evaluation Checklist

| NRC LICENSE REQUIREMENT | YES | NO | N/A |
|---|---|---|---|
| Results in any appreciable increase in the frequency of occurrence of an accident previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the consequences of an accident previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the consequences of a malfunction of an SSC previously evaluated in the license application (as updated) | | X | |
| Creates a possibility for an accident of a different type than any previously evaluated in the license application (as updated) | | X | |
| Creates a possibility for a malfunction of an SSC with a different result than previously evaluated in the license application (as updated) | | X | |
| Results in a departure from the method of evaluation described in the license application (as updated) used in establishing the final safety evaluation report (FSER) or the environmental assessment (EA) or technical evaluation reports (TERs) or other analyses and evaluations for license amendments. | | x | |

If all questions are answered NO then implementation can begin. If any of the questions are answered YES then an amendment to License must be submitted and approval received from NRC prior to implementation.

## B. SAFETY AND ENVIRONMENTAL REVIEW PANEL (SERP)

NRC License condition 9.4d of SUA-1548 requires that any changes, test or experiments made under the Performance Based License Condition be evaluated by a SERP consisting of at least three individuals. One member must have management expertise and have the financial and management responsibility for approving changes. The second member must have operational and/or construction expertise and have responsibility for implementing any operational changes. The third member must be the Radiation Safety Officer (RSO), or equivalent (CRSO), with the responsibility of assuring that the proposed activities will conform to radiation safety and environmental requirements. Members selected to perform this SERP review include:

| SERP Member | QUALIFICATIONS TITLE |
|---|---|
| Tom Cannon | General Mgr. of Operations |
| John McCarthy | Asst. EHS Mgr and RSO |
| Craig Hiser | Wellfield Operations Supervisor |
| Steve Miller | Engineer |
| Jim Clay | Engineer |
| Dawn Kolkman | Environmental Coordinator |

## C. EVALUATION OF PROPOSED CHANGE/TEST

Operations/Technical Review
Operations and technical review discussed in ORC – see minutes

Environmental/Safety Review
Discussed in ORC – please see minutes.

Compliance Review
After reviewing the process change, the group decided there would be no compliance issues with utilizing this.

## D. CONCLUSIONS

For this change no license amendment would be necessary.

C. **EVALUATION OF/PROPOSED CHANGE/TEST**

Operations/Technical Review

Environmental/Safety Review

Compliance Review

Previous Page

D. **CONCLUSIONS**

SERP Member Signatory Approvals

Signature: _____ Date: 8/3/09

Signature: _____ Date: 8.3.09

Signature: _____ Date: 8/3/2009

Signature: _____ Date: 8/3/2009

Signature: _____ Date: 8/3/09

Signature: _____ Date: 8.3.09

Signature: _____ Date: _____

Signature: _____ Date: _____

E. **ATTACHEMENTS (if any)**

Cameco

CAMECO RESOURCES
*Smith Ranch-Highland*
*Operation*

# Inter-Office Memo

To: Tom Cannon

From: Dawn Kolkman

Date: 8/11/09

Cc: Arlene Crook, John McCarthy

Subject: ORC/SERP # 0-071609-1 Resin (Scale) Traps

**A. SERP Evaluation Checklist**

(New) Change, Test and Experiment License Condition

a. The licensee may, without obtaining a license amendment pursuant to §40.44, and subject to conditions specified in (b) of this condition:

1) Make changes in the facility as described in the license application (as updated).
2) Make changes in the procedures as described in the license application (as updated), and
3) Conduct test or experiments not described in the license application (as updated).

b. NRC License Condition 9.4b of SUA-1548 requires a license amendment prior to implementing a proposed change, test or experiment. The SERP shall review the Checklist to determine if a license amendment is required prior to implementing a proposed change.

## SERP Evaluation Checklist

| NRC LICENSE REQUIREMENT | YES | NO | N/A |
|---|---|---|---|
| Results in any appreciable increase in the frequency of occurrence of an accident previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the consequences of an accident previously evaluated in the license application (as updated) | | X | |
| Results in any appreciable increase in the consequences of a malfunction of an SSC previously evaluated in the license application (as updated) | | X | |
| Creates a possibility for an accident of a different type than any previously evaluated in the license application (as updated) | | X | |
| Creates a possibility for a malfunction of an SSC with a different result than previously evaluated in the license application (as updated) | | X | |
| Results in a departure from the method of evaluation described in the license application (as updated) used in establishing the final safety evaluation report (FSER) or the environmental assessment (EA) or technical evaluation reports (TERs) or other analyses and evaluations for license amendments. | | x | |

If all questions are answered NO then implementation can begin. If any of the questions are answered YES then an amendment to License must be submitted and approval received from NRC prior to implementation.

## B. SAFETY AND ENVIRONMENTAL REVIEW PANEL (SERP)

NRC License condition 9.4d of SUA-1548 requires that any changes, test or experiments made under the Performance Based License Condition be evaluated by a SERP consisting of at least three individuals. One member must have management expertise and have the financial and management responsibility for approving changes. The second member must have operational and/or construction expertise and have responsibility for implementing any operational changes. The third member must be the Radiation Safety Officer (RSO), or equivalent (CRSO), with the responsibility of assuring that the proposed activities will conform to radiation safety and environmental requirements. Members selected to perform this SERP review include:

| SERP Member | QUALIFICATIONS TITLE |
|---|---|
| Tom Cannon | General Mgr. of Operations |
| John McCarthy | Asst. EHS Mgr and RSO |
| Craig Hiser | Wellfield Operations Supervisor |
| Steve Miller | Engineer |
| Jim Clay | Engineer |
| Dawn Kolkman | Environmental Coordinator |

C. **EVALUATION OF PROPOSED CHANGE/TEST**

Operations/Technical Review
Operations and technical review discussed in ORC – see minutes

Environmental/Safety Review
Discussed in ORC – please see minutes.

Compliance Review
After reviewing the process change, the group decided there would be no compliance issues with utilizing this.

**D. CONCLUSIONS**
For this change no license amendment would be necessary.

C. **EVALUATION OF/PROPOSED CHANGE/TEST**

Operations/Technical Review

Environmental/Safety Review

Compliance Review

Previous Page

D. **CONCLUSIONS**

SERP Member Signatory Approvals

Signature: _____ Date: 8/3/09

Signature: _____ Date: 8.3.09

Signature: _____ Date: 8/3/2009

Signature: _____ Date: 8/3/2009

Signature: _____ Date: 8/3/09

Signature: _____ Date: 8.3.09

Signature: _____ Date: _____

Signature: _____ Date: _____

E. **ATTACHEMENTS (if any)**

Cameco

# CHANGE CONTROL FORM

## Section 1: CHANGE IDENTIFICATION

**Date:** 8/3/09 **Completed By:** Dawn Kolkman

**Title of Change:** **Resin Traps**

**Change Request Originator:** Steve Miller

**Work Order # (If Applicable):** N/A **ORC Log #** O-071609-1

**Scope of Change:**

Engineering is proposing to install a resin trap at Booster House 1 which was constructed, but never used, in Mine Unit 9. These traps will be used to capture carbonate scale in the IC trunkline, preventing the repeated fouling of turbine meters on the IC headers. We are proposing to install two traps constructed for the future Reynolds Ranch Satellite, which are identical to the ones in use at SR-2. Although each trap has the capacity to handle the IC throughput, both will be installed with only one used at a time. When the pressure drop across the trap being used reaches a prescribed set point, a PLC will actuate valves, rerouting the IC fluid though the alternate trap; and also alert the SR-2 operator that one of the traps need to be purged. The material will be evacuated from the full trap using our Vacuum Truck. This material will be a radiological hazard, and will need to be handled accordingly.

The attached drawing and BOM illustrates the proposed arrangement and materials of construction.

**Section 2. ASSESSMENT OF SIGNIFICANCE**

1. Does the Change Request involve a level of significance great enough to require an ORC/SERP review as described in EHS-6? **Yes** ☒ **No** ☐

**Signed:** Dawn Kolkman **Date:** 8.3.09
EHS Coordinator

If "No" is answered to question # 1 above, then work may proceed may proceed on the request in accordance with established procedures and safe work practices, or other controls identified in the Work Order.

If "Yes" is answered to question # 1 above, then an ORC and/or SERP review must be performed in accordance with procedure EHS-6 *Managing Change*

ORC Review (See ORC Review Documentation):

Date Performed 8/3/09

Approved ☒ Disapproved ☐

Comments:

Minor modifications to drawing required.
Steve Miller is to be writing up an SOP & JHA will need to be performed.
To check into the possibility of dewatering.

SERP Review (See SERP Evaluation Checklist Documentation):

Date Performed 8/3/09

Approved ☒ Disapproved ☐ Not Applicable ☐

Comments:

## Section 3. CHANGE IMPLEMENTATION

Have actions and controls identified by the ORC and /or SERP to be implemented prior to project start-up been completed? Yes ☒ No ☐ N/A ☐

If "Yes" or "No"

Signed: _____ _____

Area Supervisor/Manager and/or EHS Coordinator

If "NA"

Signed: _____

EHS Coordinator

| Section 4. FOLLOW-UP (optional) |
| --- |
| |
| |
| |
| |
| |
| |
| |
| |
| |

Cameco

**CAMECO RESOURCES**
***Smith Ranch-Highland***
***Operation***

# Inter-Office Memo

To: Tom Cannon

From: Dawn Kolkman

Date: August 3, 2009

Cc:

Subject: ORC Review minutes – 0-071609-1 Resin (Scale) Traps

Introduction

An ORC meeting was held 8/3/09 to discuss the installation of resin (scale) traps into Booster House 1. The addition of the traps will prevent repeated fouling of turbine meters on the IC Headers. Members of the ORC present at the meeting included: Tom Cannon, Bob Hembree, John McCarthy, Craig Hiser, Steve Miller and Dawn Kolkman.

Discussion

Installation will require that the house be pulled off so that construction on the stairs and railing can be performed. During that time, the resin (scale) traps will be installed and the piping will be worked on. The construction may be carried out by a contractor but that decision has yet to be made. The headers, located before the O2 line, could be built out of carbon steel or polypipe, eliminating the potential for material incompatibility.

The water involved registers at about 2900 pCi. To purge the system it will be sucked out with a VAC truck to isolate from IC pressures. There is some concern about the crush pressure. They are considering the usage of modulation valves which a pneumatic 2-way valves that can close fast which could cause water hammer that in turn may trip the field. Discussed using an acknowledge button that would open the inlet valve while the outlet valve stays closed.

It needs to be decided what will be done with the scale and a dewatering option needs to be explored. It is uncertain if the material can be filter pressed, but if the intent is for the material to go into the BF then it needs to be dewatered.

Safety and Environmental Elements

A standard operating procedure will need to be written and approved prior to operating/maintain this equipment. It could take a long time before cleaning is required – that time frame is yet to be

determined. During cleaning all valves will be operated manually unless there is concern about charged pressure should an empty trailer be used. Consideration was given to installing a clean out line. Scale in the tanks could cause high radiation so may need to post signs. The area will need to be monitored/surveyed to determine if this will be necessary. When flushing the system air will be vented to protect the employee. As the air may contain radon it will need to be vented by a fan.

There will be 2 micro float leak detectors in the sump. One located down low and the other located in the middle.

A JHA will need to be performed prior to the commencement of work. Risk identification was performed with the committee and the remainder of the risk screening will be carried out in a separate meeting.

Attachments
Change Control Form
Risk Assessment Form
Drawing & Schematics
Copy of SOP
JHA
Risk Screening

Conclusion

The NRC license No: SUA-1548 section 10.1.4 and application have been reviewed. The ORC committee evaluated the SERP checklist.

# Inter-Company Memorandum

| | |
|---|---|
| Date: | September 4, 2009 |
| To: | File |
| From: | Miriam Whatley (EHS Coordinator) and John McCarthy (RSO) |
| Re: | Operational Review Committee (ORC) - Safety and Environmental Review Panel (SERP): Gas/Liquid Ratio Meter |
| cc: | |

## A. INTRODUCTION

A new injection header design was approved through the SERP process on April 16, 2009 (cover letter of the ORC/SERP is attached). A method is proposed to scientifically test the efficiency of the design as compared with the older headers. To attain this goal an apparatus was constructed to measure the gas to liquid ratio of each leg of a injection header and photos are attached. A pre-operational Standard Operating Procedure (SOP) to perform this task was developed and is attached. The resulting data will provide an objective comparison of the oxygen distribution system for the two designs. Resulting in an assessment of the efficiency of the new design.

## B. SAFETY AND ENVIRONMENTAL REVIEW PANEL (SERP)

NRC License condition 9.4d of SUA-1548 requires that any changes, test or experiments made under the Performance Based License Condition be evaluated by a SERP consisting of at least three individuals. One member must have management expertise and have the financial and management responsibility for approving changes. The second member must have operational and/or construction expertise and have responsibility for implementing any operational changes. The third member must be the Radiation Safety Officer (RSO), or equivalent, with the responsibility of assuring that the proposed activities will conform to radiation safety and environmental requirements. Individuals selected to perform this SERP review include:

T. Cannon- General Manager Operations
J. McCarthy- Assistant Manager, Environmental, Health, and Safety /RSO
M. Whatley- Environmental Coordinator
A. Rose – Engineer

## C. EVALUATION OF PROPOSED CHANGE/TEST

The SERP met on September 4, 2009 to review the proposed test of the oxygen/liquid ratio in a new header. Upon review the panel approved the test.

## SERP Evaluation Checklist

| NRC LICENSE REQUIREMENT | YES | NO | N/A |
|---|---|---|---|
| Does the proposed change, test, and/or experiment conflict with the ALARA principle? | | X | |
| Does the proposed change, test, and/or experiment conflict with the Company's ability to meet all applicable NRC regulations? | | X | |
| Is there degradation in the essential safety or environmental commitments in the license application, or provided in the approved reclamation plan? | | X | |
| Does the proposed change, test, and/or experiment conflict with any requirement specifically stated in the source material license? | | X | |
| Is the proposed change, test, and/or experiment not consistent with the conclusions of actions analyzed in the facilities Final Safety Evaluation Report (FSER)? | | X | |
| Is the proposed change, test, and/or experiment not consistent with the conclusions of actions analyzed in the facilities Environmental Assessment (EA) or supplemental EAs? | | X | |
| Does the proposed change, test, and/or experiment result in any increase in the frequency of occurrence of an accident previously evaluated in the license application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment result in any increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the license application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment result in any increase in the consequences of an accident previously evaluated in the license application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment result in any increase in the consequences of a malfunction of an SSC previously evaluated in the license application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment create a possibility for an accident of a different type than previously evaluated in the application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment create a possibility for a malfunction of an SSC with a different result than previously evaluated in the license application (as updated)? | | X | |
| Does the proposed change, test, and/or experiment result in the departure from the method of evaluation described in the license application (as updated) used in establishing the final safety evaluation report or the environmental assessment (EA) or technical evaluation reports (TERs) or other analysis and evaluations? (SSC means any SSC which has been referenced in a NRC staff SER, TER, EA, or environmental impact statement (EIS) and all supplements and amendments.) | | X | |

### Conclusions

This section should state the final Conclusions of the SERP evaluation and the final approval/disapproval of the proposed change. Every individual who participated in the SERP will provide a signature and date in this section.

## C. EVALUATION OF PROPOSED CHANGE/TEST

Operations/Technical Review

Environmental/Safety Review

Compliance Review

## D. CONCLUSIONS

SERP Member Signatory Approvals

Signature: John McCarthy Date: 9/4/09

Signature: Miriam Whalley Date: 9-4-09

Signature: Steven L. Miller FOR ADAM ROSE Date: 9/4/09

Signature: [signature] Date: 9.4.09

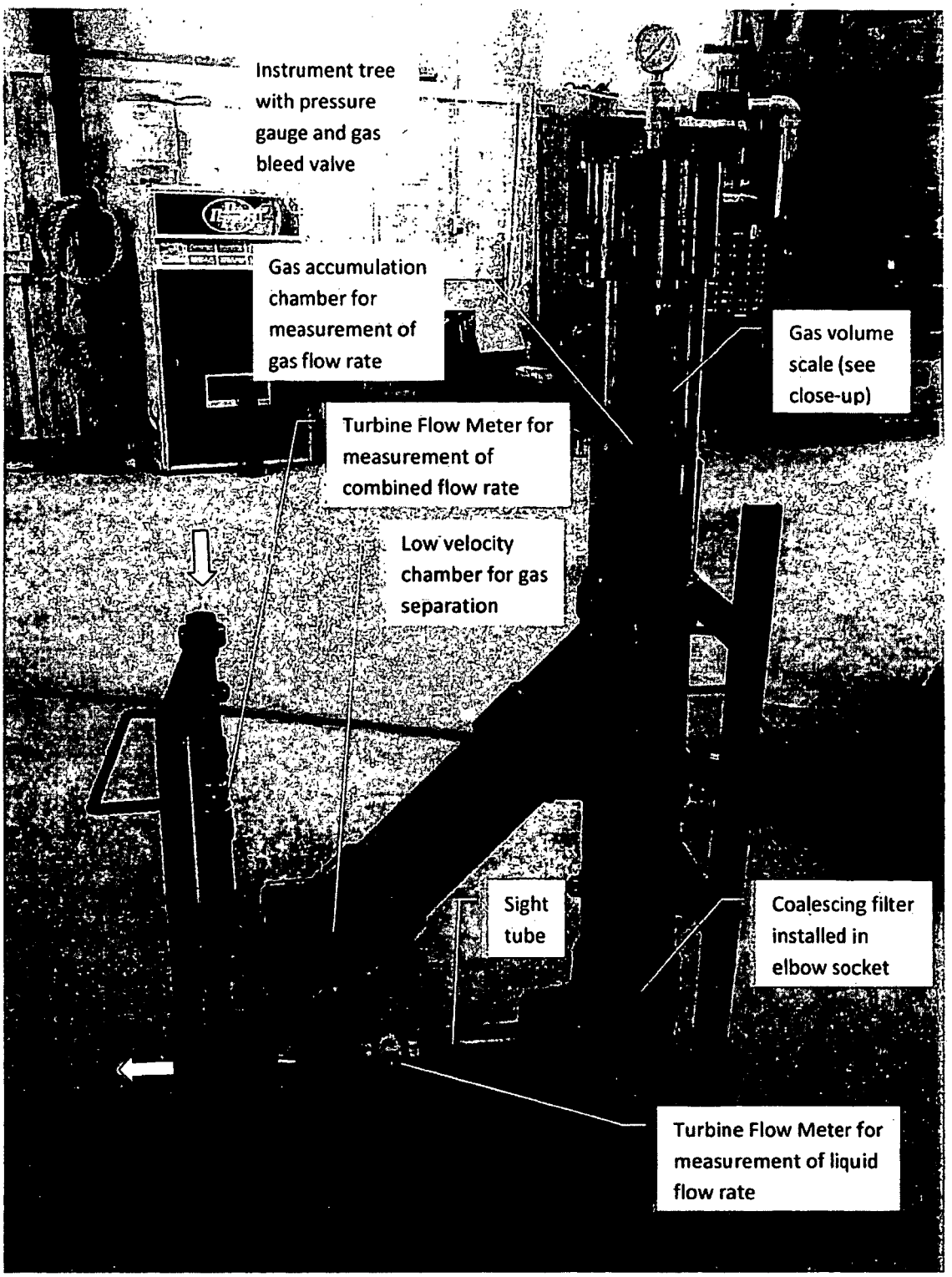
Signature: _____ Date: _____

Signature: _____ Date: _____

Signature: _____ Date: _____

Signature: _____ Date: _____

## E. ATTACHEMENTS (if any)


Instrument tree with pressure gauge and gas bleed valve
Gas accumulation chamber for measurement of gas flow rate
Gas volume scale (see close-up)
Turbine Flow Meter for measurement of combined flow rate
Low velocity chamber for gas separation
Sight tube
Coalescing filter installed in elbow socket
Turbine Flow Meter for measurement of liquid flow rate


GLR Meter – Gas volume scale

CAMECO RESOURCES
SMITH RANCH-HIGHLAND OPERATION

STANDARD OPERATING PROCEDURES

**PRE-OPERATIONAL**

TITLE: **Gas/Liquid Ratio (GLR) Meter Operation**

Section: _____
Procedure No: _____
Effective Date: _____
Revision Date/#: _____
Approvals:
Operations: _____
Proj RSO: _____
Total Pages: 3

## 1 SAFETY

1.1 Use proper lifting techniques when moving the GLR Meter into the header house.

1.2 Safety equipment: Wear hard hat, steel toe shoes, goggles and rubber gloves.

## 2 HAZARDS

2.1 The gas bled from the GLR Meter will be primarily oxygen which could present a fire hazard. This gas might also contain radon.

2.2 IC fluid released while disconnecting the meter run, and the GLR meter, will contain radium.

2.3 Use of the GLR Meter creates a chamber of compressed gas, which presents the potential for explosive release in the event of equipment failure.

## 3 RADIOLOGICAL CONTROLS

3.1 All employees working in the Smith Ranch/Highland shall endeavor to prevent radioactive contaminants from entering the body. This will be accomplished by following all rules and practicing good housekeeping and personal hygiene at all times.

3.2 Refer to SOP2950 "Radiological Controls and Housekeeping" for procedures.

## 4 USING THE GLR METER

4.1 Situate the GLR Meter adjacent to the meter run to be measured.

4.2 Measure the flow rate in the meter run, and record in the log book.

4.3 Isolate the meter run by slowly closing the upstream valve, and then the downstream valve.

4.4 Carefully disconnect the meter run at the unions, allowing all residual pressure to bleed off before completely removing the run. Care should be taken to avoid contamination of skin and clothing during this step.

4.5 Connect the GLR Meter making sure the flow direction is correct.

4.6 Open the bleed valve on top of the GLR Meter and route a hose from the bleed valve to the header house basement, near the radon fan inlet pipe.

4.7 Partially open the upper meter run valve to fill the GLR Meter with IC fluid. Slowly close the GLR Meter bleed valve when the gas accumulation chamber is full of fluid.

4.8 Fully open the upper meter run valve, and adjust the lower meter run valve until the GLR Meter entering flow rate is the same as measured in Step 4.2.

4.9 Bleed all gas from the chamber by opening the bleed valve on top of the GLR Meter. Slowly close the bleed valve when the gas accumulation chamber is full of fluid.

4.10 Measure the rate of gas accumulation in the GLR Meter chamber using a stop watch and the chamber scale. Record results in the log book.

4.11 Measure the GLR Meter exiting flow rate, and record in the log book.

4.12 Isolate the GLR Meter by slowly close the upstream valve, and then the downstream valve.

4.13 Bleed all gas from the chamber by slowly opening the bleed valve on top of the GLR Meter. Confirm the chamber pressure is zero at the pressure gauge before proceeding.

4.14 Carefully disconnect the GLR Meter at the unions. If no more runs are to be measured at this header house, drain all fluid from the GLR Meter into the house basement. Care should be taken to avoid contamination of skin and clothing during this step.

4.15 Reconnect the meter run.

4.16 Slowly open the upper meter run valve. Adjust the lower meter run valve until the flow is the same as measured in Step 4.2.

## 5 ENVIRONMENTAL

5.1 EHMS Awareness Training – NA

5.2 Job Specific Training – NA

5.3 Regulatory – required training/Roles and Responsibilities - NA

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Separate Header design change. The header will be tested first, to determine the effectiveness of the new design

# CHANGE CONTROL FORM

**Section 1: CHANGE IDENTIFICATION**

**Date:** 4/~~16~~09 **Completed By:** Dawn Kolkman

**Title of Change:** **Header House IC Design Change**

**Change Request Originator:** Steve Miller

**Work Order # (If Applicable):** N/A **ORC Log #** O-~~041609~~090409-1

**Scope of Change:**

We are proposing the following new designs for IC systems in header houses:

1. Oxygen Injection System: To improve dispersion of oxygen bubbles in the injection fluid header, we have designed a new oxygen injection system design. The system is comprised of a ½" thick 50 micron porous plastic disk glued into a flanged PVC wye. The angled leg of the wye will convey the IC fluid, with the oxygen from the straight leg, vertically into a flanged clear PVC static mixer. The static mixer will discharge into the main tee of the injection header. We propose beginning the implementation of this design with header house 9-5.

2. Injection Header: To simplify injection header construction and operation, we are proposing a new header design without the numerous flanges and orifice plates. In our existing headers, the orifice plates help with mixing of oxygen. With our newly designed Oxygen Injection System, mixing will not be required along the header. The new header design maintains the fluid velocity at ~10 fps which will help keep the oxygen well mixed. Additionally we are reversing the hierarchy of the well flows along the header. The lowest flow wells will now be nearest the main branch. This will largely insulate them from system instability when higher flow wells go offline. This design will be easier to construct and improve overall header house operation. We propose beginning the implementation of this design with header house 9-8.

**Section 2. ASSESSMENT OF SIGNIFICANCE**

1. Does the Change Request involve a level of significance great enough to require an ORC/SERP review as described in EHS-6? **Yes** ☒ **No** ☐

**Signed:** Miriam Wratley **Date:** 9/3/09 ~~9/3/08~~ mw
EHS Coordinator

If "No" is answered to question # 1 above, then work may proceed may proceed on the request in accordance with established procedures and safe work practices, or other controls identified in the Work Order.

If "Yes" is answered to question # 1 above, then an ORC and/or SERP review must be performed in accordance with procedure EHS-6 *Managing Change*

ORC Review (See ORC Review Documentation):

Date Performed 9/3/09

Approved ☒ Disapproved ☐

Comments:

SERP Review (See SERP Evaluation Checklist Documentation):

Date Performed 9/3/09

Approved ☒ Disapproved ☐ Not Applicable ☐

Comments:

| Section 3. CHANGE IMPLEMENTATION |
|---|
| Have actions and controls identified by the ORC and /or SERP to be implemented prior to project start-up been completed? Yes ☒ No ☐ N/A ☐<br><br>If "Yes" or "No"<br><br>Signed: _____ Miriam Whalley<br>Area Supervisor/Manager and/or EHS Coordinator<br><br>If "NA"<br><br>Signed: _____<br>EHS Coordinator |

| Section 4. FOLLOW-UP (optional) |
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# CHANGE CONTROL FORM

## Section 1. CHANGE IDENTIFICATION

**Date:** 9/3/09 **Completed By:** John McCarthy & Miriam Whatley

**Title of Change:** Gas/Liquid Ratio (GLR) Meter Operation

**Change Request Originator:** Steve Miller

**Work Order # (If Applicable):** N/A **ORC Log #** O-

**Scope of Change:** Cameco has constructed an apparatus for measuring Gas/Liquid Ratio (GLR) in each leg of an IC distribution Header. This will assist in well field balancing and determine the proper ratio of $O_2$ in the injection stream.

This system is portable and will Test each IC line at the header independently.

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# ORC RISK SCREENING/ASSESSMENT FORM

| Section 1 | | | |
|---|---|---|---|
| **Date:** | 9/3/09 | **Completed by:** | JOHN MCCLINTOCK |
| **Title of Change:** | GAS FLOWMETER RATIO (GLR) METER | | |
| **Change Request Originator:** | | | |
| **Work Order: (if applicable :)** | | **ORC Log #** | |

| ORC Member | Title |
|---|---|
| | GENERAL MGR |
| | SNR. ENGINEER |
| Miriam Whatley | Environmental Coordinator |
| | Asst. Manager EHS, RSO |

| Section 2 | | | |
|---|---|---|---|
| **Risk Assessment Question** | **Yes** | **No** | **N/A** |
| Will the proposed change result in a potential increase of radiological exposure to employees or the public? | ☐ | ☒ | ☐ |
| Will additional radiological monitoring be required as a result of the proposed change? | ☐ | ☒ | ☐ |
| Will additional radiological controls or personal protective equipment be required as a result of the proposed change? | ☐ | ☒ | ☐ |
| Will the proposed change result in an increase in transportation of radioactive materials or require modification of current transportation methods? | ☐ | ☒ | ☐ |
| Will the proposed change result in an increased potential for a significant release or spill of radioactive material? | ☐ | ☒ | ☐ |
| Has new equipment, facilities, or processes been proposed that introduce potential additional hazards or require engineering controls to reduce hazards? | ☐ | ☒ | ☐ |
| Have new electrical systems been proposed that introduce potential additional hazards or require engineering controls to reduce hazards? | ☐ | ☒ | ☐ |
| Will the proposed change result in an increased exposure to elevated noise levels? | ☐ | ☒ | ☐ |
| Will new potentially hazardous chemicals and/or bulk chemical storage areas be introduced? | ☐ | ☒ | ☐ |
| Will the proposed change introduce potentially hazardous confined space areas or introduce potential hazards to existing confined spaces? | ☐ | ☒ | ☐ |
| Will the proposed change result in abnormal hazards from excavation or construction not predicted in current procedures? | ☐ | ☒ | ☐ |
| Will the proposed change result in an increased fire hazard or will | ☐ | ☒ | ☐ |

| | | | |
|---|---|---|---|
| existing fire protection systems be ineffective? | | | |
| Will the proposed change increase potential for a violation of an environmental or radiological regulatory permit or standard? | ☐ | ☒ | ☐ |
| Will the proposed change cause significant surface disturbance outside of the permit area? | ☐ | ☒ | ☐ |
| Will the proposed change result in a significant increase in solid, hazardous, or radiological waste generation? | ☐ | ☒ | ☐ |
| Will the proposed change require approval from a regulatory agency or coverage under a permit? | ☐ | ☒ | ☐ |
| Will special training need to be incorporated beyond the scope of current training programs? | ☐ | ☒ | ☐ |
| Will additional Standard Operating Procedures or Emergency Response Procedures need to be developed prior to change implementation? | ☐ | ☒ | ☐ |
| Will the proposed change introduce potential legal issues or obligations? | ☐ | ☒ | ☐ |
| Will the proposed change result in nonconformance with established company policies? | ☐ | ☒ | ☐ |
| Will the proposed change result in damage to the credibility, public perception, reputation, or public good standing of Power Resources, Crow Butte Resources, or Cameco as a reputable company? | ☐ | ☒ | ☐ |
| Are there any other risk scenarios not included in the above questions that could result from the proposed change? | ☐ | ☒ | ☐ |
| Will proposed change affect the sites Environmental Aspects? | ☐ | ☒ | ☐ |

**Section 3**

**If yes was answered to any questions above, indicate the controls or mitigative actions to be used to minimize the associated risk:**

| Section 4 | | | |
|---|---|---|---|
| **Is the risk(s) identified acceptable as a result of the controls and mitigative actions described above.** | **Yes** ☒ | **No** ☐ | **N/A** ☐ |
| **If "No", describe additional controls or mitigative actions required to bring the risk(s) back to acceptable levels:** | | | |

| Section 5 | | |
|---|---|---|
| **Risk Assessment Team Approvals** | | |
| **Name (Print)** | **Signature** | **Date** |
| John McCarthy | John McCarthy | 9/3/09 |
| Tom Cannon | | 9.3.09 |
| Adam Rose | | 9/3/09 |
| Miriam Whatley | Miriam Whatley | 9-3-09 |
| | | |
| | | |
| | | |
| | | |

**John McCarthy**

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**From:** Steve Miller [stephen_miller@cameco.com]
**Sent:** Tuesday, September 01, 2009 3:13 PM
**To:** Dawn Kolkman
**Cc:** Bob Hembree; Jim Clay; Adam Rose; John McCarthy
**Subject:** ORC - GLR Meter
**Attachments:** GLR Meter Photos.pdf; SOP____-GLR Meter Operation.pdf

Dawn,

Please initiate an ORC for the following apparatus:

GLR Meter

We have designed, and constructed, an apparatus for measuring the gas/liquid ratio (GLR) in each leg of an IC distribution header. We are proposing to use this meter to measure the GLR for each leg of the IC header in HH 9-4, which is representative of the Linde header design, and in HH 9-8, which is the first operating example of the new header design. The data from these tests will provide an objective comparison of the oxygen distribution for the two designs.

The meter operates by separating the gas, primarily oxygen, from the liquid, while providing a way to measure the rate of gas accumulation along with the flow rate of the degassed liquid. The GLR Meter is constructed from components with a minimum working pressure rating of 140 PSI. The maximum possible pressure supplied from the IC header will be 110 PSI (NOTE: This is controlled by a pressure regulating valve). For additional details, please refer to the attached annotated photographs and draft SOP.

Please let me know if you have any questions.

Sincerely,
Stephen L. Miller
Sr. Engineer
Cameco Resources
P.O. Box 1210
Glenrock, WY 82637
Phone: 307-358-6541 x437
Cell: 970-319-1591
Fax: 307-358-4533
E-Mail: stephen_miller@cameco.com

**John McCarthy**

**From:** Adam Rose [Adam_Rose@cameco.com]
**Sent:** Tuesday, September 01, 2009 4:32 PM
**To:** stephen_miller@cameco.com; 'Dawn Kolkman'
**Cc:** 'Bob Hembree'; 'Jim Clay'; 'John McCarthy'
**Subject:** RE: ORC - GLR Meter

So I don't forget, I suggest an instruction that says fill the unit slowly so that not until it's full would it be subject to full flow and then the porous plastic disk would only be subject to a small pressure drop to help prevent it from braking.

Adam Rose
Cameco Resources
307-358-6541 X-468

---

**From:** Steve Miller [mailto:stephen_miller@cameco.com]
**Sent:** Tuesday, September 01, 2009 3:13 PM
**To:** Dawn Kolkman
**Cc:** Bob Hembree; Jim Clay; Adam Rose; John McCarthy
**Subject:** ORC - GLR Meter

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Sincerely,
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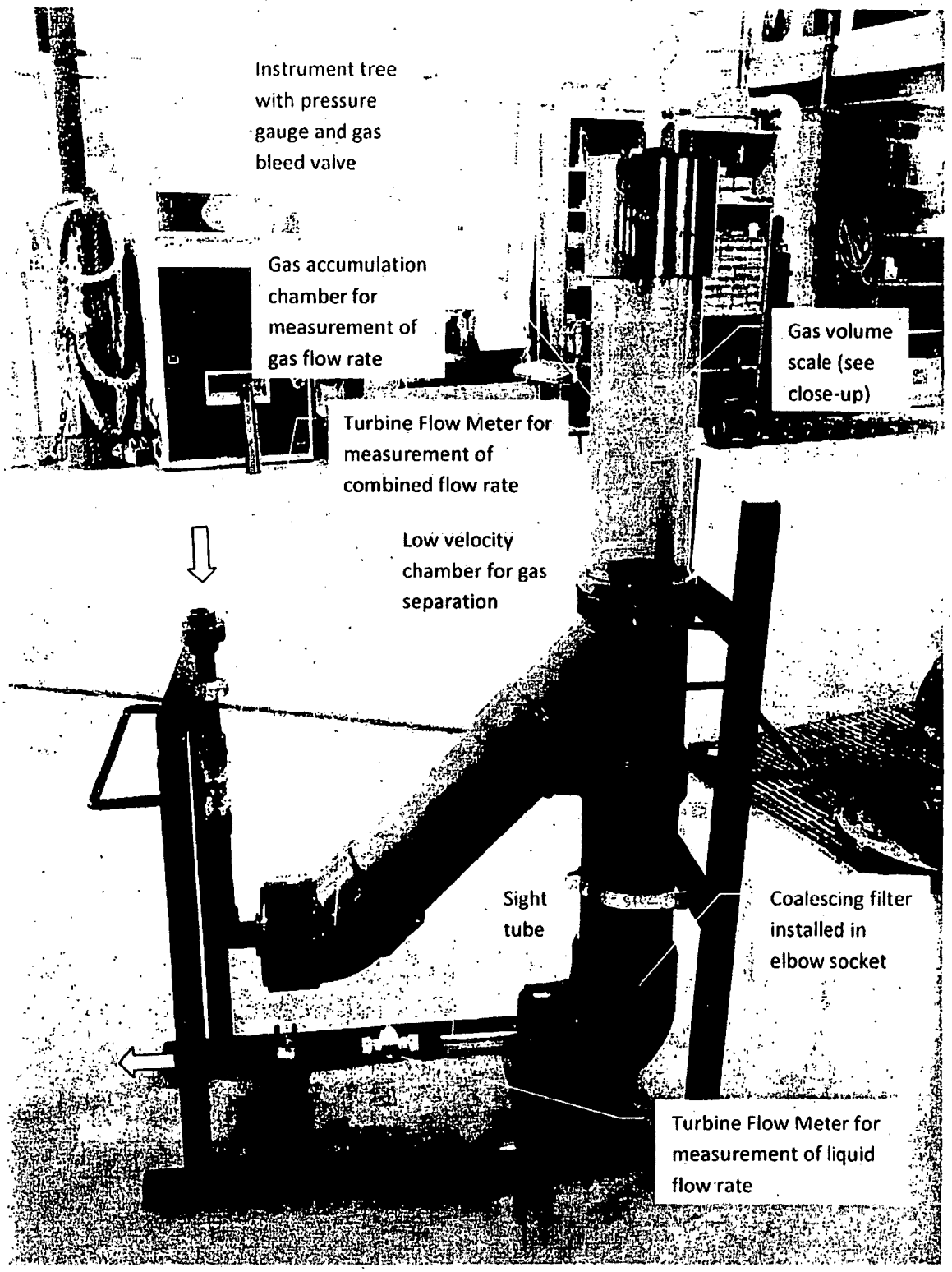
E-Mail: stephen_miller@cameco.com


Instrument tree with pressure gauge and gas bleed valve
Gas accumulation chamber for measurement of gas flow rate
Gas volume scale (see close-up)
Turbine Flow Meter for measurement of combined flow rate
Low velocity chamber for gas separation
Sight tube
Coalescing filter installed in elbow socket
Turbine Flow Meter for measurement of liquid flow rate