STRATA ENERGY INC

A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

March 2, 2018

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Deputy Director, Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Mail Stop T-8F5, 11545 Rockville Pike
Rockville, MD 20852-2738

RE: Strata Energy Inc. Ross ISR Project
Source Materials License SUA-1601, Docket No. 40-9091
July - December 2017 Semi-Annual Effluent Report

To Whom it May Concern,

Strata Energy, Inc. (Strata) hereby submits this Semi-Annual Report for the period of July 1, 2017 through December 31, 2017. This report satisfies the requirements of 10 CFR 40.65 and the applicable license conditions of Source Materials License SUA-1601.

If you have any questions regarding the provided information, please contact me at (307) 467-9375 or by email at rpond@stratawyo.com.

Sincerely,
STRATA ENERGY INC.

Royal Pond
Manager HSE/RSO

cc: Ben Schiffer, WWC Engineering

Attachments: July - December 2017 Semi-Annual Report

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STRATA ENERGY INC

A WHOLLY-OWNED SUBSIDIARY OF PENINSULA ENERGY LIMITED

Strata Energy, Inc.

Ross ISR Project

Source Materials License Number SUA-1601

Docket Number 040-09091

Semi-Annual Effluent and Environmental Monitoring Report

July 1 – December 31, 2017

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APPENDICES

1 INTRODUCTION

Pursuant to 10 CFR 40.65 and Source Materials License SUA-1601, Strata Energy, Inc. (Strata) has prepared this Semi-Annual Report, which summarizes the operational and environmental activities at the Ross ISR Project. The report includes that information required by License Condition 11.1 and 11.2, as applicable. This report covers the time period from July 1 – December 31, 2017.

1.1 ACTIVITIES SUMMARY

Strata commenced uranium recovery operations at the Ross ISR Project on December 2, 2015. The project is licensed for the construction and operation of a full Central Processing Plant (CPP); however, the current operations at the CPP are limited to the processing of wellfield recovery fluids by ion exchange, with the uranium-loaded resin transported to the NRC-licensed Irigaray Ranch facility for processing into yellowcake. In summary, the activities occurring at the Ross ISR Project are analogous to an ISR satellite facility.

Currently (through December 31, 2017) two wellfields, Mine Units 1 and 2 (MU1 and MU2), have been approved by the appropriate regulatory agencies and the Strata Safety and Environmental Review Panel (SERP) and are in operation. No other wellfields are in either active operation or restoration status at the Ross ISR Project.

Drilling, well construction, mechanical integrity testing, and hole plugging activities were continued in Mine Units 1 and 2 during the reporting period.

The monitoring for air particulates, direct radiation, and radon continued at the environmental monitoring stations. Surface water sampling continued at the three surface water monitoring stations and applicable reservoirs. Groundwater monitoring continued for the wells specified in SUA-1601.

2 LICENSE CONDITION 10.8(D) – QUARTERLY INSPECTION OF LINED RETENTION PONDS

There is currently one constructed lined retention pond at the Ross ISR Project. This lined retention pond (Pond 1) is separated into three cells (Cells 1 - 3). There is currently byproduct material being stored in Cells 2 and 3. Cell 1, which is the southernmost cell, contains only direct precipitation. Two quarterly inspections of Pond 1 occurred during the inspection period. The results of the inspections indicate that all embankments are in good condition, there have been no leaks in the liner of Pond 1, and all systems and components are in good condition. The inspection reports are available at the Ross ISR Project.

3 LICENSE CONDITION 10.8(E) – ANNUAL TECHNICAL INSPECTION OF LINED RETENTION PONDS

3.1 INSPECTION SUMMARY

An annual inspection of the lined retention pond was conducted on May 17, 2017 by WWC Engineering. The report of the inspection is provided in the January 1 – July 30, 2017 Semi-Annual Report.

4 LICENSE CONDITION 11.1(C) – OPERATIONAL MONITORING

4.1 STATUS OF WELLFIELDS IN OPERATION

There are currently (through December 31, 2017) two wellfields in operation, MU1 and MU2. There are currently four header houses in operation in MU1 and five header houses in operation in MU2. Start dates for recirculation and conveyance to the CPP for each header house are listed below.

Mine Unit	Header House	Recirculation Start Date	Conveyed to CPP Start Date
MU1	1	01-Dec-15	01-Dec-15 (recirculated through the plant)
	2	27-Jan-16	19-Feb-16
	3	20-Apr-16	16-May-16
	4	09-Jun-16	21-Jun-16
MU2	5	30-Sept-16	27-Dec-16
	6	28-Dec-16	9-Feb-17
	7	21-Feb-17	9-May-17
	8	2-Jun-17	13-Jul-17
	9	15-Aug-17	4-Oct-17

4.2 PROGRESS OF WELLFIELDS IN RESTORATION

There are no wellfields in restoration at the Ross ISR Project.

4.3 STATUS OF LONG TERM EXCURSIONS

No excursions have occurred at the Ross ISR Project.

4.4 SUMMARY OF MECHANICAL INTEGRITY TESTS

4.4.1 Third Quarter

One (1) MU2 well located in Section 7, T53N, R67W, 32 MU2 wells located in Section 18, T53N, R67W, 8 MU2 wells located in Section 13, T53N, R68W, and 4 MU2 wells located in Section 12, T53N, R68W passed mechanical integrity test (MIT) during the third quarter. Three wells (MU2-OZ126, MU2-OZ199, and MU2-0Z201) underwent MIT twice during the quarter due to accidents. In all of these cases, the wells were repaired and passed MIT. Well MU2-OZ258 failed initial MIT, was repaired, and passed a second MIT.

4.4.2 Fourth Quarter

Fifteen (15) MU1 wells located in Section 18, T53N, R67W passed MIT during the fourth quarter.

Twenty-three (23) MU2 wells located in Section 7, T53N, R67W, 6 MU2 wells located in Section 18, T53N, R67W, 6 MU2 wells located in Section 12, T53N, R68W, and 8 MU2 wells located in Section 13, T53N, R68W passed MIT during the fourth quarter.

5 LICENSE CONDITION 11.1(D) – ENVIRONMENTAL MONITORING

Source Materials License SUA-1601 License Condition 10.9 requires Strata to conduct an effluent and environmental monitoring program in accordance with the programs described in the approved license application. Section 5.7.7 and 5.7.8 of the Technical Report (TR) of the approved license application describe the operational effluent and environmental monitoring at the Ross ISR Project.

During the reporting period, Strata operated five environmental monitoring stations. Each monitoring station has a continuous air sampler for measuring the concentration of air particulates, a dosimeter to measure direct radiation, and a detector for measuring radon gas in air. The locations of the monitoring stations are consistent with the recommendation set forth in NRC Regulatory Guide 4.14 and are discussed in detail in TR Section 2.9.2.4.

The environmental monitoring station names and descriptions are as follows:

- "Oshoto" – This location is northeast and downwind of the CPP. It is near a private residence.
- "Met Station" – This location is northwest of the CPP at the site where the meteorological station was previously operated.
- "Southwest" – This location is southwest and upwind of the CPP and wellfields. Per TR Section 2.9.2.4, this is the designated "background location."
- "East" – This location is east of the CPP;
- "North" – This location is north and downwind of the CPP and wellfields. The MILDOS-AREA computer model results show that this location is the "maximally exposed member of the public."

5.1 AIR PARTICULATES

Strata conducts continuous air sampling to determine particulate concentrations in the air. The air particulate sampling is conducted according to TR Section 5.7.7.1.1 and guidance contained in NRC Regulatory Guide 4.14 Section 2.1.2. The air monitoring was conducted at the five environmental monitoring stations discussed above. Air filters were collected bi-weekly, or more often as required by dust loading, and composited for analysis on a quarterly basis. The filters were sent to an accredited contract laboratory for analysis for total uranium, Ra-226, Th-230, and Pb-210.

The results from the air particulate monitoring are summarized in Appendix A, Table 1. The appropriate values from 10 CFR 20, Appendix B, Table 2, Effluent Concentration Limits are also provided in this table for comparison along with the appropriate lower limits of detection (LLDs). The LLDs met the specifications in NRC Regulatory Guide 4.14. The 10 CFR 20, Appendix B, Table 2 values associated with class "W" were used for natural uranium and Th-230.

A review of the data indicates that the air particulate concentrations are consistent with concentrations obtained during the preoperational monitoring period and during 2015, 2016, and the first half of 2017. There is no evidence of any impacts from the current operations.

5.2 DIRECT RADIATION

Strata conducts a direct radiation monitoring program to monitor the direct radiation levels at the environmental monitoring stations described above. The direct radiation levels were measured using LANDAUER® InLight® optical stimulated luminescence (OSL) dosimeters. The OSL dosimeters are exchanged quarterly and sent to LANDAUER®, an NVLAP-accredited company, for analysis. The direct radiation monitoring program was conducted according to TR Section 5.7.7.1.1 and NRC Regulatory Guide 4.14, Section 2.1.6.

A summary of the data obtained from the direct radiation monitoring program for the reporting period is included in Appendix A, Table 2. Data are presented as gross readings.

A review of the data indicates that the gross results are consistent with those obtained during the preoperational monitoring period and during 2015, 2016, and the first half of 2017. There is no evidence of any impacts from the current operations.

5.3 RADON

Strata conducts continuous monitoring for radon gas in accordance with TR Section 5.7.7.1.1 and NRC Regulatory Guide 4.14, Section 2.1.2. The radon gas was measured using LANDAUER® high sensitivity environmental radon alpha-track detectors. The detectors were exchanged quarterly and sent to Radonova for analysis. The detectors were placed at the environmental monitoring stations described above. A summary of the data obtained from the radon gas monitoring is included in Appendix A, Table 3. The 10 CFR 20, Appendix B, Table 2 effluent concentration value of 1.00E-10 µCi/mL for radon with daughters present is also included in Table 3 for comparison.

A review of the data indicates that the results are consistent with those obtained during the preoperational monitoring period and during 2015, 2016, and the first half of 2017. There is no evidence of any impacts from the current operations.

5.4 GROUNDWATER

5.4.1 Private Water Supply Wells

Strata conducts monitoring of private water supply wells in accordance with License Condition 11.1(D), and TR Section 5.7.8.2, which are based on the guidance in NRC Regulatory Guide 4.14 Section 2.1.3. All wells which are currently in use for domestic, agricultural, and livestock purposes and within 2 kilometers of the monitor well ring for active mine units are sampled quarterly. Samples are sent to an accredited contract laboratory for analysis for dissolved and suspended uranium, Ra-226, Th-230, Pb-210, Po-210, gross alpha, and gross beta. An inventory of the private water supply wells is provided in Appendix A, Table 4.

Seventeen private water supply wells were within 2 kilometers of the monitor well ring for MU1 (14 of which were also within 2 kilometers of the monitor well ring for MU2) and an additional three private water supply wells were within 2 kilometers of the monitor well ring for MU2 only during the reporting period.

Three wells (P206432W, P23418P, and P7430P) were not sampled during the reporting period as the pump infrastructure has not been maintained to suitable standards for obtaining a sample. Six wells were not sampled because they were either not in use, could not be located, or have been replaced and the SEO permits have not been canceled. At the landowners request, well SBWELL02 was not sampled during the reporting period. In addition, wells P206432W and P50883W were not functioning in the third quarter.

A summary of the results from the monitoring for the reporting period are included in Appendix A, Table 5. The LLDs and the 10 CFR 20, Appendix B, Table 2 value for each radionuclide of interest are included in Appendix A, Table 6.

A review of the data indicates that all parameters are below the applicable effluent concentration limits and are consistent with results obtained during the preoperational monitoring and during 2015, 2016, and the first half of 2017. There is no evidence of any impacts from the current operations.

5.4.2 Industrial Wells

Strata monitors the groundwater quality of two industrial wells (19XX18 and 22X-19) used for oil field water flood purposes in accordance with License Condition 10.19 and TR Section 5.7.8.2. The industrial wells are sampled on a monthly basis when those wells are near active wellfields in accordance with License Condition 10.19. The samples were sent to an accredited contract laboratory for analysis of dissolved and suspended uranium, Ra-226, Th-230, Pb-210, Po-210, gross alpha, and gross beta.

During the reporting period, industrial well 19XX18 was inoperable. Well 22X-19 was sampled September through December. A summary of the results from the monitoring for the reporting period are included in Appendix A, Table 7. The LLDs and the 10 CFR 20, Appendix B, Table 2 value for each radionuclide are included in Appendix A, Table 6.

A review of the results indicates that all concentrations in well 22X-19 are at similar levels to those obtained during previous reporting periods. The occurrence of low levels of radionuclides in this well is natural, since it is completed in the mineralized formation. There is no evidence of any impacts from ISR activities at the Ross ISR Project.

5.5 SURFACE WATER

Strata conducts monitoring of surface waters in accordance with TR Section 5.7.8.2. Surface water features that lie within the license boundary and may be impacted by operations are sampled and analyzed for dissolved and suspended uranium, Ra-226, Th-230, Pb-210, Po-210, gross alpha, and gross beta. The samples are collected quarterly, when water is available. For the reporting period, site R-2 (Oshoto Reservoir) was the only reservoir with the potential to be impacted by operations.

Strata obtained quarterly grab water samples from site R-2 during the reporting period, as recommended in Regulatory Guide 4.14. The three surface water stations were dry throughout the reporting period. The results are included in Appendix A, Table 8. The LLDs and the 10 CFR 20, Appendix B, Table 2 value for each radionuclide are included in Appendix A, Table 6.

A review of the data indicates that all parameters are below the applicable effluent concentration limits and are consistent with results obtained during the preoperational monitoring and during 2015, 2016, and first half of 2017. There is no evidence of any impacts from the current operations.

5.6 POND MONITORING WELLS

License Condition 10.20 requires Strata to conduct a groundwater detection monitoring program for the lined retention ponds that meet the requirements of Criteria 5 and 7A of 10 CFR 40, Appendix A. The elements in the program are required to be documented in standard operating procedures. Those procedures are contained in Strata's Environmental Management Program (EMP). Throughout the reporting period, Strata collected quarterly samples from the pond monitoring wells. The samples were analyzed for total alkalinity, chloride, and electrical conductivity. All concentrations were below the action levels established by the Strata SERP (SERP 17-3).

5.7 FRENCH DRAIN AND LINED RETENTION POND UNDERDRAIN

As part of the initial CPP area construction activities, a containment barrier wall (CBW) with associated French drain were installed to the south of the CPP and the lined retention pond to depress the shallow groundwater. This was required to facilitate the construction of the lined retention pond and prevent the shallow groundwater from affecting the pond liner system. Discharges from the French drain and lined retention pond underdrain are permitted through the Wyoming Department of Environmental Quality, Water Quality Division. Each discharge point is equipped with a totalizing meter. The flow rate for the French drain averaged 798 gallons per day (gpd) for the third quarter and 625 gpd for the fourth quarter. The flow rate for the lined retention pond underdrain averaged 1,040 gpd for the third quarter. In the fourth quarter, the PLC controlling the pump failed, so there was no discharge from the lined retention pond underdrain in November or December. The flow rate for the lined retention pond underdrain was 2,857 gpd in October. The lined retention pond underdrain flow rates were higher than those estimated in the Ross TR (26 to 28 gpd), which assumed that a French drain would be installed on the west side of the pond, thereby decreasing the amount of shallow groundwater flowing under the pond.

6 LICENSE CONDITION 11.1(D) – OPERATIONAL EFFLUENT MONITORING

Strata's effluent monitoring program was approved by the NRC staff by a verification letter dated November 19, 2015 (ADAMS accession number ML15302A405).

6.1 EFFLUENTS DUE TO AIR PARTICULATES

6.1.1 Plant

In order to measure the quantity of effluent released from the processing facility as air particulates, Strata submits quarterly composite samples obtained from periodic air sampling events at three locations within the processing facility to an outside accredited laboratory. The composite samples are analyzed for the radionuclides of concern, namely uranium, Ra-226, Pb-210, and Th-230. The three locations are the Ion Exchange Area, the Reverse Osmosis Area, and the Laboratory. The reported concentrations are averaged across the three locations and then multiplied by the air ventilation rate of the processing facility and the length of time in the reporting period to determine the total quantity of effluent released in the form of air particulates from the processing facility.

The results displayed in Appendix A, Table 9, show that all of the concentrations were non-detect for the third and fourth quarters. Beginning in the third quarter of 2016, the contract laboratory changed the reporting limits based on the 10 CFR Part 20 Occupational Limits. The uranium, Ra-226, and Th-230 reporting limit changed from 1E-16 µCi/mL to 1E-12 µCi/mL, and the Pb-210 reporting limit changed from 2E-15 µCi/mL to 2E-12 µCi/mL.

6.1.2 Wellfield

Wellheads are not considered sources of air particulates, and Strata's deep disposal well building only contains a sealed wellhead and no ventilation system. Although it is very unlikely that air particulates will be generated at header houses, since all fluids are within pressurized piping, it has been assumed that header houses could be a diffuse source of air particulates at the Ross ISR Project. Therefore, monthly air particulate samples are obtained from each header house and submitted as a composite sample to an

outside accredited laboratory. For the reporting period, the composite samples were submitted quarterly and analyzed for uranium, Ra-226, Pb-210, and Th-230. The results were averaged to determine the average concentration of air particulates in the header houses. This average concentration was then multiplied by the design ventilation rate of the two ventilation fans in each header house, the time of the reporting period, and the number of header houses to determine the total quantity of effluent released in the form of air particulates due to operations in the wellfield.

Each ventilation fan in the header houses is rated at 167 CFM (4.7E6 mL/minute). There are two ventilation fans in each header house. The results, displayed in Appendix A, Table 10, show that most results were non-detect for the regulatory period. Beginning in the third quarter of 2016, the contract laboratory changed the reporting limits based on the 10 CFR Part 20 Occupational Limits. The uranium, Ra-226, and Th-230 reporting limit changed from 1E-16 µCi/mL to 1E-12 µCi/mL, and the Pb-210 reporting limit changed from 2E-15 µCi/mL to 2E-12 µCi/mL. In the fourth quarter, Th-230 was measured at detectable concentrations in header houses 7 and 9.

6.2 EFFLUENTS DUE TO RADON AND RADON PROGENY

The term radon progeny refers to the long-lived decay products of Rn-222. Strata will assume equilibrium between radon and radon progeny.

6.2.1 Plant

To determine the quantity of effluent released from the plant as radon and radon progeny, Strata has committed to obtaining periodic samples of process fluid and analyzing the solution for the quantity of Rn-222. Samples are obtained from the recovery and injection solutions and sent to an outside accredited laboratory for analysis of the concentration of Rn-222. The concentration of Rn-222 is multiplied by the average process fluid flow for the time period to determine the quantity per unit time of Rn-222 that was in the processing facility on the recovery side and the quantity per unit time on the injection side. The quantity per unit time of Rn-222 from the injection portion is subtracted from the quantity per unit time of Rn-222 from the recovery portion, and the resulting number is designated as the "loss term." This loss term is multiplied by the time period covered by the sampling to yield a total quantity released. Thus, this method determines the effluent released by assuming that a drop in the concentration of Rn-222 from the recovery portion compared to the injection portion is being released inside the plant and subsequently exhausted to the outside.

Monthly samples of the injection and recovery solutions were collected in July and August. During the reporting period, Strata changed the sampling frequency of the injection and recovery solutions to quarterly. Therefore, for this reporting period, the quantity of effluent released from the plant as radon was calculated as follows:

- July and August - the monthly loss term was calculated using the monthly injection and recovery solution Rn-222 concentrations and the monthly average injection and recovery fluid flow rates.
- September - the monthly loss term was calculated by averaging the July and August Rn-222 concentrations and the September average injection and recovery fluid flow rates.

- October through December (4Q17) - the quarterly loss term was calculated using the quarterly injection and recovery solution radon-222 concentration and the average injection and recovery fluid flow rates during the quarter.

A summary of the results for the monitoring period are displayed in Appendix A, Table 11. Duplicate samples were collected but not included in the table or used to determine the total quantity of effluent released during the reporting period. The results for the reporting period are consistent with 2016 and first half 2017 results (i.e., all less than 10 Ci per month released), which indicates that the current sampling protocol is a viable method for determining the quantity of effluent released from the processing facility.

6.2.2 Wellfield

To determine the quantity of effluent released from the wellfield, alpha-track devices were placed in each header house and in 10% of the recovery wellheads. Since injection wells have sealed wellheads, they are not significant sources of radon and radon progeny. The reported concentrations obtained from the header houses are averaged, and this number is multiplied by the design ventilation rate, the time of the reporting period, and the number of header houses in operation. For the wellheads, the reported concentrations are averaged, and the number is multiplied by a ventilation rate of 2 LPM, the time of the reporting period, and the total number of recovery wells in operation. The ventilation rate of the header houses is 9.5E6 mL/minute (two fans at 4.7E6 mL/minute each).

A summary of the results from the monitoring period are displayed in Appendix A, Table 12. The total annual effluent release estimates are displayed in Appendix A, Table 1.

6.2.3 Unplanned Releases

Two unplanned reportable releases of process fluid occurred at the Ross ISR Project during the reporting period. A reportable release occurred on July 27, 2017 (reported to NRC staff on July 28, 2017, NRC ADAMS Accession No. ML17264B080), with an estimated 10,008 gallons of injection fluid released. Another reportable release occurred on August 8, 2017 (reported to NRC staff on August 14, 2017, NRC ADAMS Accession No. ML17264B087), with an estimated 4,316 gallons of injection fluid released. A summary of the estimated quantity of fluid released, the injection Rn-222 concentration found for each month, and the calculated Rn-222 released from each event is provided in Appendix A, Table 14. The conversion factor of 1 gallon = 3,785 milliliters was used.

6.3 BACKGROUND

The background concentration levels for radon and air particulates are the radon and air particulate concentration levels measured at the environmental monitoring station designated as the background location (the "Southwest" site).

6.3.1 Radon and Radon Progeny

As reported in Appendix A, Table 3, the value obtained from the background location is an average radon concentration of 5.5E-10 µCi/mL. This background value was not subtracted from the concentrations of effluent found in the processing facility, since the concentrations were measured in the process fluid, not the surrounding atmosphere. The method determines the effluent released by measuring a difference in

concentrations in the process fluid and then assuming that difference is exhausted, thus a consideration of background would not be appropriate. A consideration of background in regards to unplanned releases is also not appropriate, since the release is calculated based on the concentration of Rn-222 in the process fluid released and not on the concentration of Rn-222 in the surrounding atmosphere. The background concentration was subtracted from wellfield effluents displayed by the net average concentrations in Appendix A, Table 13.

6.3.2 Air Particulates

Background values for air particulates are reported in Appendix A, Table 1. These values were not subtracted from the processing facility results since all of the results, were non-detect for the reporting period (Appendix A, Table 9). The background Th-230 concentration was subtracted from header house 7 and 9 results, as displayed by the net average concentrations in Appendix A, Table 10.

6.4 TOTAL QUANTITIES RELEASED

The three sources of effluent at the Ross Project have been identified as the processing facility, the wellfield, and any unplanned releases of process fluids. In September 2018, Strata installed a new injection pump in the deep disposal well building (SERP 17-10). The seals on the pump are designed to allow some oil to flow through the seal which causes an occasional drip of wastewater. For this reason, the deep disposal well is now considered a potential source for effluent releases. The deep disposal well building does not contain a ventilation system so release rates cannot be calculated; however, Strata will continue monitoring radon within the deep disposal well building and will commence air particulate monitoring in the 1st quarter 2018 at the same frequency as the header houses.

6.4.1 Quantity of Air Particulate Effluent

The quantity of effluent released in the form of air particulates is summarized in Appendix A, Table 15. Due to the change in the contract laboratory reporting limit, described in Sections 6.1.1 and 6.1.2, all of the results were non-detect, with the exception of Th-230 in the wellfield effluent. Overall, the total air particulate effluent was negligible.

6.4.2 Quantity of Radon and Radon Progeny Effluent

The annual Rn-222 effluent released from the plant is calculated as 4.9 Ci. The annual Rn-222 effluent released from the wellfields is calculated as 1.5E-01 Ci. The effluent released from unplanned releases is calculated as 2.8E-03 Ci. The summation of the three sources of effluent yields a total quantity of Rn-222 effluent released of 5.1 Ci.

6.4.3 Conclusion

As stated in 10 CFR § 40.65: "If quantities of radioactive materials released during the reporting period are significantly above the licensee's design objective previously reviewed as part of the licensing action, the report shall cover this specifically." Strata previously estimated the quantity of effluent released in TR Section 7.3, which states: "The Ross ISR project has the potential to produce radiological effluent in the form of Rn-222 that is dissolved in the production and restoration fluid and is present as a result of the uranium decay series. It is assumed there will be no particulate emissions during routine operations

of this facility as the facility will use modern, low temperature vacuum driers, the particulate release of which is considered to be zero by the NRC as provided in NUREG 1910."

The lack of effluent in the form of particulates is demonstrated by the non-detect concentrations reported.

Regarding the quantity of Rn-222 effluent, TR Section 7.3.4.4 estimated the following: 122 Ci/yr from recovery wells in Mine Unit 1 and 71.2 Ci/yr from operations in the plant. The quantities of effluent found during this reporting period are far below what was estimated in the approved license application.

7 LICENSE CONDITION 11.1(E) AND (F) AND 11.2 - ANNUAL REPORT

The annual report requirement for these license conditions covering the submittal of SERP reviews and changes and inventory of water supply wells and land use survey within 2 km of a production area and the results of the annual ALARA audit and an analysis of the dose to the public will be submitted within 90 days following the completion of the reporting period (December 31, 2017).

APPENDIX A

Tables

Table 1 - Environmental Air Particulates Monitoring Results, 3Q and 4Q 2017

Location	Sample Period	Radionuclide	Concentration (µCi/mL)	Error ± (µCi/mL)	LLD (µCi/mL)	10 CFR 20, App. B Table 2 Values (µCi/mL)	Percent Effluent Concentration Value (%)
Oshoto							
	3rd Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	ND	N/A	1E-16	2E-14	N/A
		Ra-226	1.5E-16	2.8E-17	1E-16	9E-13	0.0
		Pb-210	1.4E-14	1.2E-15	2E-15	6E-13	2.3
	4th Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	ND	N/A	1E-16	2E-14	N/A
		Ra-226	ND	N/A	1E-16	9E-13	N/A
		Pb-210	1.5E-14	8.6E-16	2E-15	6E-13	2.5
North (maximally exposed member of the public)							
	3rd Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	2.0E-16	1.2E-16	1E-16	2E-14	1.0
		Ra-226	ND	N/A	1E-16	9E-13	N/A
		Pb-210	1.5E-14	1.3E-15	2E-15	6E-13	2.5
	4th Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	2.4E-16	1.1E-16	1E-16	2E-14	1.2
		Ra-226	ND	N/A	1E-16	9E-13	N/A
		Pb-210	1.4E-14	8.5E-16	2E-15	6E-13	2.3
Met Station							
	3rd Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	1.9E-16	1.1E-16	1E-16	2E-14	1.0
		Ra-226	2.5E-16	5.5E-17	1E-16	9E-13	0.0
		Pb-210	1.5E-14	1.5E-15	2E-15	6E-13	2.5
	4th Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	ND	N/A	1E-16	2E-14	N/A
		Ra-226	ND	N/A	1E-16	9E-13	N/A
		Pb-210	5.1E-15	8.4E-16	2E-15	6E-13	0.9

N/A – Not Applicable, ND – Non-Detect

Table 1 - Environmental Air Particulates Monitoring Results, 3Q and 4Q 2017 (Continued)

Location	Sample Period	Radionuclide	Concentration (µCi/mL)	Error ± (µCi/mL)	LLD (µCi/mL)	10 CFR 20, App. B Table 2 Values (µCi/mL)	Percent Effluent Concentration Value (%)
Southwest (Background)							
	3rd Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	1.9E-16	1.1E-16	1E-16	2E-14	1.0
		Ra-226	1.4E-16	5.6E-17	1E-16	9E-13	0.0
		Pb-210	1.8E-14	1.2E-15	2E-15	6E-13	3.0
	4th Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	1.3E-16	9.8E-17	1E-16	2E-14	0.7
		Ra-226	ND	N/A	1E-16	9E-13	N/A
		Pb-210	1.2E-14	7.6E-16	2E-15	6E-13	2.0
East							
	3rd Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	1.4E-16	8.5E-17	1E-16	2E-14	0.7
		Ra-226	1.8E-16	5.7E-17	1E-16	9E-13	0.0
		Pb-210	1.3E-14	1.1E-15	2E-15	6E-13	2.2
	4th Quarter	Uranium	ND	N/A	1E-16	9E-13	N/A
		Th-230	ND	N/A	1E-16	2E-14	N/A
		Ra-226	1.2E-16	6.3E-17	1E-16	9E-13	0.0
		Pb-210	1.3E-14	8.8E-16	2E-15	6E-13	2.2

N/A – Not Applicable, ND – Non-Detect

Table 2 - Environmental Direct Radiation Monitoring Results, 3Q and 4Q 2017

Location	3rd Quarter Gross mrem/quarter	4th Quarter Gross mrem/quarter	Annual Location Average mrem/quarter
Oshoto	34.8	31.7	35.0
North (maximally exposed member of the public)	36.6*	30.4	34.2
Met Station	40.3	31.8	37.3
Southwest (Background)	36.4	33.5	36.5
East	34.3	31.8	33.7

* Dosimeter damaged; results based on best evaluation possible.

Table 3 - Environmental Radon in Air Results, 3Q and 4Q 2017

Location	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	4th Quarter (µCi/mL)	Error ± (µCi/mL)	Annual Location Average (µCi/mL)	10CFR20, App B Table 2 Value (µCi/mL)	Percent Effluent Concentration Value (%)
Oshoto	5.4E-10	1.1E-10	5.9E-10	1.1E-10	4.7E-10	1E-10	470
North (maximally exposed member of the public)	5.4E-10	1.1E-10	7.3E-10	1.4E-10	4.9E-10	1E-10	485
Met Station	3.2E-10	9.0E-11	5.1E-10	1.1E-10	3.4E-10	1E-10	335
Southwest (Background)	7.3E-10	1.1E-10	6.8E-10	1.4E-10	5.5E-10	1E-10	550
East	3.5E-10	9.0E-11	5.1E-10	1.1E-10	3.9E-10	1E-10	390

Table 4 - Private Water Supply Wells Inventory

SEO Permit Number	Strata Well ID	Mine Unit Perimeter Ring within 2 km	3Q17	4Q17
P103666W	TW02	MU1 & MU2	X	X
P132537W	CSWELL01	MU1 & MU2	X	X
P192896W	TWWELL03	MU1 & MU2	X	X
P205345W	PWSW 2	MU1 & MU2	X	X
P206432W	5368-43-12 SM	MU1 & MU2	1	1
P22582P	P22582P	MU2	1	X
P23418P	P23418P	MU2	1	1
P50883W	P50883W	MU1 & MU2	1	X
P55052P	P55052P	MU1 & MU2	2	2
P55053P	P55053P	MU1 & MU2	2	2
P55054P	P55054P	MU1 & MU2	2	2
P55055P	P55055P	MU1 & MU2	2	2
P7323P	P7323P	MU1 & MU2	2	2
P7324P	HBWELL03	MU1	X	X
P7326P	HBWELL04	MU1	X	X
P74302W	TW01	MU1 & MU2	X	X
P7430P	HBWELL05	MU1 & MU2	1	1
P7431P	P7431P	MU1	2	2
Unknown	DWWELL01	MU1 & MU2	X	X
Unknown	SBWELL02	MU2	3	3

Notes:

X - Sample Collected

1-2 - No sample collected due to:

1 - Well not functioning

2 - Not in use/not found/replaced

3 - Landowner request

Table 5 - Private Supply Well Monitoring Results, 3Q and 4Q 2017

Sample Location	TW02 (P103666W)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	4.7E-10	N/A	0.2	4.1E-10	N/A	0.1
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	7.0E-10	1.0E-10	1.2	5.0E-10	1.0E-10	0.8
Ra-226 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	1.4E-09	4.0E-10	14	1.2E-09	4.0E-10	12
Pb-210 (suspended)	2.2E-09	5.0E-10	22	ND	N/A	N/A
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	ND	N/A	N/A	ND	N/A	N/A
Gross beta	ND	N/A	N/A	ND	N/A	N/A

Sample Location	CSWELL01 (P132537W)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	6.2E-09	N/A	2.1	1.6E-09	N/A	0.5
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	4.0E-10	1.0E-10	0.7	4.0E-10	1.0E-10	0.7
Ra-226 (suspended)	3.0E-10	1.0E-10	0.5	ND	N/A	N/A
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	1.4E-08	4.1E-09	N/A	1.0E-08	3.8E-09	N/A
Gross beta	2.2E-08	6.5E-09	N/A	2.0E-08	6.2E-09	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 5 - Private Supply Well Monitoring Results, 3Q and 4Q 2017 (Continued)

Sample Location	TWWELL03 (P192896W)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (suspended)	ND	N/A	N/A	3.0E-10	1.0E-10	0.5
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	1.1E-09	4.0E-10	1.1	9.0E-10	2.0E-10	0.9
Pb-210 (dissolved)	ND	N/A	N/A	1.1E-09	4.0E-10	11
Pb-210 (suspended)	2.1E-09	5.0E-10	21	1.2E-09	3.0E-10	12
Po-210 (dissolved)	1.1E-09	7.0E-10	2.8	2.7E-09	1.2E-09	6.8
Po-210 (suspended)	ND	N/A	N/A	1.2E-09	7.0E-10	3.0
Gross alpha	ND	N/A	N/A	ND	N/A	N/A
Gross beta	ND	N/A	N/A	ND	N/A	N/A

Sample Location	PWSW 2 (P205345W)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	2.1E-09	N/A	0.7	1.7E-09	N/A	0.6
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	4.0E-10	1.0E-10	0.7	3.0E-10	1.0E-10	0.5
Ra-226 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	1.6E-09	5.0E-10	16	ND	N/A	N/A
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	1.4E-09	8.0E-10	3.5	ND	N/A	N/A
Gross alpha	6.0E-09	3.0E-09	N/A	9.8E-09	3.9E-09	N/A
Gross beta	ND	N/A	N/A	2.3E-08	6.2E-09	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 5 - Private Supply Well Monitoring Results, 3Q and 4Q 2017 (Continued)

Sample Location	P22582P					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	No Sample – Well Not Functioning			ND	N/A	N/A
Uranium (suspended)				ND	N/A	N/A
Ra-226 (dissolved)				ND	N/A	N/A
Ra-226 (suspended)				ND	N/A	N/A
Th-230 (dissolved)				ND	N/A	N/A
Th-230 (suspended)				ND	N/A	N/A
Pb-210 (dissolved)				ND	N/A	N/A
Pb-210 (suspended)				ND	N/A	N/A
Po-210 (dissolved)				ND	N/A	N/A
Po-210 (suspended)				ND	N/A	N/A
Gross alpha				ND	N/A	N/A
Gross beta				ND	N/A	N/A

Sample Location	P50883W					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	No Sample – Well Not Functioning			ND	N/A	N/A
Uranium (suspended)				ND	N/A	N/A
Ra-226 (dissolved)				ND	N/A	N/A
Ra-226 (suspended)				ND	N/A	N/A
Th-230 (dissolved)				ND	N/A	N/A
Th-230 (suspended)				ND	N/A	N/A
Pb-210 (dissolved)				ND	N/A	N/A
Pb-210 (suspended)				ND	N/A	N/A
Po-210 (dissolved)				ND	N/A	N/A
Po-210 (suspended)				ND	N/A	N/A
Gross alpha				ND	N/A	N/A
Gross beta				ND	N/A	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 5 - Private Supply Well Monitoring Results, 3Q and 4Q 2017 (Continued)

Sample Location	HBWELL03 (P7324P)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	1.3E-09	N/A	0.4	1.0E-09	N/A	0.3
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	5.0E-10	1.0E-10	0.8	4.0E-10	1.0E-10	0.7
Ra-226 (suspended)	2.0E-10	1.0E-10	0.3	3.0E-10	1.0E-10	0.5
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	1.1E-09	3.0E-10	11	ND	N/A	N/A
Pb-210 (suspended)	1.2E-09	5.0E-10	12	1.4E-09	3.0E-10	14
Po-210 (dissolved)	1.0E-09	5.0E-10	2.5	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	7.5E-09	3.2E-09	N/A	ND	N/A	N/A
Gross beta	2.6E-08	6.7E-09	N/A	1.9E-08	5.7E-09	N/A

Sample Location	HBWELL04					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	1.8E-08	N/A	6.0	1.6E-08	N/A	5.3
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	3.0E-10	1.0E-10	0.5	3.0E-10	1.0E-10	0.5
Ra-226 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	1.8E-09	5.0E-10	18	ND	N/A	N/A
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	1.4E-08	4.0E-09	N/A	1.1E-08	3.2E-09	N/A
Gross beta	2.4E-08	6.2E-09	N/A	1.8E-08	5.4E-09	N/A

HBWELL04

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 5 - Private Supply Well Monitoring Results, 3Q and 4Q 2017 (Continued)

Sample Location	TW01 (P74302W)					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	2.1E-09	N/A	0.7	ND	N/A	N/A
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	4.0E-10	1.0E-10	0.7	ND	N/A	N/A
Ra-226 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	ND	N/A	N/A	1.3E-09	3.0E-10	13
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	8.3E-09	3.1E-09	N/A	9.2E-09	3.3E-09	N/A
Gross beta	ND	N/A	N/A	1.6E-08	5.6E-09	N/A

Sample Location	DWWELL01					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	4.7E-09	N/A	1.6	4.2E-09	N/A	1.4
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	5.3E-09	3.0E-10	8.8	6.0E-09	3.0E-10	10
Ra-226 (suspended)	4.1E-09	3.0E-10	6.8	2.9E-09	2.0E-10	4.8
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	2.2E-09	5.0E-10	22	3.0E-09	4.0E-10	30
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	1.3E-09	8.0E-10	3.3	ND	N/A	N/A
Gross alpha	3.0E-08	5.7E-09	N/A	3.6E-08	6.0E-09	N/A
Gross beta	2.5E-08	6.7E-09	N/A	3.9E-08	6.7E-09	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 6 - Water Sample Lower Limits of Detection and Effluent Concentration Values

Radionuclide	LLD (μCi/mL)	10 CFR 20, App. B, Table 2 Effluent Conc. Water (μCi/mL)
Uranium	2.0E-10	3.0E-07
Ra-226	2.0E-10	6.0E-08
Th-230	2.0E-10	1.0E-07
Pb-210	1.0E-09	1.0E-08
Po-210	1.0E-09	4.0E-08

Table 7 - Industrial Well Monitoring Results, 3Q and 4Q 2017

Location: 22X-19

Sample Date	9/13/2017		10/24/2017		11/9/2017		12/12/2017		Avg. Conc. (µCi/mL)	% Eff. Conc.
Parameter	Conc. (µCi/mL)	Error ± (µCi/mL)	Conc. (µCi/mL)	Error ± (µCi/mL)	Conc. (µCi/mL)	Error ± (µCi/mL)L)	Conc. (µCi/mL)	Error ± (µCi/mL)		
Uranium, dissolved	1.4E-08	N/A	1.2E-08	N/A	1.44E-08	N/A	1.5E-08	N/A	1.4E-08	4.6
Uranium, suspended	ND	N/A	1.3E-09	N/A	ND	N/A	ND	N/A	1.3E-09	0.4
Ra-226, dissolved	2.6E-09	2.0E-10	2.8E-09	2.0E-10	2.6E-09	2.0E-10	2.8E-09	2.0E-10	2.7E-09	4.5
Ra-226, suspended	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A	N/A
Th-230, dissolved	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A	N/A
Th-230, suspended	ND	N/A	5.0E-10	2.0E-10	ND	N/A	ND	N/A	5.0E-10	0.5
Pb-210, dissolved	1.4E-09	4.0E-10	1.6E-09	4.0E-10	3.4E-09	5.0E-10	1.1E-09	3.0E-10	1.9E-09	18.8
Pb-210, suspended	1.8E-09	4.0E-10	1.1E-09	4.0E-10	1.4E-09	4.0E-10	ND	N/A	1.4E-09	14.3
Po-210, dissolved	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A	N/A
Po-210, suspended	1.4E-09	6.0E-10	ND	N/A	ND	N/A	1.3E-09	5.0E-10	1.4E-09	3.4
Gross Alpha	3.1E-08	5.1E-09	3.1E-08	5.1E-09	2.9E-08	3.8E-09	3.1E-08	4.3E-09	3.1E-08	N/A
Gross Beta	1.9E-08	6.1E-09	2.0E-08	5.7E-09	1.3E-08	3.1E-09	1.0E-08	3.2E-09	1.6E-08	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 8 - Surface Water Monitoring Results, 3Q and 4Q 2017

Sample Location	Oshoto Reservoir					
Parameter	3rd Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*	4th Quarter (µCi/mL)	Error ± (µCi/mL)	% Eff. Conc.*
Uranium (dissolved)	8.7E-09	N/A	2.9	9.7E-09	N/A	3.2
Uranium (suspended)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Ra-226 (suspended)	ND	N/A	N/A	3.0E-10	1.0E-10	0.5
Th-230 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Th-230 (suspended)	ND	N/A	N/A	2.0E-10	1.0E-10	0.2
Pb-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Pb-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (dissolved)	ND	N/A	N/A	ND	N/A	N/A
Po-210 (suspended)	ND	N/A	N/A	ND	N/A	N/A
Gross alpha	2.3E-08	5.1E-09	N/A	1.3E-08	3.2E-09	N/A
Gross beta	3.3E-08	6.4E-09	N/A	1.6E-08	6.2E-09	N/A

* Lower Limits of Detection and Effluent Concentration values from 10 CFR 20, Appendix B, Table 2 are listed in Table 6

N/A = Not Applicable; ND = Non-Detect

Table 9 - Processing Facility Air Particulate Effluent Results, 3Q and 4Q 2017

Sample Period	Radio-nuclide	Concentration (µCi/mL)	Error ± (µCi/mL)	Concentration (µCi/mL)	Error ± (µCi/mL)	Concentration (µCi/mL)	Error ± (µCi/mL)	Average Conc. (µCi/mL)	Net Average Conc. (µCi/mL)	Effluent Released (Ci)
		Ion Exchange Area		**Reverse Osmosis Area**		**Lab**				
3rd	U-Nat	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
Quarter	Th-230	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
4th	U-Nat	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
Quarter	Th-230	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	ND	N/A	ND	N/A	N/A

Note: The LLD for uranium, Th-230, and Ra-226 was 1E-12 µCi/mL, and the LLD for Pb-210 was 2E-12 µCi/mL.
N/A = Not Applicable; ND = Non-Detect

Table 10 - Wellfield Air Particulate Effluent Results, 3Q and 4Q 2017

Location	Radionuclide	3rd Quarter Concentration (µCi/mL)	Error ±(µCi/mL)	4th Quarter Concentration (µCi/mL)	Error ±(µCi/mL)	Net Concentration (µCi/mL)	Effluent Released (Ci)
Header house 1	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 2	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 3	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 4	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 5	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A

Note: The LLD for uranium, Th-230, and Ra-226 was 1E-12 µCi/mL, and the LLD for Pb-210 was 2E-12 µCi/mL.

Table 10 - Wellfield Air Particulate Effluent Results, 3Q and 4Q 2017 (Continued)

Location	Radionuclide	3rd Quarter Concentration (µCi/mL)	Error ±(µCi/mL)	4th Quarter Concentration (µCi/mL)	Error ±(µCi/mL)	Net Concentration (µCi/mL)	Effluent Released (Ci)
Header house 6	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 7	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	4.5E-12	4.5E-12	4.5E-12	5.6E-06
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 8	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	ND	N/A	N/A	N/A
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A
Header house 9	U-Nat	ND	N/A	ND	N/A	N/A	N/A
	Th-230	ND	N/A	2.4E-12	3.2E-13	2.4E-12	3.0E-06
	Ra-226	ND	N/A	ND	N/A	N/A	N/A
	Pb-210	ND	N/A	ND	N/A	N/A	N/A

Note: The LLD for uranium, Th-230, and Ra-226 was 1E-12 µCi/mL, and the LLD for Pb-210 was 2E-12 µCi/mL.
N/A = Not Applicable, ND = Non-Detect
Background Th-230 = 1.3E-16 µCi/mL (Table 1)

Table 11 - Processing Facility Radon Effluent Results, 3Q and 4Q 2017

Sample Date	Concentration Recovery (µCi/mL)	Uncertainty ±(µCi/mL)	Average Recovery Flow Rate for the Month (mLPM)	Concentration Injection (µCi/mL)	Uncertainty ±(µCi/mL)	Average Injection Flow Rate for the Month (mLPM)	Loss Term (µCi/minute)	Effluent Released (Ci)
7/25/2017	4.98E-05	9.97E-07	1.16E+07	4.96E-05	9.88E-07	1.13E+07	20	0.9
8/23/2017	4.01E-05	7.98E-07	1.09E+07	5.55E-05	1.11E-06	1.05E+07	-143	NC*
September	4.50E-05	8.98E-07	1.13E+07	5.26E-05	1.05E-06	1.09E+07	-61	NC*
4Q17	4.54E-05	9.04E-07	1.26E+07	4.82E-05	9.63E-07	1.23E+07	-21	NC*
							TOTAL	**0.9**

Loss Term = (Concentration Recovery * Avg. Flow Rate Recovery) - (Concentration Injection * Avg. Flow Rate Injection)

* NC – Not calculated for negative loss terms.

Table 12 - Header House and Wellhead Radon Effluent Results, 3Q and 4Q 2017

Location	3rd Quarter (µCi/mL)	Uncertainty ±(µCi/mL)	4th Quarter (µCi/mL)	Uncertainty ±(µCi/mL)	Annual Average Concentration by Location (µCi/mL)
Header house 1	5.5E-09	6.5E-10	3.7E-09	4.6E-10	4.0E-09
OZ-005	9.7E-08	1.8E-08	2.3E-07	4.6E-08	1.2E-07
OZ-054	2.4E-09	3.0E-10	9.8E-08	1.8E-08	1.5E-07
OZ-057	7.3E-10	1.1E-10	1.3E-09	1.9E-10	2.8E-08
Header house 2	9.8E-09	1.2E-09	9.4E-09	1.2E-09	8.9E-09
OZ-018	1.1E-07	2.0E-08	>3.1E-07*	Not reported	1.1E-07
OZ-160	6.2E-10	1.1E-10	2.2E-07	4.4E-08	5.6E-08
OZ-170	9.5E-10	1.4E-10	3.2E-09	4.1E-10	1.6E-09
Header house 3	8.1E-09	9.8E-10	8.4E-09	1.1E-09	7.1E-09
OZ-215	1.3E-09	1.9E-10	3.1E-09	3.8E-10	1.7E-09
OZ-262	3.8E-10	6.0E-11	1.2E-09	1.9E-10	7.2E-10
OZ-199	2.4E-09	3.0E-10	3.0E-09	3.8E-10	2.3E-09
Header house 4	2.4E-09	3.0E-10	2.0E-09	2.8E-10	1.8E-09
OZ-291	1.2E-09	1.9E-10	6.6E-09	8.2E-10	2.2E-09
OZ-267	2.4E-08	4.4E-09	2.9E-07	5.7E-08	1.5E-07
OZ-305	1.3E-09	1.9E-10	3.9E-09	4.9E-10	2.0E-09
Header house 5	4.9E-09	5.7E-10	4.3E-09	5.5E-10	5.0E-09
OZ-061	1.1E-07	1.9E-08	9.8E-08	1.8E-08	1.0E-07
OZ-075	4.6E-10	1.1E-10	1.1E-09	1.7E-10	6.4E-10
OZ-097	9.2E-10	1.4E-10	2.2E-09	3.0E-10	1.2E-09
Header house 6	3.9E-09	4.9E-10	3.4E-09	4.4E-10	3.3E-09
OZ-125	1.4E-09	1.9E-10	1.2E-09	1.9E-10	1.0E-09
OZ-153	8.4E-10	1.4E-10	1.3E-09	1.9E-10	8.4E-10
OZ-210	1.6E-09	2.2E-10	8.9E-10	1.7E-10	9.5E-10
Header house 7	3.1E-09	3.8E-10	2.5E-09	3.3E-10	2.5E-09
OZ-026	1.9E-09	2.8E-10	7.7E-09	9.2E-10	4.9E-09
OZ-169	6.9E-09	8.4E-10	1.7E-08	2.6E-09	9.1E-09

Table 12 - Radon Concentration in the Wellfield Results, 3Q and 4Q 2017 (Continued)

Location	3rd Quarter (µCi/mL)	Uncertainty ±(µCi/mL)	4th Quarter (µCi/mL)	Uncertainty ±(µCi/mL)	Annual Average Concentration by Location (µCi/mL)
OZ-424	6.6E-08	1.2E-08	>3.1E-07*	Not reported	1.3E-07
Header house 8	3.9E-09	4.9E-10	2.9E-09	3.8E-10	3.4E-09
OZ-279	8.1E-09	9.8E-10	2.4E-08	4.4E-09	1.6E-08
OZ-309	7.3E-08	1.3E-08	2.0E-07	4.0E-08	1.4E-07
OZ-368	1.2E-08	1.4E-09	8.8E-08	1.6E-08	5.0E-08
Header house 9	NA	NA	3.5E-09	4.4E-10	3.5E-09
OZ-324	NA	NA	1.5E-08	2.3E-09	1.5E-08
OZ-333	NA	NA	>3.1E-07*	Not reported	3.1E-07
OZ-318	NA	NA	1.2E-07	2.2E-08	1.2E-07
DDW	6.6E-08	1.2E-08	8.9E-10	1.7E-10	1.7E-08

* Note: The 4th quarter radon results for OZ-018, OZ-424, and OZ-333 were reported by the contract laboratory as greater than 308 pCi/L, since reportable results could not be provided due to the exposure to the detectors. The annual average concentration was based on a concentration of 308 pCi/L for each of these locations in the 4th quarter.

NA - Not available, radon cups were not yet installed.

Table 13 - Wellfield Radon Effluent Results, 2017

Location	Annual Average Concentration (µCi/mL)	Net Annual Average Concentration (µCi/mL)	Effluent Released per Location (µCi)	Number of Recovery Wells	Annual Effluent Released (Ci)
Header house 1 Recovery Wells	1.0E-07	1.0E-07	1.1E+02	29	3.1E-03
Header house 2 Recovery Wells	5.4E-08	5.4E-08	5.6E+01	30	1.7E-03
Header house 3 Recovery Wells	1.6E-09	1.0E-09	1.1E+00	30	3.2E-05
Header house 4 Recovery Wells	5.3E-08	5.2E-08	5.0E+01	17	8.6E-04
Header house 5 Recovery Wells	3.5E-08	3.5E-08	2.8E+01	26	7.2E-04
Header house 6 Recovery Wells	9.4E-10	3.9E-10	3.1E-01	28	8.7E-06
Header house 7 Recovery Wells	4.6E-08	4.6E-08	3.6E+01	24	8.7E-04
Header house 8 Recovery Wells	6.7E-08	6.7E-08	3.5E+01	27	9.5E-04
Header house 9 Recovery Wells	1.5E-07	1.5E-07	3.9E+01	25	9.6E-04
Header house 1	4.0E-09	3.5E-09	1.7E+04	N/A	1.7E-02
Header house 2	8.9E-09	8.3E-09	4.1E+04	N/A	4.1E-02
Header house 3	7.1E-09	6.6E-09	3.3E+04	N/A	3.3E-02
Header house 4	1.8E-09	1.3E-09	6.3E+03	N/A	6.3E-03
Header house 5	5.0E-09	4.4E-09	1.7E+04	N/A	1.7E-02
Header house 6	3.3E-09	2.8E-09	1.0E+04	N/A	1.0E-02
Header house 7	2.5E-09	2.0E-09	7.3E+03	N/A	7.3E-03
Header house 8	3.4E-09	2.9E-09	7.1E+03	N/A	7.1E-03
Header house 9	3.5E-09	3.0E-09	3.7E+03	N/A	3.7E-03
				Total (Ci):	**1.5E-01**

N/A = Not Applicable

Annual background is 5.5E-10 µCi/mL (Table 3)

Table 14 - Unplanned Releases Radon Effluent Results, 3Q and 4Q 2017

Spill Date	Process Fluid Type	Spill Volume (mL)	Rn-222 Concentration (µCi/mL)	Effluent Released (Ci)
7/27/2017	Injection	3.8E+07	5.0E-05	1.9E-03
8/8/2017	Injection	1.6E+07	5.6E-05	9.1E-04
			TOTAL	**2.8E-03**

Table 15 – Total Air Particulate Effluent, 3Q and 4Q 2017

Radionuclide	Plant Effluent (Ci)	Wellfield Effluent (Ci)	Total Effluent (Ci)
U-Nat	N/A	N/A	N/A
Th-230	N/A	8.5E-06	8.5E-06
Ra-226	N/A	N/A	N/A
Pb-210	N/A	N/A	N/A
			8.5E-06

N/A = Not Applicable