INTERROGATORY R317-6-2.1-27/03: GROUNDWATER MONITORING

PRELIMINARY FINDING:

Refer to R317-6-2.1: "The following Ground Water Quality Standards (GWQSs) as listed in Table 1 are adopted for protection of ground water quality (refer to Table 1in the standard, however, this list is not required for analysis per the current January 2004 GWQDP)."

Refer to R317-6-6.3.I: [APPLICATION REQUIREMENTS FOR A GROUND WATER DISCHARGE PERMIT] – "Unless otherwise determined by the Executive Secretary, the application for a permit to discharge wastes or pollutants to ground water shall include the following complete information: (I) A proposed sampling and analysis monitoring plan which conforms to EPA Guidance for Quality Assurance Project Plans, EPA QA (EPA/600/R-98/018, February 1998) and includes the following…1. ground-water monitoring to determine ground water flow direction and gradient, background quality at the site, and the quality of groundwater at the compliance monitoring point…"

Refer to R317-6.9 [PERMIT COMPLIANCE MONITORING] – "A. Ground Water Monitoring" - The Executive Secretary may include in a ground water discharge permit requirements for ground water monitoring, and may specify compliance monitoring points where the applicable class TDS limits, ground water quality standards, protection levels or other permit limits are to be met.

The Executive Secretary will determine the location of the compliance monitoring point based upon the hydrology, type of pollutants, and other factors that may affect the ground water quality. The distance to the compliance monitoring points must be as close as practicable to the point of discharge. The compliance monitoring point shall not be beyond the property boundaries of the permitted facility without written agreement of the affected property owners and approval by the Executive Secretary.

B. Performance Monitoring - The Executive Secretary may include in a ground water discharge permit requirements for monitoring performance of best available technology standards…"

Refer to R317-6.10 [BACKGROUND WATER QUALITY DETERMINATION] – "A. Background water quality contaminant concentrations shall be determined and specified in the ground water discharge permit. The determination of background concentration shall take into account any degradation.

B. Background water quality contaminant concentrations may be determined from existing information or from data collected by the permit applicant. Existing information shall be used, if the permit applicant demonstrates that the quality of the information and its means of collection are adequate to determine background water quality. If existing information is not adequate to determine background water quality, the permit applicant shall submit a plan to determine background water quality to the Executive Secretary for approval prior to data collection. One or more up-gradient, lateral hydraulically equivalent point, or other monitoring wells as approved by the Executive Secretary may be required for each potential discharge site.

C. After a permit has been issued, permittee shall continue to monitor background water quality contaminant concentrations in order to determine natural fluctuations in concentrations. Applicable up-gradient, and on-site ground water monitoring data shall be included in the ground water quality permit monitoring report."

Refer to R317-6.16 [6.16 OUT-OF-COMPLIANCE STATUS] – "A. Accelerated Monitoring for Probable Out-of-Compliance Status. If the value of a single analysis of any compliance parameter in any compliance monitoring sample exceeds an applicable permit limit, the facility shall:

1. *Notify the Executive Secretary in writing within 30 days of receipt of data;*
2. *Immediately initiate monthly sampling if the value exceeds both the background concentration of the pollutant by two standard deviations and an applicable permit limit, unless the Executive Secretary determines that other periodic sampling is appropriate, for a period of two months or until the compliance status of the facility can be determined.*

B. Violation of Permit Limits

Out-of-compliance status exists when:

1. *The value for two consecutive samples from a compliance monitoring point exceeds:*

a. one or more permit limits; and

b. the background concentration for that pollutant by two standard deviations (the standard deviation and background (mean) being calculated using values for the ground water pollutant at that compliance monitoring point) unless the existing permit limit was derived from the background pollutant concentration plus two standard deviations; or

2. the concentration value of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable permit limit. The statistical significance shall be determined using the statistical methods described in Statistical Methods for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 of the Federal Register, Oct. 11, 1988 and supplemental guidance in Guidance For Data Quality Assessment (EPA/600/R-96/084 January 1998)."

INTERROGATORY STATEMENT:

Per discussions between Uranium One and the DRC and in accordance with the application requirements of the Utah Administrative Code R317-6, Uranium One needs to provide adequate documentation, justification, evaluation procedures, and modeling results that include a sound basis for the groundwater monitoring for the site. This includes a complete presentation and description of the existing hydrogeologic conditions, means of establishing background, and the evaluation of results as they compare to the respective limits. Based on the review of the information submitted to date, the following items need to be addressed by Uranium One:

Ground water protection at the Shootaring Canyon Mill will be accomplished primarily through waste isolation using the Best Available Technology (BAT) in the Tailings Disposal Facility design and operation with the primary point of compliance being the Leak Detection System (LDS) in the Tailings Disposal Facility liner system. Ground Water monitoring provides an essential secondary method for ensuring that ground water protection is maintained.

A comprehensive Compliance Monitoring Plan for all environmental media (ground water, air, soils and vegetation) is being developed and will be submitted at a future date. The ground water monitoring component of this Compliance Monitoring Plan consists primarily of *Shootaring Canyon Mill Site Ground Water Monitoring Plan* **(Tetra Tech, June 2008), which is support by two additional documents, a)** *Groundwater Modeling and Proposed Monitoring Wells for the Shootaring Canyon Mill Tailings Disposal Facility* **(Gard Water Consultants, June 2008) and b)** *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008). All three of these documents are attached to these interrogatories for DRC review. These documents supersede the** *Draft Groundwater Monitoring Plan (Plan)* **dated 11/30/07 and the** *Shootaring Background Water Quality* **document (December 12, 2007) submitted previously.**

A new ground water monitoring network is proposed. This includes the technical basis for well locations and selection of well screen placement and sampling frequency as well as selection of monitoring parameters and methods for determining ground water compliance consistent with the requirements of UAC 317-6. Recent site-specific ground water quality data have been used to establish defensible background water quality for the existing monitoring network as well as compliance criteria for an interim period while sufficient ground water quality

data are developed from the proposed new monitoring wells. In addition, methods are proposed for developing defensible intra-well ground water quality statistic and compliance monitoring criteria for the new ground water monitoring network of wells once sufficient data is available.

The attached documents provide adequate documentation, justification, evaluation procedures, and modeling results, including a sound basis for the groundwater monitoring for the site. These documents, in conjunction with the report *Ground Water Hydrology of the Shootaring Canyon Mill Site* (Hydro-Engineering, 1998), present and describe the existing hydrogeologic conditions, the means used to establish background water quality, and an evaluation of results as they compare to the respective limits.

1. ***BAT Monitoring Plan for Seepage Rate Monitoring and Verification****: Please provide a BAT monitoring plan which includes: (a) Justification or basis for the plan; (b) Best Available Technology and seepage control monitoring for the tailings impoundments; and (c) Information to verify that Engineering Controls are sufficient and will limit seepage to specified levels. It is recommended that Uranium One prepare a separate document (from the respective Groundwater Monitoring Plan) reflecting specific monitoring devices and types, monitoring frequency, and validation procedures to comply with laws, regulations and guidance.*

   Response

   Specific details regarding the BAT monitoring plan for the tailings disposal facility will be included with the Operation Plan for the tailings disposal facility and will be submitted under separate cover.

2. ***Hydrogeologic Modeling and Groundwater Monitoring Well Designs and Network:*** *Please provide additional information, including groundwater modeling, information regarding estimated horizontal and vertical dispersion, groundwater-surface water interaction (relationship of groundwater flow systems to existing springs present in the area), and information adequately describing flow direction, gradient and spatial variability of groundwater flow, to ensure that potential contaminant flow paths and potential plume shape are described. Please provide information indicating how this information supports design of the monitoring well network including well locations, screen length and depth(s) of monitoring. Modeling needs to consider flow paths in the vadose zone, the perched aquifer and the main (lower) Entrada aquifer. It has been noted, for example, based on past monitoring and modeling at the facility that a low-permeability zone exists at the top of the main (lower) Entrada aquifer in the area near the main Tailings Dam. The impact of this condition on flow paths for potential releases from the tailings containment cells needs to be carefully examined and clarified.*

Response

The *Groundwater Modeling and Proposed Monitoring Wells for the Shootaring Canyon Mill Tailings Disposal Facility* **presents the hydrogeologic modeling used to develop the monitoring network and well design. The report includes groundwater modeling, information regarding estimated horizontal and vertical dispersion, groundwater-surface water interaction, and information describing flow direction, gradient and spatial variability of groundwater flow that ensures potential contaminant flow paths and potential plume shapes are adequately monitored.**

The modeling determined that the lateral spacing between the monitoring wells necessary to detect any seepage from the tailings disposal facility, should a leak occur, is approximately 175 feet as measured parallel to the groundwater table contours. The modeling also indicated that the contaminants from a potential leak would exist in the top 100 feet of the aquifer. Therefore, all new monitoring wells are proposed as continuously screened from the top of the water table to a depth of 100 feet below the water table. The proposed well locations are presented in Figure 23 of the *Groundwater Modeling and Proposed Monitoring Wells for the Shootaring Canyon Mill Tailings Disposal Facility*.

As discussed in more detail in the report referenced above, existing geologic information indicates that a small localized perched water condition (perched Entrada) exists above the main Entrada aquifer under a portion of the footprint of the proposed tailings disposal facility but does not exist outside the proposed tailings disposal facility footprint where the new monitor wells will be located. Therefore, the main Entrada aquifer is the uppermost aquifer that will be monitored at the location of each monitoring well. If leakage of the tailings disposal facility occurs above the perched aquifer (perched Entrada), contaminants will be delayed in reaching the water table of the uppermost aquifer as it migrates vertically through and flows laterally over and off the edges of the lower permeability strata that create the localized perched water condition. However, should contaminants leak from the tailings above the perched water condition, they will not circumvent the proposed monitoring network. If geologic information obtained during the installation of the new monitoring wells indicate conditions are different than those assumed in the site conceptual model, the DEQ will be advised and appropriate action taken to adapt or expand the monitoring network to the updated conceptual model.

It should be noted that the proposed wells in the southern most portion of the site are located along the down-gradient edge of the tailings disposal facility at the approximate location of the reclaimed toe of the tailings disposal facility. While it is possible to have the wells closer to the disposal facility during operations, reclamation activities would require the long-term location of the POC wells to be as proposed. It is believed that locating the wells now where they will be in the long-term is advantageous in that a continuous data base of groundwater quality for each well will be available.

Additionally, a review of the horizontal groundwater contour information on Figure 1, Proposed Ground Water Monitoring Locations, of the Draft Groundwater Monitoring Plan suggests that potential releases from the containment cells might flow to an area southwest of the proposed monitoring locations and therefore be missed by the monitoring network. In preparing the additional information requested in this interrogatory, Uranium One needs to demonstrate that the modeling assumptions that are used are conservative and/or are representative of field conditions.

Response

Uranium One has provided appropriate modeling and assumptions that are representative of site-specific conditions to establish a monitoring network design that will preclude potential releases from circumventing the monitoring network. The proposed monitoring wells have been located to monitor any potential seepage that might occur along the east or west side of the disposal facility based on modeling of ground water flow paths. Figures 24 and 25 in the *Groundwater Modeling and Proposed Monitoring Wells for the Shootaring Canyon Mill Tailings Disposal Facility* **show the modeled flow paths and the location of the proposed monitoring wells.**

3. ***Background Monitoring Plan for New POC Wells:*** *Please confirm the location of the POC monitoring wells and provide additional information concerning the approach for developing interim and final intrawell Groundwater Compliance Limits (GWCLs) for the POC monitoring wells.*

Response

The proposed POC monitoring well locations are presented in Figure 23 in the *Groundwater Modeling and Proposed Monitoring Wells for the Shootaring Canyon Mill Tailings Disposal Facility***. Interim background water quality concentrations for the list of constituents that are proposed to be monitored have been determined using ASTM methods from existing wells around the site as discussed in Section 5 of** *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008). These inter-well background values and interim GWCLs are proposed to be used on an interim basis until intra-well background water quality data can be developed for the new proposed POC monitoring wells. The proposed methodology to determine the intra-well background values for each new POC well is presented in Section 5 of** *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) and is discussed in subsequent section of these responses.**

Please provide information to justify the duration of background sample collection and analysis, proposed sampling frequency, and procedures to be used for controlling or correcting for such seasonal and/or temporal correlation in the data, if necessary.

Response

Approaches for the interim and final intra-well background sampling and statistical methods are discussed in Section 5 and illustrated in Figures 2 and

3 of *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) . Sampling frequency and procedures for handling seasonal and temporal correlation of data are also detailed in that report. Background sample collection from the new wells for development of intra-well water quality statistics is proposed to occur quarterly for two years and annually thereafter. Due to very slow travel times for ground water at the site, on the order of 8 ft/yr, the time for ground water to travel from the most down gradient point in the tailings disposal facility (immediately behind the main dam) to the POC well locations is on the order of 100 years. Thus, it would be possible to collect reliable intra-well background water quality for a period of time significantly longer than the initial two years.**

The plan also provides for water quality parameter trend analysis for the new POC wells. This will provide ongoing confidence that background conditions can be demonstrated for quite some time into the future. All data collected up to such time as trend analysis identifies statistically significant change will be used to calculate and update background on an annual basis.

Analysis of existing ground water quality data, described in the current plan, demonstrate no statistically significant seasonality. Thus, no corrections for seasonality for future monitoring are anticipated.

Please clarify the ultimate use of the current (ongoing) background evaluation. For example, indicate whether the evaluation is being conducted to provide interim limits for downgradient operational POC wells based on two standard deviations above background as listed in R317-6-6.16 until specific intrawell background can be established. In order to conform to GWCL criteria previously established for this facility and GWCLs that have been established for other similar (licensed) facilities in Utah, final GWCLs should be determined as follows: (a) for constituents detected as a background concentration, the GWCL should not exceed the mean concentration in that well plus two standard deviations or 1.1 times the background (mean) concentration, whichever value is greater; and (b) for a contaminant not present in a detectable amount as a background concentration, the GWCL should not exceed 1.1 times the value of the groundwater quality standard Maximum Contaminant level (MCL)or the limit of detection, whichever value is greater.

Response

The DRC is correct in their understanding that the current (ongoing) background evaluation is being conducted to provide interim limits for the proposed downgradient operational POC wells based on two standard deviations above background as listed in R317-6-6.16 until specific intra-well background can be established. The interim compliance criteria are found in Table 3 of the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008). The methods by which final intra-well compliance criteria will be developed are also presented in this report, specifically in Section 5 entitled "Final Compliance Criteria", Figure 3 " Groundwater Final (Intra-well) Compliance Limit Flow Chart".**

As specified in ASTM (2005) Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs. Method D6312-98 **the**

determination of the compliance limits was developed by dividing the parameters into three groups, those with less than 15% non-detect values, those with between 15 and 99% non-detect and those with 100% non-detect values.

The compliance limit was determined at the upper 95% confidence limit (which is essentially the same as mean plus two standard deviations) for the parameters which have less than 15% non-detect values and are normally or log-normally distributed. For the parameters which have less than 15% non-detect and are not normally or log-normally distributed, the compliance limit was set at the maximum recorded value. Similarly, the compliance limit for the constituents with between 15% and 99% non-detect values was set at the maximum recorded value. The compliance limit for the parameters with 100% non-detect values was set at the larger of the detection limit or 0.1 MCL. (Note: The DRC Interrogatory Statement above suggests the larger of the detection limit or 1.1 MCL be used – it is believed that this is a typographic error and should state 0.1 MCL)

4. ***Statistical Analysis of Groundwater Data****: Please provide the following with respect to the Draft Groundwater Monitoring Plan (Plan) dated 11/30/07 and the Shootaring Background Water Quality document (December 12, 2007):*

   a. *Additional information to further substantiate/verify the degree of homogeneity (lack of spatial variability) of groundwater quality within groups of groundwater monitoring wells. The Piper diagrams in the current statistical approach use only a limited list of ions. Additional information, including the distribution of trace elements detected in groundwater at the site, should also be considered, and a discussion of how those trace element concentrations relate to site subsurface (e.g., aquifer matrix geochemical) conditions should be provided, along with evidence to confirm that the background groundwater data are suitable for comparison to the site groundwater data. Parameters such as arsenic (previously detected at apparently elevated levels in wells RM-8 and RM-20), selenium (previously detected at apparently elevated levels in well RM20) and fluoride (previously detected at apparently elevated levels in wells RM8 and RM20) are examples of parameters (Plateau Resources, Ltd. 2006) that require further analysis.*

Response

The three documents submitted with this interrogatory response supersede the *Draft Groundwater Monitoring Plan (Plan)* **dated 11/30/07 and the** *Shootaring Background Water Quality* **document (December 12, 2007). Further investigation of groundwater trace metal variability from past data is not necessary to assess for new POC wells. Even if spatial variability were detected in currently existing monitoring wells, it could not alter the use of pooled site-wide data to determine interim compliance limits. Should spatial variability be documented in current monitoring wells, there would be no way to estimate any such variability associated with new POC wells that have yet to be constructed.**

As noted, wells RM-8 and RM-20 have anomalous values for some constituents such as selenium, arsenic and fluoride. It is not clear what are the causes for these anomalies but based on the absence of anomalous values for

conservatively transported constituents associated with site activities (chloride, sulfate, etc.) these values are likely the result of natural variability in groundwater quality. Regardless, the data from these two wells have been excluded from the development of the interim, inter-well background ground water quality statistics in an effort to ensure the proposed interim values are conservative.

Uranium One may wish to consider other types of data analysis, for example, multivariate statistical techniques such as cluster analysis and/or Principal Component Analysis, wherein the distributions of additional parameters (possibly including, but not limited to, arsenic, uranium, molybdenum, barium, manganese, chromium, and nickel) in the site monitoring wells are analyzed. Uranium One may also wish to consider developing stiff diagrams as an additional means of deciphering patterns in groundwater quality at the site.

Response

A wide range of data analysis techniques were considered and it was determined that the proposed approach as discussed in the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) is the most suitable for the site conditions and objectives.**

b. Please provide a revised Plan that employs consistent terminology with respect to the different groundwater-bearing units present beneath the site.

Response

Terms have been adjusted in the attached reports to be consistent, using "Main Entrada" and "Perched Entrada" to distinguish between the two distinct water-bearing zones.

c. Please add carbonate + bicarbonate, calcium, and nitrate + nitrite to the monitoring parameters list (Table 1 of Plan), or, alternatively, provide justification for not including these parameters in the Plan.

Response

These constituents have been added to the list of constituents that will be monitored.

d. Please provide information indicating the relevance of the 2007 Final Rule (EPA 2007) that amends relevant previous EPA Final Rues that specify acceptable analytical methods for some monitoring parameters included in Table 1, including Ra-226, chloride, fluoride, nitrate, nitrite, and sulfate, to the Plan. Please revise the text on page 4 of the Plan and in Appendix 1, as necessary, to conform to the EPA 2007 Final Rule. This information should be included as an element of the Facility Quality Assurance Plan (QAP) and Groundwater Monitoring QAP.

Response

The text in the *Shootaring Canyon Mill Site Ground Water Monitoring Plan* **(Tetra Tech, June 2008) include reference to the current EPA 40 CFR methods.**

e. Please include a description of the missing Appendices 1 through 3, and provide a copy of any missing Appendices.

Response

The format of the report has been significantly changed and there are only two appendices to the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) Both are included with the current submittal.**

f. Please revise the text of the Plan to reflect the correct ordering of the tables in the document. On Page 5 – "Test of Normality", 2nd paragraph: in the first sentence the order of the two tables as identified in the text is reversed.

Response

The text in the *Shootaring Canyon Mill Site Ground Water Monitoring Plan* **(Tetra Tech, June 2008) reflect the comments.**

g. Please provide an expanded discussion within the Plan (in reference to the discussion presented on p. 10 of the current Draft Groundwater Monitoring Plan entitled "Trend Analysis"), to include the following elements:

i) Identification of any seasonal variability as well as any temporal correlation in the data, and procedures for controlling or correcting for such seasonal and/or temporal correlation in the data, if necessary,

ii) Completing background sampling on a schedule that will ensure sample independence,

iii) Criteria for selecting statistical analysis methods for each parameter of interest in each well,

iv) Specific criteria, including data characteristics such as normality or lack of normality, for selecting the statistical analysis method(s) for analyzing accrued data and criteria and timetables for updating background groundwater quality statistics/concentrations as new data are obtained, and

Response

The section on Trend Analysis in Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site ***(Tetra Tech, June 2008)*** **has been expanded to include discussion of all above mentioned elements i) through iv).**

v) *Identification of any spatial variability of data when an inter-well data analysis method is used.*

Response

A statistical evaluation of the spatial variability of the existing data that will be used on an interim basis was not made. Simple observation indicates that there was little variability in the existing data, especially when the data from Wells RM-8 and RM-20 were excluded from the database. Excluding the anomalous data results in a lower compliance limits and therefore is conservative.

The long-term evaluation of each well will be based on intra-well statistics and therefore spatial variability between wells will not be relevant.

h. *Please revise page 11 – "Frequency": 1st paragraph, second sentence, to change the word "down" to "downgradient". Please revise the text to reflect the correct term.*

Response

The text has been revised.

i. *Please provide an expanded discussion within the Plan following the discussion presented on p. 11 of the current Draft Plan entitled "Frequency", under a heading entitled "Actions Taken if Monitoring Data Are Out of Control" or some other similar heading, of the specific timetable within which a verification (confirmation) sampling/analysis episode would occur following determination of initial evidence of an exceedance or evidence of a statistically significant trend in one or more parameter concentrations within a well.*

Response

The text in the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) addresses this issue as suggested. In addition the logic and procedures that would be used to evaluate the data and to decide what actions, if any, should be taken are outlined in Figure 4 of the report.**

j. *Please revise the text in the first paragraph of the Plan to refer to ASTM D6312-98 instead of ASTM D6313-98.*

Response

This change has been incorporated into the new documents.

k. *Please provide additional information to evaluate the impact, if any, that the indicated lack of a normal or lognormal distribution of at least four of five monitoring parameters identified as process-related parameters, (i.e., K, Na, Unat, and $SO4^{-2}$) – see Tables 1 and 2 of the Plan – has on the selection and application of statistical analysis method(s) for these parameters, including the compilation of time-series plots/future intrawell statistic analysis. Please also provide*

information to assess whether the highest concentrations of several parameters (e.g., Na, Unat, Cl^-, Fl^-, NO3 + NO2, $SO4^{-2}$, TDS, Mg), as shown on the Probability Plots in Figure 3 of the Shootaring Background Water Quality document, might represent different water quality populations.

Response

As discussed above, parameters that have less than 15% non-detect values that are not normally or log-normally distributed will have interim compliance limits set at the maximum recorded value as recommended by ASTM. A complete discussion of the procedures used to determine the compliance limits is in section 5 of the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra Tech, June 2008) . As stated above, the evaluation indicated that the water quality are from one population, excluding the data from wells RM-8 and RM-20 which were not used in the evaluation.**

l. Please provide additional information regarding the values of "n" shown in Tables 1 and 2. It appears that "n" represents the number of samples in each parameter data set; however, this information is not explicitly stated. The values of "n" given for the various parameters, assuming that "n" represents the number of samples, also seem to be very large.

Response

Column headings have been renamed the tables to address the issue.

5. ***Proposed Groundwater Monitoring Approach**: Please provide responses to the following concerns regarding the proposed groundwater monitoring approach presented to date. These concerns were expressed in Round 2 of this Interrogatory, and Uranium One stated that responses will be provided in the next submittal.*

a. Please provide a proposed sampling and analysis plan for monitoring of the seep (or spring) located south of the mill site near Ant Knolls (as shown on Figure 1-1 of the revised Tailings Management Plan). Please also provide information to indicate whether sampling and analysis of springs or seeps located northwest of the mill site and proposed Cells 1 and 2 and the spring or seep located northeast of proposed Cells 1 and 2 (e.g. Lost Spring) would be conducted, for example, for comparison purposes. Alternatively, please provide justification for not monitoring these seep/spring locations.

Response

Three springs around the site were investigated to determine if any relevant information could be determined by monitoring water quality from them. The three springs that were investigated are the Ant Knolls Spring, Lost Spring and a spring on Shitamaring Creek.

Ant Knolls Springs and Lost Springs are shown on Figure 1. Lost Springs is north and up-gradient from the proposed tailing disposal facility. Ant Knolls Spring is south and down-gradient from the tailings area. One additional seep

was located northwest of the proposed disposal facility on Shitamaring Creek near its confluence with Lost Spring Wash. This seep is not shown on Figure 2 but exists at an approximate elevation of 4,330 feet above Mean Sea Level (MSL), and is approximately 4,000 feet northwest of the proposed tailings cells

Ant Knolls Spring is a small and discrete point seep down-gradient from the tailings area and exists at an elevation of 4320 feet MSL, approximately 80 feet higher than the elevation of the groundwater under the south end of the tailings disposal facility (approximate elevation of 4240 feet MSL). Therefore, the water in this spring cannot be hydraulically connected to the groundwater under the tailings and is likely from a localized perched zone well above the main Entrada aquifer.

The Lost Spring is also a small and discrete point seep up-gradient from the proposed site and is at an elevation of 4450 feet MSL, approximately 180 feet above the elevation of the groundwater under the north end of the tailings area (approximately 4270 feet MSL). Assuming the groundwater gradient is relatively uniform in the area as indicated by historical data which is reported in the annual groundwater monitoring reports, the groundwater elevation in the main Entrada formation in the Lost Spring area is projected to be approximately 4280 feet to 4290 feet MSL. The elevation of the spring is 4450 feet MSL which is approximately 170 feet above the estimated groundwater elevation in the Entrata at that location and therefore Lost Spring could not be hydraulically connected to the Entrada aquifer. It is likely that the water in this spring is also created by a localized perched zone well above the main Entrada aquifer.

The spring on Shitamaring Creek is upgradient from the site. It is unclear if the water in the spring is from the main Entrada formation or in a perched zone. If the water is from the main Entrada aquifer, it is not connected to the Entrada aquifer under the proposed tailings disposal facility as it is discharging to the surface as a result of an incised drainage system.

Since the springs are not isolated from potential contaminant transport flow paths, there is no reason to sample and monitor the seeps as they could not be impacted by potential future site ground water impacts or be useful in determining background water quality.

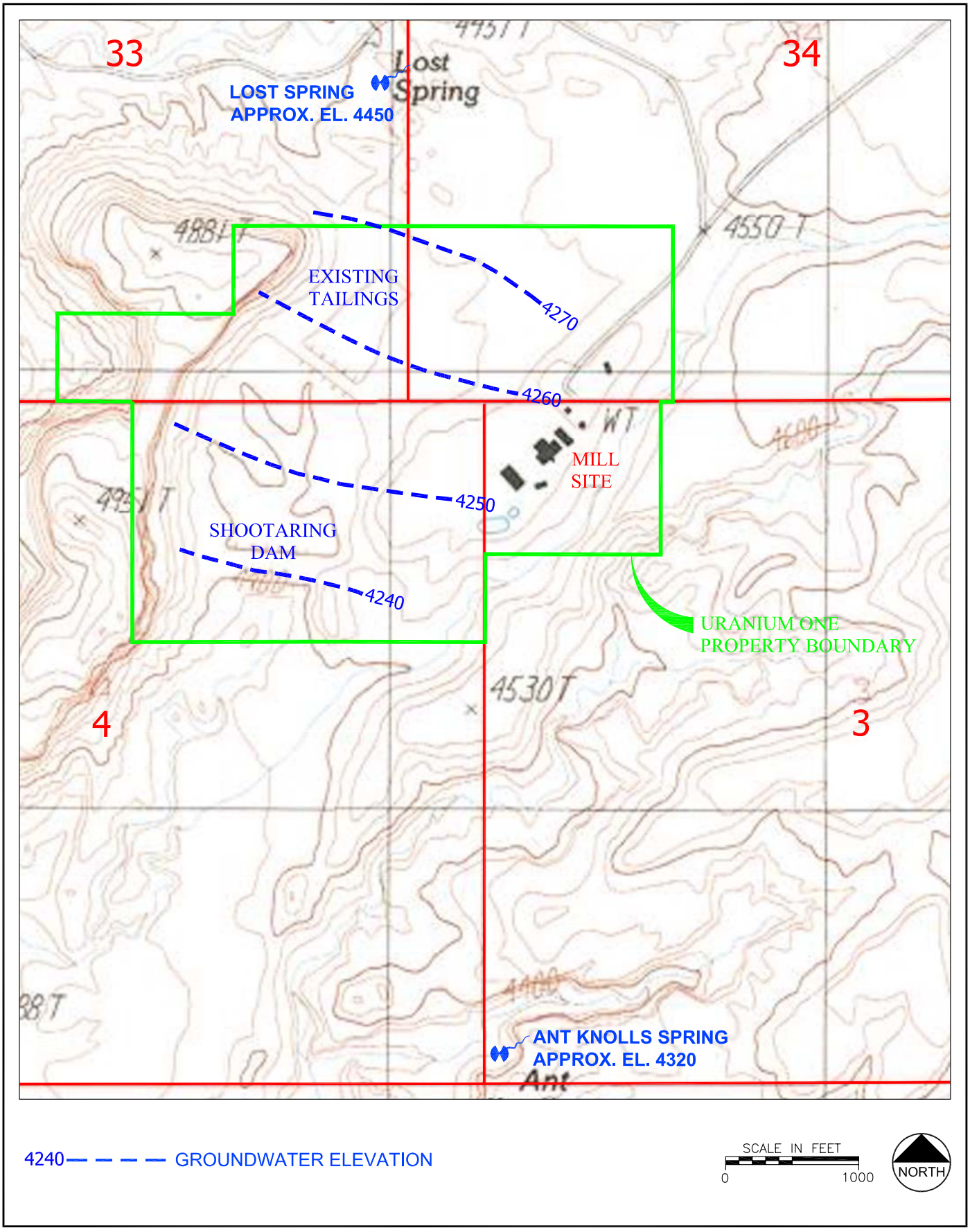
b. *Please provide rationale for selecting parameters for groundwater sampling and analysis as listed in Section 7 and in Appendix D of the Revised Tailings Management Plan (Plateau Resources, Ltd. And Hydro-Engineering, LLC 2007), including parameters to be used as key indicators of performance. Please provide additional information/rationale to support not specifying requirements for analysis of any parameters (e.g., Radium-228 and gross alpha) identified in R317-6-2.1, as applicable parameters for sampling and analysis.*

Response

The rationale for selecting parameters for groundwater sampling and analysis is presented in Section 3 of the *Ground Water Geochemical Evaluation And Background Water Quality Determination For The Shootaring Canyon Mill Site* **(Tetra**

Tech, June 2008). The parameters that will be monitored were selected to be consistent with the historic list of hazardous constituents for the site which were determined based on knowledge of process chemicals, composition of the ore and results of analysis of tailings fluid. The key indicator parameters were selected as they have both conservative transport characteristics and there is a large difference between the background concentrations and the concentration in the tailings fluid. The combination of these two characteristics makes the proposed key indicator parameters ideal for leak detection monitoring.

Many of the constituents in R317-2-2.1 are organic compounds that would not exist in the tailings since they are not used in the process and would not occur naturally in the ore. Inorganic constituents are included if they are expected as a result of processing or are naturally present in the ore. Both gross alpha and radium-228 are included in the proposed list of constituents. As indicated in the geochemical and background water quality report, samples will be taken from the tailings disposal facility once tailings deposition begins. Based on the results of that sampling, it is possible that additional constituents will requested to be added or deleted from the list of constituents that are analyzed.



E:\181692\general\FIG_spring.dwg SAVED: 7/1/08 PRINTED: 7/16/08 BY: MFGFTCACAD3

Project No. 181692

June 2008

Figure 1
Location of Lost and Ant Knolls Springs and Tailings Storage Facility