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CERTIFIED MAIL
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Anthony Baus
Rio Algom Mining LLC
P.O. Box 218
Grants, NM 87020

Subject: Utah Division of Radiation Control Comments on the Rio Algom Mining LLC July 22, 2014 Supplemental Site Assessment to Address Out-of-Compliance Status at Trend Wells RL-1 and EF-8: Request for Information

Dear Mr. Baus:

Utah Division of Radiation Control ("DRC") comments regarding the Rio Algom Mining LLC ("RAML") July 22, 2014 Supplemental Site Assessment to address Out-of-Compliance Status at Trend Wells RL-1 and EF-8 ("Site Assessment") are presented below. Please note that the Site Assessment must meet the minimum requirements specified in Duly Executed Stipulated Consent Agreements ("SCAs") dated September 10, 2012 (Phase I Assessment) and July 23, 2013 (Phase II Assessment). Based on this review, not all of the minimum requirements of the SCAs have been met as discussed below.

General Comment 1: DRC notes that a Long Term Groundwater Monitoring Plan ("LTGMP") was not submitted with the Site Assessment as required by the SCAs. RAML states in the Site Assessment that the LTGMP, including assessment of monitoring procedures, will not be submitted until after DRC review and approval of the Site Assessment.

Detailed analysis of the comparability and representativeness of water quality data from all sampling methods needs to be completed prior developing new ACLs. The purpose of the DRC allowing the Licensee use of previously unauthorized alternative sampling methods for sampling was to conduct an experiment and analysis and see whether the proposed alternative methods would work. That analysis is required to be part of the Site Assessment.

General Comment 2: The SSA contains many expressed speculations, hypotheses, guesses or beliefs throughout it that are not supported within the SSA by an accompanying presentation of site evidence. Any hypotheses or speculations presented in the SSA should be identified as such and should be justified in the SSA using site field data, site laboratory data, literature references, or a combination thereof. Otherwise, these speculations, in the absence of supporting data, would best be avoided.

General Comment 3: Comments on statements in the SSA should also be applied to all corresponding or relevant information in the appendices.

Section 1.1 "Introduction", Page 1, Paragraph 2: DRC notes that reference is made in the paragraph to the SCAs but the documents are not included in the reference section. Please add the 2012 and 2013 SCAs to the reference section.

Section 2.3 "Site Geology", Page 6, Paragraph 2: The paragraph refers to the Lisbon Valley Fault as a "reverse" fault. The Lisbon Valley Fault is a normal fault. See references, http://geology.utah.gov/geothermal/ngds/Activefaults/2511S.pdf, and Utah Geological Survey, 2004, *Geologic Map of the La Sal 30' X 60' Quadrangle*, Compiled by Hellmut Doelling.

Section 2.4.2 "Core Sampling": The DRC would like to see a detailed description of the MW-116 core, from the top of the saturated zone of the BCA down to total drilling depth. This area has anomalous concentrations of various constituents, including uranium, in groundwater, and the DRC needs to better understand the local hydrogeological setting and the local aqueous geochemistry to assess potential contamination (or the lack thereof).

Section 3.1 "Hydrogeologic Conditions", Page 21: Please clarify in the first paragraph of the section that an exception to previously logged lithological information was a 10-ft-thick section of sandstone, with about four feet of fracturing, found about 20 feet below the top of the Jmb in MW-102DB.

Section 3.1 "Hydrogeologic Conditions", Page 22, 2nd Bullet Comment Regarding Section A-A' Figure 6: Groundwater appears to be confined in the BCA not only in Area 3, near MW-108, but also to be confined in Area 4, near the MW-112, MW-114, MW-115, MW-116 and MW-117 well clusters. Groundwater near MW-108 was first noted being produced at 100 ft bgs, but after well completion, the water level rose to 25 ft bgs. It is interpreted by the Licensee in Appendix B that the "*aquifer is confined at this location, most likely by the fine-grained siltstone layers.*" However, after well completion of MW-112, MW-114, MW-115M, MW-116 and MW-117M, according to Appendix B, water levels also rose significantly above the point at which water was first noted coming into the borehole: by 46 feet, by 12 feet, by 25 feet, by 15 feet, and by 28 feet respectively. This behavior is reasonably consistent with the behavior of a confined aquifer. Cross section B-B' in Figure 7 and cross section E-E' in Figure 8 show that a thick low-permeability layer of siltstone, mudstone or shale exists in the upper part of the Jbc at these five well locations. This thick zone of siltstone, mudstone or shale could potentially serve as a confining layer.

This low-permeability layer does not appear to exist along section B-B' to the northwest, e.g. at MW-118 and MW-107D. There, after well completion, water levels only rose zero feet, and 10 feet, respectively. This is generally more consistent with an unconfined aquifer, or with a partially confined aquifer, with perhaps some lag time having been required for MW-107D before water levels fully stabilized after drilling.

The low-permeability layer also does not appear to exist along section B-B' to the southeast (e.g. at MW-105 and MW-120). There, after well completion, water levels in each well only rose 5 feet. This is generally more consistent with an unconfined aquifer or with an aquifer with a partially confining layer, with perhaps some lag time having been required before water levels fully stabilized after drilling.

This leads to a discussion about saturated thickness. This realization that, outside of boreholes or wells, the BBA in much of the syncline area is normally only saturated within the more-permeable lower portion, and that the upper portion is not saturated, or, at best, is only variably saturated, means that the saturated thickness map in Figure 12 requires significant revision. Mapped saturated thickness in a confined aquifer should represent the difference in elevation between the base of the aquifer and the top of the saturated portion of the aquifer, not the water level found in a penetrating well, which may be well above the top of the saturated aquifer. Thus, the saturated thickness values shown in Figure 12 in the areas of MW-108, MW-112, MW-114, MW-115M and MW-117M should be markedly reduced, since they currently represent distance from the base of the aquifer to the water levels in wells.

Section 3.1 "Hydrogeologic Conditions", Page 22, 6th Bullet Comment Regarding Section A-A' Figure 6: Please further describe the degree of upward vertical gradient at well pair MW-107S/MW107D.

Section 3.1 "Hydrogeologic Conditions", Page 23, 3rd Bullet Comment Regarding Section B-B' Figure 7: Please further describe the degree of downward gradient at the listed well pairs.

The apparent decrease in head with depth appears to be, at least in part, an artifact of fluid density associated with higher salinity. Once corrected to account for density differences, the heads at various depths may not be that different, if at all. Or, when corrected, it is possible that heads may actually indicate flow in the opposite direction. By way of example, the following (from Table 11) are maximum values of electrical conductivity (related to salinity, and therefore to fluid density) for the various wells in the MW-117S/MW-117M/EF-3A well cluster (listed from most shallow to most deep):

Well No.	Head (ft amsl)	Conductivity (uS/cm)
MW-117 S	6,503.96	1,520
MW-117M	6,503.95	3,260
EF-3A	6,503.43	8,070

As can be seen here, conductivity, and thus density, increase as a function of depth in this area. Accordingly, equivalent fresh water heads for the deeper-screened wells would be greater than the point values or environmental values measured in and currently reported for these wells.

Section 3.1 "Hydrogeologic Conditions", Page 23, 5th Bullet Comment Regarding Section B – B' Figure 7: Please explain why uranium concentrations increase as a function of depth and provide data to help explain. Are density differences associated with the increase in uranium concentrations as a function of depth?

Section 3.1 "Hydrogeologic Conditions", Page 23, 1st Bullet Comment Regarding Section C-C' Figure 7: The statement with this bullet does not appear to be worded correctly. The wording should be amended. Monitoring Wells MW-118 and MW-108, located NW of the LVA axis, appear to have a saturated thickness in the BCA much greater than 25 feet. MW-119 does have a small saturated thickness. Most of the other wells along Section C-C' appear to be located to the NE of the axis of the LVA, rather than to the NW.

Section 3.1 "Hydrogeologic Conditions", Page 23, 2nd Bullet Comment Regarding Section C-C' Figure 7: Please discuss the degree of upward hydraulic gradient at well pair MW-102/MW-102DB.

Section 3.1 "Hydrogeologic Conditions", Page 23, 3rd Bullet Comment Regarding Section C-C' Figure 7: It appears that the BCA wells referred to in this section are northeast and not northwest of the LVA.

Section 3.1 "Hydrogeologic Conditions", Page 24, Section E-E': Section E-E' appears to need some modification where the water level is drawn through the Brushy Basin Member (BBM). The water level in the Jmb at MW-111 is currently drawn higher than the water level in the Kbc at MW-101, but the water level at MW-111 (6553.5 ft amsl) should be 6.5 feet lower than at MW-101 (6560 ft amsl).

Also, if the water in the Jmb is flowing out to the more-permeable Kbc, then the head loss through the Jmb should be shown in areas of the Jmb west of MW-111. The water level in the Jmb may drop down to the level of the water level in the Kbc on the west of the subsurface Jmb structural high.

Section 3.1 "Hydrogeologic Conditions", Page 24, 3rd Bullet Comment Regarding Section E-E': Please discuss the degree of upward hydraulic gradient at well pairs MW-100/LW-1 and MW-113/EF-6.

Section 3.1 "Hydrogeologic Conditions", Page 24, 4th Bullet Comment Regarding Section E-E': Please provide more specific information to justify the claim that the uranium concentrations are consistent with "*naturally occurring mineralized and geochemical conditions*" at this location. With groundwater concentrations of uranium in this well reaching 20 mg/L, compared with Utah State groundwater limits of 0.030 mg/L (i.e., 667x), the justification here should be as rigorous as possible.

Alternative hypotheses for the high concentrations (e.g., transport of contaminants from the former Lower Tailings area toward the Lisbon Fault ("LF") through the EF-3A area and through the MW-116 area) should be examined and considered in the Site Assessment. Analyses should be based on appropriate geochemical and hydrogeological data. Please also account for the extremely high concentrations of sulfate in the groundwater, as well as other anomalous chemical concentrations.

Based on available data, there appears to be no obvious reason why the contamination observed in groundwater at MW-116 may not be part of a plume extending from the Lower Tailings area, through the EF-3A area, to the MW-116 area, before the plume moves northward along fractures associated with the LF. This interpretation would appear to be consistent with existing hydrogeological and geochemical data.

The plume along the NE part of the LVA has traveled about 7,000 feet. There is no reason explained in the Report why the plume to the SW of the LVA cannot have similarly traveled a large distance. That plume is in rock having generally a much higher hydraulic conductivity than the rock to the NE of the LVA. The hydraulic gradients generally appear greater. Therefore, unless other factors are involved, it seems that the plume to the SW of the LVA, over a period of several years, should have traveled at least as far as the fractures associated with the Lisbon fault zone. This could potentially account for the poor groundwater quality in groundwater sampled from MW-116.

Section 3.2.1 "Slug Test Results": It appears that field analysis data test sheets are provided for MW-105 and MW-119 but no slug test data was provided (Table 5 of the Site Assessment). Please provide the slug test data for these wells.

Section 3.2.1 "Slug Test Results" Page 26, 2nd Paragraph: The anisotropy value chosen for the slug-test analysis (estimated mean horizontal K calculations) conflicts with core test results for the BCA wells. The majority of core data for the Kbc indicates a ratio of vertical to horizontal K components to be no more than 0.1. This means that analyses of the slug tests for the BCA are incorrect. All of them are shown in Appendix F to have been analyzed with "Anisotropy Ratio (Kz/Kr) = 1." The correct single value (if a single value is to be used universally for BCA slug testing analysis) would be "Anisotropy Ratio (Kz/Kr) = 0.1." Please recalculate the K values.

Section 3.2.1 "Slug Test Results" Page 26, 3rd Paragraph: The written value of 1.4 ft/d for geometric mean K for the BCA appears to conflict with the reported value of 1.9 ft/d as given in the following statement on Page 6 of Appendix J (and other locations in the Site Assessment): "The geometric mean of all estimated horizontal K values of the BCA across the entire Site was estimated to be 1.9 feet per day (ft/d)."

Also please clarify in this paragraph that the estimate does not account for results from MW-105, where the water-level recovery was too fast to determine a K value, or from MW-122, where the well was dry, and no testing occurred.

Section 3.2.2 "Laboratory Test Results" Page 27 1st Paragraph: Figure B-52 appears to be in error. It states that the bluish gray shale found at MW-118 at a drilling depth of 64 feet was Kbc. However, Figure B-23 (Monitor Well MW-118 construction schematic) shows greenish-blue shale encountered at a depth of 65 feet as Jmb.

The text on Page 12 of Appendix B states: "*MW-118: . . . Prior to well drilling at the MW-118 location, a PQ corehole was advanced to obtain undisturbed samples for detailed lithologic characterization. The core was advanced to a depth of 78 feet bgs, approximately 13 feet below the Kbc/Jmb contact. . . . Greenish blue homogeneous Jmb shale was encountered from 65 to 78 feet bgs.*"

The text Page 27 refers to MW-118 BBM core, which means that BBM is present at the location, which is not indicated in Figure B-52.

The greenish blue Jmb shale found at MW-118 is correlative with the greenish blue shale found at MW-107D. Page 17 of Appendix B states: "*MW-107S and MW-107D: . . . Greenish blue homogeneous Jmb shale was encountered from 80 to 85 feet bgs.*"

Please revise statements in the Site Assessment on this topic to be consistent with each other.

Section 3.2.2 "Laboratory Test Results" Page 27 3rd Paragraph: Statements in this paragraph indicating that, for the BBM, K_v is similar or equal to K_h appear to conflict with a statement on Page 6 of Appendix J: "*Based on laboratory estimates, vertical K is estimated to be at least an order of magnitude lower than horizontal K for the BCA and BBM.*" Please reconcile these statements or amend them so as to make them consistent with each other and field and laboratory data.

Section 3.3.1 "Groundwater Elevations" Page 28 1st Paragraph: Figure 10 appears to have several errors that need to be fixed:

1. The locations for Wells MW-13 and MW-105 are not the same as in other figures and appear to be incorrect.

2. Lines of hydraulic head, which correspond with equipotential lines, do not currently intersect no-flow boundaries at right angles, which, in an isotropic, homogeneous environment, they must (e.g., see Domenico and Schwartz, 1990). This would apply to intersections with the "dry zone" (except where recharge is modeled as occurring) and also with the LF, where the BCA abuts nearly impermeable rock, such as the Chinle Formation. Following this generally accepted scientific and engineering principle will dramatically change the current contouring on the map.

   If RAML is assuming that the BCA is non-isotropic, that is, it is anisotropic, horizontally, then it should (1) explain why that assumption is being made (and provide adequate scientific justification), and (2) discuss anisotropy in the description of the groundwater contours and incorporate anisotropy in a revised version of the model.

3. The 6,595-ft contour is on the wrong side of MW-116, which has a groundwater level of 6492.98. The contour should be on the upgradient, instead of the downgradient, side of the well. The 6,490-ft contour should also be moved. It should be closer to MW-116.

4. Flow from east to west across the top of the contoured head map is not balanced in terms of mass flux. Continuity demands that the mass flux balances between any two streamlines. Assuming constant fluid density, what needs to be proven is equivalent volumetric flux across any vertical cross-sectional saturated area located at the same equipotential line between two laterally bounding streamlines. This means that the volumetric flux over the crest of the LVA should match the volumetric flux bounded by the same streamlines downgradient on the western slope of the LVA and over the syncline.

Instead, the latter is orders of magnitude larger, based on values reported on maps in Figures 9, 10 and 12 and an assumption of Darcian flow. The reported K, the reported saturated thickness, and the calculated hydraulic gradient are each much larger on the western slope than on the crest, between the same two streamlines. If flow is non-Darcian, then the model is of questionable value.

Section 3.3.2 "Groundwater Flow Directions and Hydraulic Gradients" Page 29 1st Paragraph: Contrary to what is written here in the Site Assessment, Upper Colorado-Kane Springs is not a groundwater basin. It is neither defined in terms of groundwater, nor is it a basin. It is a sub-basin, defined in terms of surface water drainage. Please correct this terminology.

Please provide a reference or figure to support the statement that a topographic divide exists immediately east of the site. Support for the statement is not evident on any of the maps provided in the Site Assessment (including Figure 11). It is not apparent that such a divide immediately east of the site exists, either for groundwater or for surface water. Immediately east of the site is sloping ground that slopes to the northeast, leading to a valley.

A watershed divide, by contrast, is typically a topographic ridgeline or crest line that separates flows to separate surface water bodies located on either side of it. No such feature is evident in Figure 11, which shows the topography east of the site.

Please confirm any claims of groundwater flow directions (e.g., flow into the Animas Groundwater Basin) with published literature or map references.

Section 3.3.2 "Groundwater Flow Directions and Hydraulic Gradients" Page 30: Please confirm or correct groundwater flow directions listed under bullets on this page. It appears that stated flow directions do not agree with flow directions depicted on maps and figures in the site assessment attachments.

Under the fourth bullet on this page RAML uses wells ML-1/MW-112 and MW-118 to calculate a hydraulic gradient for the area (0.009 ft/ft). A line drawn between these wells is not oriented perpendicularly to the hydraulic gradient. These wells should therefore not be used as the bounding wells to determine the hydraulic gradient. It would be better to use MW-119/MW-107 or MW-108/MW-107. The hydraulic gradient between MW-108 and MW-107 is about 0.024 ft/ft.

Section 3.3.2 "Groundwater Flow Directions and Hydraulic Gradients" Page 31: Comments regarding groundwater flow based on April 2014 contours state that a groundwater mound is evident in the BBM and is likely caused by seepage of water from Bisco Lake and tailings. Seepage of tailings solution into the BBM implies local contamination of groundwater in the BBM. If flow from a contaminated mound of groundwater has entered into the BBM, then it follows that, somewhere, at or downgradient from the point of inflow, the BBM should be contaminated, and probably not over a limited area. This zone of contamination should extend over an area greater than that of a single monitoring well location. Monitoring data for MW-103 (e.g., uranium concentrations) confirm that impacts to the BBM have occurred, at least at the specific location of this well. However, the shape of the contamination plume in the BBM has not been delineated as part of the site assessment.

Section 3.3.3 "Vertical Gradient" Page 32 1st Paragraph: One of the two columns toward the right in Table 9 appears to be mislabeled. One says October 2012 Vertical Gradient, and the other, located to its right, just says Vertical Gradient. Judging from the site assessment and Table 9, it appears that the headers for these two columns should reflect that the data are from the Fall 2013 (October 2013) event and the Spring 2014 (April 2014) events, respectively.

Section 3.3.4 "Saturated Thickness of the BCA" Page 33: This paragraph summarizes findings of Figure 12 (*Saturated Thickness in the Burro Canyon Aquifer*, April, 2014) of the site assessment. It was noted that Figure 12 does not accurately depict the measured saturated thicknesses at several wells, particularly in areas where groundwater flow across the LVA likely occurs. Specifically:

- Well RL-1, shown almost touching the dry zone (0 feet of saturated thickness), has a stated saturated thickness of 10 feet. It is not touching, or even near, the 10-ft contour.
- Well RL-3, with a stated saturated thickness of 25 feet, is shown between the 10-ft and 20-ft contours, an obvious error.
- Well RL-4, with a stated saturated thickness of 20 feet, is not touching, or even near, the 20-ft contour. It is shown about half way between the 10-ft and the 20-ft contours.
- Well RL-5, with a stated saturated thickness of 20 feet, is not touching, or even near, the 20-ft contour. It is shown touching the 30-ft contour.
- Well LW-1, with a stated saturated thickness of 88 feet, is shown touching the 90-ft contour, slightly closer to the 100-ft contour than to the 80-ft contour.
- Well OW-UT-9, with a stated saturated thickness of 14 feet, is shown touching the 30-ft contour. The contours in the area are drawn incorrectly.

Additionally, please review the map and make corrections, as it appears that other wells are shown at locations with incorrect contouring.

The relatively thin saturated thickness is currently allowing groundwater and contaminant flow toward the west over the LVA crest. If groundwater levels fall, then the plume would first have to move north over LTSM boundaries before moving west toward the LF. Southeast of MW-109 and RL-1, the Kbc is currently dry along part of its crest because the elevations of the Kbc located in that part are greater than the elevations of the adjacent groundwater table. If the groundwater table drops several feet, as it could, for example, during a major drought, then more of the LVA crest located north of MW-109 and RL-1 (and north of MW-119) would have elevations greater than the elevations of the adjacent water table. This would potentially extend the dry zone in the Kbc north of the LTSM boundary line, and cause the uranium plume to move north of the LTSM boundary line. Figure 12 shows the BCA in the vicinity of MW-119 as having only three feet of saturated thickness. With current water levels in the BCA, the large uranium plume runs NW parallel to the LVA (on the NE side of the LVA), then is modeled as crossing the LVA without reaching the LTSM.

Section 3.4 "Laboratory Testing of Vadose Zone Core Samples" Page 34 1st Paragraph: Page 2 of 19 of Appendix C showing the results from ACZ Laboratories reports a detection of uranium in leachate from hard rock sample 102-DB-123-123.5 of 0.0005 mg/L. This is the core sample for borehole 102DB. It is noted that this analysis is for a sample of the Kbc, which, in the associated completed well (MW-102), is screened over the cored interval. The groundwater sampled from the screened interval of MW-102 shows a high uranium concentration of 148 mg/L. Based on Figure 15, please describe why the concentrations in the groundwater are extremely high, yet the concentrations from leachate testing are very low.

Section 3.5 "Groundwater Quality" Page 34: RAML states "*Review of the groundwater quality data from the comprehensive events indicates that all three sampling methods provide comparable analytical results.*" This assertion is yet to be substantiated. Data in Table 3 for the three sampling methods appear to have many discrepancies and/or inconsistencies between the methods. The DRC would like to see a thorough analysis of the data and submission of a LTGMP with the Site Assessment as required by the SCAs.

Section 3.5 "Groundwater Quality", Page 36 1st Paragraph: RAML states that the groundwater chemistry at monitoring well MW-116 (located adjacent to the LF) is notably distinct from nearby wells based on the finding that "*trace metals concentrations are significantly higher than concentrations reported in nearby BCA wells located closer to the Site.*"

This is not the case for uranium in groundwater at nearby EF-3A at 27.5 mg/L, higher than 20.8 mg/L at MW-116. Neither is it the case for dissolved arsenic at nearby MW-117M at 0.245 mg/L, and at nearby EF-3A at 0.206 mg/L, higher than 0.134 mg/L at MW-116. Neither is it the case for dissolved molybdenum at nearby EF-3A at 2.81 mg/L, higher than 1.25 mg/L at MW-116.

Please justify the statements and the claims that groundwater chemistry in the BCA adjacent to the LF is impacted by geochemical conditions of the fault zone (and without impact from the groundwater plume) with specific information (e.g., parameter lists and concentrations for each well).

Section 3.5 "Groundwater Quality", Page 36 1st Paragraph: The RAML statements regarding "*the water quality detected at MW-107S, and to a lesser degree MW-107D, is similar to that of MW-116*" appears to require amending. RAML should substantiate, quantitatively, the claim water quality in each well is similar. There are some large differences in water quality between the two wells. Uranium in GW in Well MW-107S is 0.0019 mg/L, whereas that in Well MW-116 is 20.8 mg/L (10,900 times as high). TDS in Well MW-107S is 1,960 mg/L, whereas that in Well MW-116 is 26,600 mg/L (14 times as high.) Arsenic in Well MW-107S is 0.005 mg/L, whereas that in Well MW-116 is 0.134 mg/L (27 times as high.) The Licensee should acknowledge these and other instances (e.g., Mg^{2+} and Cl^-) where water quality is considerably different.

Section 3.5 "Groundwater Quality", Page 36 2nd Paragraph: Jacobs and Kerr (1965) only refer to acidic conditions at or near the LF once in their entire paper, speculating that "Solutions of acidic nature, possibly enriched in hydrogen sulphide, bleached the wall rock by reducing ferric oxide pigment and precipitated metallic sulphides." However, they also make a statement in reference to sandstones present near the LF that "Silicification suggests higher pH values at times." This indicates the presence near the LF at times of basic solutions (higher pH). DRC cannot see where Jacobs and Kerr (1965) assert that fluids of either high or low pH moved into the system specifically during tectonic activity. Together, the statements of Jacobs and Kerr (1965) do not appear to provide evidence that current hydrochemical conditions of the LF should be characterized by acid or low pH. The text of the Site Assessment should therefore be amended.

RAML needs to provide evidence for statements in this paragraph. Acidic conditions during tectonic activity of ages past do not necessarily result in acidic conditions now. Subsequent geochemical events over millions of years may modify geochemical conditions, potentially changing lower pH conditions to higher pH conditions. Jacobs and Kerr (1965) indicate that the presence of silicification noted near the LF indicates the possibility of higher pH conditions there in times past. Please make changes in the Site Assessment to reflect these considerations.

Section 3.5.1 "Common Constituents": RAML's claims in this section that high sulfate concentrations measured at wells MW-116 and MW107S are "*the result of naturally occurring hydrochemical conditions in the fault zone, and not the result of historical mining operations at the Lisbon Facility*" need to be substantiated with specific evidence.

Section 3.5.1 "Common Constituents", Page 38 3rd Paragraph: RAML statements that groundwater from BBM wells MW-103 and MW106 appear similar in signature to groundwater from BCA wells near the tailings impoundments needs to clarify why the groundwater in well MW-106 which is located far upgradient from the tailings impoundments is similar in signature to groundwater from BCA wells located near the tailings impoundments. If it is similar, then what is the cause, and why is the finding significant?

Section 3.5.1 "Common Constituents", Page 38 3rd Paragraph: Statements that groundwater from wells MW-111 and MW-102D show no impact from tailings seepage due to characterization as alkali carbonate are not fully consistent with the interpretation found elsewhere in the Site Assessment. Specifically, there are concerns that tailings seepage from the tailings impoundments created mounding which causes the head in MW-102DB to be so much higher than in the companion well screened in the BCA. The term used elsewhere in the Site Assessment (see Page 33) describing the relationship between groundwater in the fractured section of the BBM in MW-102DB and the contaminated mound water beneath the Upper Tailings Impoundment is "hydraulically connected." Please clarify the RAML interpretations regarding this issue.

Section 3.5.2 "Trace Metals": As a general statement for all parameters discussed under this section, any claims ("beliefs") that elevated concentrations are due to hydrochemical conditions along the LF needs additional substantiation. Additionally, the Site Assessment needs to discuss the possibility that elevated concentrations may be due to more than one source of contaminants.

Section 3.5.2 "Trace Metals", Uranium: Sooty staining was noted for fractures in BCA rock encountered during drilling of MW-102 (see Appendix B). We don't know what this sooty staining is. It may possibly be sooty manganese or sooty pitchblende (low solubility, and kinetic requirements may keep concentrations down during core testing). Sooty pitchblende is a possibility for the staining. That type of deposit is described in Uranium Deposits of The World, Volume 2, by Franz J. Dahlkamp.

Section 3.5.2 "Trace Metals", Uranium: The Site Assessment, Figure 10, Groundwater Elevations, April 2014 seems to exhibit several errors. The 6,495-ft contour is drawn downgradient from Well MW-116, whereas it should be drawn upgradient. The groundwater level for MW-116 is 6,492.98 ft amsl. This means that the well should be located between the 6,490-ft and the 6,495-ft contours, which it is not. These two groundwater contours need to be shifted to properly account for the water level in the well. Also, the 6,500-ft contour needs some adjustment. When the contours are properly drawn, they show that Well MW-116 is directly downgradient from Well EF-3, which, like Well MW-116, exhibits relatively high concentrations of uranium and other contaminants. This suggests the possibility of contamination from a plume of leachate from the tailings impoundments. RAML should correct the groundwater contours in Figure 10. They should also discuss the potential for groundwater sampled from Well MW-116 having been contaminated by a westward-moving plume of contaminants and justify any conclusions made using site data.

Section 3.5.2 "Trace Metals", Arsenic: RAML states that arsenic was detected above the Utah Groundwater Quality Standard in six of the 20 new wells. Please indicate where these detections were found and if there is any relationship between the concentrations and the delineated contaminant plumes.

Section 3.5.2 "Trace Metals", Selenium: Well MW-107D does not have the correct concentration given in the bulleted item. The actual concentration is orders of magnitude less.

Section 4.0 "Conceptual Site Model", Source Area: It is noted that groundwater in BBM Well MW-103 contains 9.66 mg/L uranium. The risk-based health standard for uranium adopted by the State of Utah for groundwater is, by contrast, only 0.030 mg/L. Thus, the existing uranium concentration in groundwater at MW-103 is 322 times as high as the State limit. Thus, it cannot properly be said that "meaningful impacts to groundwater in the BBM that pose a public health risk do not exist." Please amend the language here in the Site Assessment, or justify the claims.

Section 4.0 "Conceptual Site Model", Groundwater Contamination: DRC notes that per RAML language the contaminants are considered to be transported by advection, dispersion and dilution only. RAML states that other processes such as attenuation of uranium by chemical reactions with the tailings solution and mineral matrix are minimal. Is this determination made through results of the Site Assessment Activities or other studies which were conducted at or near the site? Please provide additional information regarding this determination and how it affects the outcomes of the contaminant transport model (e.g., conservative transport).

Section 4.0 "Conceptual Site Model", North Plume: This Site Assessment does not provide adequate evidence for the assumed current rate of transport of 60 ft/y. Please provide evidence.

Darcian calculations show that velocities in the area of the plume tip may be greater than 60 ft/y. For instance, near Well RL-3, where the BCA has a hydraulic conductivity of 1.2 ft/day, the hydraulic gradient of the BCA downgradient from the well appears to be about -10 ft/600 ft, or -0.017 ft/ft. The mid-range effective porosity of sandstone is, according to a range of values shown by Domenico and Schwartz (2003), about 5%, or 0.05. Since groundwater velocity, v, equals - KI/n_e, where K is hydraulic conductivity, I is hydraulic gradient in the direction of groundwater flow, and n_e is effective porosity, it follows that groundwater velocity in this area, based on these assumptions, should be about (1.2 ft/d)(0.017 ft/ft)/0.05, or 0.4 ft/d, or 149 ft/y. If effective porosity was actually smaller than 5%, then the groundwater velocity would be greater. If flow occurs through fractures, and it is non-Darcian, then transport may be appreciably faster.

In an area downgradient from the existing leading edge of the plume, between MW-108 and MW-107S, the hydraulic gradient, based on Figure 10, is about -29 ft/1200 ft, or -0.024. The geometric mean hydraulic conductivity in the local area, based on Figure 9 values, is 1.6 ft/d (MW-107S has a K value of 2.5 ft/d, and MW-108 has a K value of 1.3 ft/d). Assuming an effective porosity for the sandstone of 0.05, this gives a groundwater velocity, based on the assumption of Darcian flow through an equivalent porous medium, of about 0.77 ft/d, or 281 ft/y. At this rate, the plume would reach the LF, located 2,000 ft away, in a little over seven years. If the effective porosity was less than 5%, then the plume would arrive at the LF even faster. If flow occurs through fractures, and it is non-Darcian, then transport may be faster. Near the LF, the plume could then traverse the northern LTSM boundary in the NW of the model domain in the highly fractured sandstone rock assumed to be present parallel to the LF.

To assess the overall likelihood of the plume moving beyond the borders of the LTSM, please provide estimates for plume velocity estimated using ranges of likely parameter values, and consider movement along the LF to the northwest portion of the model domain. The immediate concern is not necessarily with the NW plume moving beyond the northern LTSM boundary near the LA, but with the plume first moving to the fractures near the LF on the west and then moving past the northern LTSM boundary in those fractures near and parallel to the LF. However, should the groundwater table decline in elevation, then the plume along the NE side of the LVA might be forced to travel further toward the NW than anticipated by the conceptual model, and perhaps even move across the LTSM boundary, before it can cross the crest of the LVA and travel toward the LF in the west. These issues need to be addressed in the conceptual model and represented in groundwater modeling.

The migration velocity of the uranium, which, assuming no sorption as stated by RAML, is assumed for the calculations above. Advective flow is likely to largely displace local groundwater, so dilution in the main part (core) of the plume is not a critical parameter. The hydraulic gradient and the hydraulic conductivity, coupled with the effective porosity, are what, in general, govern the contaminant velocity, not the saturated thickness.

Section 4.0 "Conceptual Site Model", South Plume: RAML claims that density gradients and the presence of more dense groundwater near the Kbc/Jmb contact limit the flow of deeper groundwater; these claims are speculative, and they need to be justified with more evidence.

Section 4.0 "Conceptual Site Model", South Plume: GW flux from the SE cannot be assumed to be small simply due to a physical restriction in the flow zone. Hydraulic gradients there are fairly large. Hydraulic conductivities in nearby areas are extremely large. To make the argument in the Site Assessment effectively, RAML must supply evidence to support the claim; otherwise, it would be better to delete the speculative comment.

Section 4.0 "Conceptual Site Model", South Plume: RAML's claim that groundwater in areas southwest of the study area is generally flowing west toward the LF is not generally the case south and southwest from the tailings ponds. Specifically, it is not the case between MW-105 and MW-117S/M/EF-3A, where hydraulic gradients appear in Figure 10 to indicate northwesterly flow, parallel to the LF, rather than westward flow, toward the LF.

Section 4.0 "Conceptual Site Model", South Plume: The RAML concept of downward drainage along the LF is speculative. No evidence is presented in the Site Assessment for it. Please provide evidence for this concept, and, if proven, how does this affect the contaminant transport and model conclusions?

Section 4.0 "Conceptual Site Model", Exposure Pathway: RAML states in this section that transport of contaminants to the POE locations and beyond the LTSM is "low." This conclusion remains to be proven. Available evidence suggests the potential for contaminants to move westward to fractures along the LF, which may then direct contaminants northward over the LTSM boundary. Until better well coverage is attained, conclusions about the relative likelihood of migration beyond the LTSM boundary being low are speculative. Additionally, RAML states in the second paragraph of this section that there is not enough field data to determine exposure pathways in areas of the LTSM.

Section 4.0 "Conceptual Site Model", Exposure Pathway: In the footnote on page 46, RAML states that rock on the west and southwest side of the LF is dry. RAML states on Page 29, "Dry conditions were observed at TRc well MW-121 for several months after installation. The most recent depth to water measurement indicates that a small amount of water has accumulated in the well (less than 1 foot). It appears that groundwater is slowly accumulating in the well." Thus, the Chinle Formation, in which MW-121 is screened, consists of rocks W-SW of the LF that are not dry. They may be relatively impermeable, releasing water to a well very slowly, but they are not dry.

Section 5.3 "Model Development" Page 49: No northern boundary of any kind as used for modeling is shown in Figure 21.

Section 5.3 "Model Development" Page 49: Use of a no-flow boundary along the northern LTSM boundary in the model would definitely help support RAML's claim that "the north plume is not expected to migrate beyond the northern LTSM boundary," but use of a no-flow boundary along the northern LTSM boundary may not be justified in the model. There are no data indicating that flow and transport is not occurring across the northern LTSM boundary in the extreme NW portion of the model. Flow and transport across the boundary there may actually occur, particularly near the LF. Figure 10 demonstrates that groundwater flow is likely occurring across the LTSM boundary in the extreme NW. Please provide evidence for any assumptions of flow and transport or lack thereof. It appears that a no-flow boundary in that portion of the model is not appropriate.

Section 5.3 "Model Development" Page 49: RAML states that a drain boundary is used on the southwest portion of the site (and depicted on Figure 21 of the Site Assessment). RAML justifies that this simulates the potential for groundwater discharge to the LF zone. RAML should provide more and detailed justification for use of a drain boundary in the model here. Typically, the modeled flux of groundwater removed from an aquifer at a drain is proportional to an assigned conductance value and the difference between the local hydraulic head in the aquifer and the local elevation of the drain threshold. Within the modeled domain, there is 75 feet of difference in hydraulic head in the aquifer going from the most southeasterly portion of the drain to the most northwesterly portion of the drain. The modeled flux of groundwater removed at different locations along the drain depends on the relative elevations of the hydraulic head in the aquifer and the drain. Why would there be so much more influx into the SE part of the LF fracture zone than into the NE part? Please explain and justify the current approach.

Section 5.5 "Results" Page 51: Please justify use of an effective porosity of 0.14. This issue has additionally been discussed in DRC comments above. Domenico and Schwartz (1998) indicate in Table 2.2 of their text that the range of effective porosity in sandstone varies from 0.005 to 0.10. RAML should justify why the use of a value of 0.14, instead of the lowest value (0.005), or the median (0.05), in the Domenico and Schwartz (1998) range, is conservative. Alternatively, the Licensee should perform laboratory testing to assess a measured average effective porosity for the Kbc.

Section 5.5 "Results" Page 51: Please justify the use of 150 feet for longitudinal dispersivity. Gelhar et al. (1992)[1], in a critical review of longitudinal dispersivity values versus field scale, showed that all high-reliability longitudinal dispersivity values that they studied range from 0.3 to 3 meters (1 ft to 10 ft). See also Fitts (2002)[2]. Other values from the literature reviewed were of only intermediate- to low-reliability. A value of 150 feet as used in the SSA model is 150x the minimum value and 15x the maximum value in the high-reliability range described by Gelhar et al. (1992).

Section 5.5 "Results" Page 51: RAML states: "*The 1.3 mg/L concentration was then contoured for each worst case plume*." This sentence (which may be corrupted) says that the 1.3 mg/L concentration value was contoured. The first sentence of the paragraph (as well as Figure 22) indicates, by contrast, that the 0.03 mg/L concentration value was used during contouring for plume delineation. Please resolve this discrepancy.

Section 5.5 "Results" Page 51: Regarding the North Plume RAML states: "*This projection is consistent with the concept that the north plume will dilute as it migrates to the west due to increasing saturated thickness*." Slowing of the plume west of the LVA does not occur due to dilution. It may be due to declining rates of advection associated with an increase in saturated thickness, as would be expected based on principles of continuity. Please revise the statement.

Also, since the plume involves a denser fluid, the plume (in this denser fluid) may move rapidly down the western side of the LVA. Please provide an analysis of this potential.

Section 5.5 "Results" Page 51, 2nd Bullet: As previously explained, while the plume may not cross the northern LTSM boundary directly north of the existing plume (i.e., near RL-4 and RL-

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[1] Gelhar, L.W., Welty, C. and Rehfeldt, K.R. (1992) Water Resources Research, v. 28, p. 1955–1974.
[2] Fitts, C.R. (2002) Groundwater Science, Academic Press, London, 450 pp

5), the plume may cross the LTSM boundary in the extreme northwest of the model domain (near the LF). In an area just downgradient from the current nose of the plume, between MW-108 and MW-107S, the hydraulic gradient, based on Figure 10, is about -29 ft/1200 ft, or - 0.024. The geometric mean hydraulic conductivity in the area, based on Figure 9 values, is 1.6 ft/d (MW-107S has a K value of 2.5 ft/d, and MW-108 has a K value of 1.3 ft/d). Assuming an effective porosity for the sandstone of 0.05, this gives a groundwater velocity, based on Darcian flow through an equivalent porous medium, of about 0.77 ft/d, or 281 ft/y. At this rate, the plume would reach the LF, located 2,000 ft away, in a little over seven years. If the effective porosity was less than 5%, then the plume would arrive at the LF even faster. If density flow occurs, then the plume may travel faster. Once in the highly fractured rock adjacent and parallel to the LF, the plume may cross the LTSM boundary in the northwest portion of the model domain.

Section 5.5 "Results" Page 52: The model assumes a drain along the LF. A single drain with a single threshold elevation may not be appropriate all along the LF. That would bias flow toward the SE part of the LF, since groundwater elevation above a single threshold value in the drain would be much greater there. Field data suggest that flow along the LF may be controlled by large fractures, which may not always be coincident with the LF, but may rather parallel it. Please explain how the model handles these considerations.

Section 5.5 "Results" Page 52: Figure 22 of the Site Assessment shows the south plume expanding beyond the LTSM boundary at the corner of the boundary near MW-114 and MW-116. It is not clear how the contaminant plume is traveling northwesterly in or along the LF. Is transport occurring in the drain, or is it occurring adjacent to the drain within fractures? If in the drain, what is the rate of transport within the drain, and how is this determined? What hydraulic conductivity is assigned to the drain? How is the hydraulic gradient within or adjacent to the drain influenced by assumptions made when setting up the drain?

Section 6.1 "Proposed New Alternate Concentration Limits": New ACLs should be based on a model updated to account for the deficiencies currently found in it as described in these comments. Additionally, other potentially appropriate actions (re: active remediation at site locations) should be discussed in terms of the update Site Assessment.

RAML's conclusions that health and environment impacts will not occur for 200 years need to be delayed until further work and data are done for the Site Assessment. Uranium at concentrations exceeding the 0.030 mg/L Utah Ground Water Quality Standard is considered a potential health risk if the groundwater can be ingested.

Section 6.3 "Point of Compliance Wells" Table 12: Monitoring Well MW-102 is located about 1,400 feet away from the source of contamination at the Upper Tailings Pond. Therefore, the conservative uranium concentration value used in the model for the north plume source is not appropriately applied at MW-102, since the location of MW-102 is about 1,400 feet distant from the source, and dispersion and radioactive decay will diminish uranium concentration along the plume centerline as a function of distance. It is expected that the concentration of uranium at MW-102 should therefore be lower than the concentration at the source, such that the location of the MW-102 would not be appropriate for a Point-of–Compliance well. This condition is likewise true for monitoring well EF-3A and needs to be evaluated by RAML.

Section 6.4 "Point of Exposure Wells": Since groundwater levels near the tip of the uranium plume near MW-119 show groundwater flow to the southwest, and not to the northwest, relative to the well, it does not make sense to put Point of Exposure Wells along the north boundary of the LTSM where placement is now being proposed. Wells might instead be put in fractured BCA rock along the LF, where contaminants are likely to be transported. Please consider this, and further justify the RAML request for POE well placement.

Section 7.2 "Conclusions": Additional work and characterization by RAML is needed before the groundwater transport of the contaminant plume is well understood. Uncertainty exists relative to the direction of groundwater flow once it approaches the LF. If flow is either down the curvilinear fault surface, as suggested in this Site Assessment, or in fractures in the BCF along the fault plane toward the NW corner of the Model Domain, as is suggested by Figure 10, or both, then significant uranium contamination levels within the flow could pose a risk to public health and the environment. Flow direction is insufficiently understood at present, and this uncertainty, among other factors mentioned in these comments, must preclude current acceptance of ACL proposals, since ACLs are inherently based on a presumption of conditions protective of public health and the environment.

RAML's claims that highly acidic and mineralized groundwater along the LF fault zone is not caused by the contaminant plume are not based on sufficient facts or evidence. The addition of uranium contamination to the groundwater in and near the fault system is unacceptable if it will result in transport offsite at concentrations in excess of State of Utah limits of 0.030 mg/L. The Site Assessment has not provided sufficient evidence that this will not happen.

There is uncertainty about the lateral extent of each uranium plume. The north plume may extend to the southwest of RL-3 (south of MW-119). Currently, no monitoring wells exist in the area to disprove this possibility. The south plume may extend southwest and west of EF-3, affecting groundwater at or near MW-116, and possibly in fractures associated with the LF. Currently, no monitoring wells exist southwest or due west of EF-3 to disprove this possibility.

The RAML determination that "*there is no apparent complete exposure pathway from Site uranium contamination to the public and environment*" does not consider the potential for migration occurring offsite to the northwest after either plume migrates to and along the fractures associated with the LF to cross the northern boundary. In addition, as shown in Figure 22, contamination is shown via modeling to cross the western boundary where exposure could potentially occur by 2165 and 2215.

Section 7.3 "Recommendations": After additional field word and characterization of the site has been completed by RAML, the subject of recommended actions can be addressed.

Per telephone discussions with the RAML representative and Lisbon Facility Superintendent, Theresa Ballaine, DRC has agreed to provide comments regarding the Site Assessment for RAML review. The intention is that after RAML has had sufficient time to review these comments a meeting will be arranged amongst DRC and RAML and its consultants.

If you have any specific questions regarding the comments please contact David Edwards at (801) 536-4259. If you would still like to meet in person to discuss the comments please contact Phil Goble at (801) 536-4044 to arrange the meeting.

Sincerely,

Rusty Lundberg

Rusty Lundberg
Director

cc: Theresa Ballaine, Rio Algom Mining LLC

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