

Request for Additional Information

Grants Reclamation Project, Updated Corrective Action Program (CAP)
March 2012

Section 4.4 of NUREG-1620, Rev 1., "Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978," provides the criteria the U.S. Nuclear Regulatory Commission (NRC) staff used to review Homestake Mining Company of California's (HMC's) Grants Reclamation Project Groundwater Corrective Action Program (CAP) Revision, dated December 15, 2006 (2006 revised CAP, ADAMS Accession No. ML070240350). The staff's review of the 2006 revised CAP resulted in a Request for Additional Information (RAI) which was transmitted to HMC on February 4, 2010 (ADAMS Accession No. ML100320466). On March 15, 2012, HMC submitted an updated CAP (2012 updated CAP, ADAMS Accession No. ML120890113) that addressed the NRC's February 4, 2010 RAI and issues raised by the U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED).

The NRC has completed its review of the 2012 updated CAP. The staff's review consisted of (1) verifying that HMC adequately addressed the NRC's previous RAIs (Table 1), and (2) evaluating the adequacy of new information.

Table 1. NRC staff's review of the adequacy of HMC's response to RAIs from the 2006 revised CAP

RAIs from NRC review of the 2006 revised CAP	RAI adequately addressed in 2012 updated CAP and where addressed
RAI 1	Yes. Section 5
RAI 2	No. The reinjection program was not described, the water quality at each of the collection for reinjection wells and of the reinjection area was not discussed, and the effectiveness and benefits of the reinjection of impacted water is still unclear. Yes. Collection for reinjection wells were identified in App. F Table F-1, Figure 5.3.2-1, and Appendix M (Wells 0521, 0522, and 0639 were not included in Appendix M as stated in Appendix F).
RAI 3	Yes. Section 5.3.5, Appendix J
RAI 4	Yes. The historic data was not available and NRC determined that information about the quality of the water on or near the site before or during site operations is not relevant to current requirements in their license for groundwater remediation. The statement was removed from the 2012 updated CAP. See NRC response to MASE comment 5 in Enclosure 2.
RAI 5	Yes. Section 5.3.2, Appendix F
RAI 6	Yes. Appendix A
RAI 7	Yes. Section 3.2.4
RAI 8	Yes. Section 3.2.2
RAI 9	Yes. Figure 3.2.2-4
RAI 10	Yes. Section 3.2.2, more detail about the aquifer properties was referenced to Hydro-Engineering (1983 and 1996)

RAI 11	Yes. Section 3.2.2.1, Figure 3.2.2-1
RAI 12	Yes. Section 3.2.2
RAI 13	Yes. Section 3.2.3.2 and 4.2
RAI 14	Yes. “Permeability” was replaced with “hydraulic conductivity” where necessary.
RAI 15	Yes. Section 3.2.3.3
RAI 16	Yes. Section 3.2.3.1
RAI 17	Yes. Figure 3.2.3.1-4 and Figure 3.2.3.2-4
RAI 18	Yes. Section 3.2.3.2
RAI 19	Yes. Figure 3.2.3.2-2
RAI 20	Yes. Section 3.1, 4.0, 4.1 and Appendix E
RAI 21	Yes. Section 4.2.1
RAI 22	Yes. Section 2.2
RAI 23	Yes. Section 5.3.1
RAI 24	No. The term “French drain” was removed from the CAP. However, the NRC staff believes that the two systems (French drain vs tailing toe drain) are different. The reason for removing the term “French drain” from the updated version of the CAP is unclear and needs clarification.
RAI 25	Yes. Section 5.3.5
RAI 26	No. Extraction well P2 is said to reduce the amount of water flowing under the Large Tailings Pile (LTP). However, fresh water injection wells (Figure G-5) and re-injection wells (Figure 3.2.2-1) adjacent to the LTP would appear to negate the effectiveness of extraction well P2. Extraction from well P2 does not appear to be a necessary component of the CAP.
RAI 27	Yes. Section 5.3.2, Figure 5.2-1, and Section 7.2.2 [Figure 5.2-2]
RAI 28	Yes. Section 5.3.5
RAI 29	Yes. Figure 5.2-1 [Figure 5.2-2, irrigation, and annual groundwater reports]
RAI 30	Yes. Injection wells were discussed, injection rates used to create hydraulic control were discussed, water used for injection is discussed, Section 5.3.2 [Appendix M]. No. Minimum injection rates required to maintain the hydraulic barrier and the effectiveness of the hydraulic barrier was not discussed.
RAI 31	Yes. Section 5.3.2, Appendix F [Section 6.3.2]
RAI 32	Yes. Section 5.3.2, Appendix F [Section 6.3.2]
RAI 33	Yes. Section 5.3.3, Section 5.5.3, Appendix F, Appendix I
RAI 34	Yes. Section 5.3.3
RAI 35	Yes. Section 5.3.4
RAI 36	Yes. Section 5.3.2, Appendix F [Section 6.3.2]
RAI 37	Yes. Soil concentrations were discussed in Section 5.3.5 Yes. Soil cleanup was not discussed, but will be addressed in the Decommissioning and Reclamation Plan (DRP)
RAI 38	Yes. Changes made throughout report where appropriate.
RAI 39	Yes. Section 6.2, Figure 6.2-1

RAI 40	Yes. Section 6.1, Appendix I [Extraction/injection rates have been modified since 2006 CAP]
RAI 41	Yes. Section 7.2.2
RAI 42	No. The parameters in Table 7.2.2-1 are still inconsistent with License Condition 35.B. Most of the wells use parameter code G (Table 7.2.2-2) which does not sample for all of the hazardous constituents listed in License Condition 35B. To show compliance HMC should sample and verify each of the constituent concentrations.
RAI 43	Yes. All figures were updated appropriately.
RAI 44	No. HMC should discuss how License Condition 16 is implemented and the Safety and Environmental Review Panel (SERP) process used to evaluate changes to determine whether NRC approval is required.
RAI 45	Yes. Section 5.1, Appendix G Yes. Statistical analysis was not performed. Instead, predicted versus observed concentrations for the calibrated conditions were provided in Figures G-6 through G-17 (Contour maps and graphs). No. Pre-calibration figures during 2004 and information on the acceptable parameter variance for model calibration should also be provided.
RAI 46	Yes. Section 5.1, Section 5.3.1, Appendix G

Please address the identified inadequacies in the 2006 revised CAP RAI responses. In addition to the RAIs identified above, which were not adequately addressed in the 2012 updated CAP, the staff has the following requests for additional information from our review of the 2012 updated CAP.

NRC Request for Additional Information for the Grants Reclamation Project Updated Corrective Action Program (CAP) dated March 2012

Review Area - CAP Progress and Schedule

1. Description of the Deficiency

The terms “unimpacted” and “slightly impacted” are used qualitatively throughout the CAP to describe the injection water quality and do not clearly define the upper limits of contaminant concentrations in the water used for injection.

Basis of the Request

The terms are not defined and do not adequately describe the quality of the water used for injection. The constituent concentrations in the water used for injection within a given aquifer should not be greater than the approved groundwater protection standards in the license. Constituent concentrations in the water used for injection into the subsurface should be as low as reasonably achievable to ensure that additional constituent mass is not added to the

groundwater. For example, if the licensee believes that water containing constituent concentrations above the approved groundwater protection standards for the alluvium needs to be injected into the alluvial aquifer for hydraulic control, the process and limits should be specifically described in the CAP and a rationale provided.

Formulation of RAI

Please define the terms “unimpacted” and “slightly impacted” with numerical values for the contaminants of concern. If “slightly impacted” water has constituent concentrations above the approved groundwater protection standards in the license, then a specific request needs to be made in the license amendment request for use of that water in the CAP and a rationale provided. Any proposed injection standards must not degrade the site groundwater or delay progress toward restoration of the groundwater. Any request to inject water containing constituent concentrations greater than the approved groundwater protection standards, must be consistent with the objective of the CAP, which is to restore the groundwater to the approved groundwater protection standards.

2. Description of the Deficiency

The elimination of the land application component from the State permit reduces the effectiveness of the remedial effort and potentially prolongs corrective actions.

Basis of the Request

The Executive Summary states that if land application limitations continue, additional delays should be expected, as this strategy is a critical component of the CAP.

Formulation of RAI

The elimination of land application as a component of the CAP will require an alternative treatment component(s) capable of treating a sufficient portion of the impacted water required to complete active groundwater restoration efforts by the end of year 2020. HMC should describe in sufficient detail how implementation of an alternative treatment component(s) and upgrades to the existing components would overcome elimination of land application. In addition, the HMC environmental monitoring program will need to be expanded to the former land application areas to demonstrate compliance with 10 CFR 20.1301 and be reported pursuant to License Condition 15 of License Number SUA-1471.

3. Description of the Deficiency

The mass removal analysis for dissolved uranium does not demonstrate the effectiveness of the plume control program.

Basis of the Request

The saturated thickness used during the 2001 through 2009 time period remains constant and does not account for variations influenced by injection and extraction. The majority of the dissolved uranium is removed from a single polygon containing a well screened in the tailings

(well ED1) and from the polygons immediately below the large tailings pile. The dissolved uranium mass in the remaining polygons remains relatively constant or slightly increasing from 2001 to 2009. The analysis better demonstrates the effectiveness of the source control program and its ability to flush uranium from the tailings. In addition, the mass removal analysis underestimates the total uranium removed because it does not account for the additional uranium mass added to the system from the LTP seepage due to the flushing program or from the re-injection program.

Formulation of RAI

There is no requirement in the regulations or license to demonstrate the effectiveness of the plume control program through a mass removal analysis. However, if the mass removal analysis is used as a basis for determining the schedule to complete groundwater remediation at the site, which is described in the license, then this deficiency should be considered. Since the NRC staff believes that the mass removal analysis is an effective tool to demonstrate the success of the CAP, further refinement should be considered to include the actual saturated conditions within each of the polygons and possible division of some polygons where concentrations show significant spatial variation between nearby wells. The analysis should also take into account the additional mass being added to the system through seepage from the LTP.

4. Description of the Deficiency

The tailing flushing program has proven effective at reducing the total mass and overall concentration of uranium to an amount that will not adversely impact the groundwater beyond the disposal area at the established points of compliance and ultimately at the facility boundary. However, molybdenum concentrations have remained well above the approved alluvial aquifer standard of 0.10 mg/L within the tailings impoundment at wells where the uranium concentrations have been reduced below the 2 mg/L target uranium concentration, e.g., tailings sampling points WA4, WA10, WC12, WE2, WE14, and WE15 sampled in 2013 (2014 HMC Annual Monitoring Report). The NRC staff understands that the concentrations within the pile are not representative of future concentrations to the groundwater beyond the disposal area, but the current CAP does not provide adequate justification or information to determine if the current molybdenum concentrations will be sufficiently low enough to avoid recontamination of the alluvial aquifer. The limited number of radium samples taken from sampling points in the large tailings impoundment in 2013 contain elevated concentrations considering the extent of tailings flushing performed and the lack of historic radium impacts in the groundwater, e.g., sampling location NE9, 114 pCi/l of Ra-226.

Basis for the Request

Completion of the CAP is in part dependent on reducing the tailings pore water to concentrations that will result in groundwater concentrations at or below the approved site standards. Current sampling data observed at the large tailings pile wells may indicate that concentrations for all site constituents are not being sufficiently reduced to meet the proposed schedule for completion of the CAP that will be specified in the license.

Formulation of the RAI

Provide a technical justification to explain why the molybdenum and radium concentrations will be sufficiently reduced to meet the groundwater protection standards at the compliance wells when the 2 mg/L uranium average is reached.

5. Description of the deficiency

The actual rates of tailings injection and extraction from the tailings dewatering wells and the tailings toe drains have not met the projected rates for years 2011 through 2013. The actual rates compared to the projected rates are as follows for the years 2011 through 2013:

Year	Injection Rate (gpm)			Extraction Rate from Dewatering: Extraction Wells (gpm)			Extraction Rate from Toe Drains (gpm)		
	Projected	Actual	Delta	Projected	Actual	Delta	Projected	Actual	Delta
2011	300	270	30	120	104.1	15.9	--	27.4	--
2012	300	263.7	36.3	120	107.5	12.5	30	23.2	6.8
2013	300	232	68	120	59.9	60.1	30	17.5	12.5

Basis for the Request

Injection of water into the large tailings pile through 2014 and extraction of water from the large tailings pile through 2016 may incur delays due to the projected rates not being achieved.

Formulation of the RAI

HMC should rerun the Reformulated Mixing Model to account for the actual injection rates to ensure that the estimated timeline for tailings injection and extraction is still valid. In addition, if the completion of the flushing program is determined to be delayed, the flow and transport models should also be reevaluated to determine the extent of the delays to the overall program.

6. Description of the Deficiency

Section 4.2.2 entitled "Extent" does not discuss the overall extent of the impacted area for each of the aquifers and mixing zones.

Basis of the Request

The information in the CAP does not adequately identify the current extent of the impacted areas.

Formulation of RAI

Please provide general descriptions and figures of the impacted areas for each aquifer and mixing zone. The description and figures of the impacted areas should encompass the

maximum extent of contamination that is at or above site standards for all of the constituents, but does not have to discuss or depict each individual constituent.

7. Description of the Deficiency

Section 5.3.2 states that the capture zone analysis is used in conjunction with the uranium mass removal analysis to optimize performance of the plume control program, but Section 5.5.2 states that a capture zone evaluation has not yet been conducted.

Basis of the Request

Contradictory statements are made in the CAP regarding the capture zone analysis.

Formulation of the RAI

Please clarify whether a capture zone analysis has already been used to optimize the performance of the plume control program.

8. Description of the Deficiency

Section 6.1.1 states that the site groundwater standards will be met at the point of compliance (POC) wells if the “average” uranium concentration in the LTP is 2 mg/L or less. Section 3 of Appendix G states that the “average flow weighted” uranium concentration from the LTP is predicted to be approximately 2.1 mg/L. The method used to calculate the current uranium concentration and the 2 mg/L metric in the LTP is unclear.

Basis for the Request

Completion of the source control program cannot be verified due to the uncertainty of how the 2 mg/L uranium metric in the LTP will be determined. Completion of the source control program will be a requirement of the approved CAP to ensure concentrations of constituents of concern remain below the NRC-approved groundwater protection standards at and beyond the designated compliance monitoring wells.

Formulation of the RAI

Please clarify how the 2 mg/L uranium metric is calculated and from which tailings wells the concentration is measured to determine the average or flow weighted average.

9. Description of the Deficiency

Section 2.2 of Appendix G discusses the sources and sinks of the groundwater model. The operational schedule for groundwater restoration efforts assume a 285 gpm collection rate (sink) in the tailings area of the alluvial aquifer for 2011 through 2015. The assumed collection rate then increases to 900 gpm from 2016 through 2020. The injection rates (sources) range from 695 gpm to 749 gpm for years 2012 through 2020.

It is unclear whether the groundwater flow model accounts for the actual and projected seepage rates from the large tailings pile. Section 2.1.1.1 of Appendix G states that the “seepage rates

were evenly divided among the 27 simulated injection points distributed over the base of the large tailings pile in the alluvial aquifer.” However, the seepage rates were not discussed or accounted for in Section 2.2 of Appendix G, which discusses the groundwater model’s sources and sinks. In addition, this section discusses the total injection and collection rates necessary for restoration but does not provide adequate detail to evaluate the required injection rates to maintain hydraulic control or the necessary collection rates from specific areas within the impacted aquifers required to meet the estimated restoration schedule.

Basis for the Request

Clarification and additional information is needed to assess the validity of the restoration schedule.

Formulation of the RAI

Please clarify whether the groundwater flow model accounts for the actual and projected seepage rates from the large tailings pile and provide additional detail of the modeled rates for injection to maintain the hydraulic barrier and the necessary collection rates from specific areas within the impacted aquifers. The area of influence resulting from the projected injection and collection should be determined and illustrated to ensure adequate capture and control.

10. Description of the Deficiency

Section 3.2 to Attachment A of Appendix G states that the reformulated mixing model shows that the “predicted [uranium] mass removed by dewatering the LTP during 2000 to 2004 is also consistent with observations. The observed dewatering uranium mass removal for the five year period was 27,209 pounds while the modeled mass removal was 26,223 lb. Total predicted uranium mass removal through 2050 was just over 130,000 pounds for flushing case F...” The NRC staff would expect the model results to be consistent with the observed uranium mass removal for the five-year period since the model was calibrated by making adjustments to the initial concentration and appropriate scaling factors to match observed points in 2000 and 2004. Validation of the model results with observed data after the calibration period would provide confidence that the model-predicted concentrations are reasonable.

Basis for the Request

Additional information is necessary to assess the validity of the restoration schedule.

Formulation of the RAI

Please validate the reformulated mixing model results for the years following the calibration period. A table and graph should be provided to represent the model predicted concentrations, observed concentrations, and the uranium concentrations resulting from the applied mixing factor in the tailings seepage used for modeling.

11. Description of the Deficiency

Table A-3 in Section 3.2 to Attachment A of Appendix G is intended to present the water and

uranium balance for the reformulated mixing model flushing Case F. However, Table A-3 is a duplicate of the original mixing model flushing Case F results reported in Table A-1.

Basis for the Request

The information provided in Table A-3 is incorrect.

Formulation of the RAI

Please revise Table A-3 and associated graphs to accurately reflect the results from the reformulated mixing model.

12. Description of the Deficiency

Section 3.3 to Attachment A of Appendix G states that “[t]he output from the original mixing model and the reformulated mixing model that is used in the MODFLOW and MT3DMS groundwater flow and transport modeling is the rate of seepage and toe drain input and the concentration of uranium in the seepage from the tailings.” However, the water from the toe drains is collected and discharged for treatment and should not be included in the volume of seepage released to the alluvial aquifer below the large tailings pile. In addition, it is unclear how the output from the original mixing model and the reformulated mixing model was used in combination to provide input parameters for the groundwater flow and transport modeling. The reformulated mixing model is understood to be an updated version of the original mixing model used to evaluate the conditions of the large tailings pile and therefore could not be used in conjunction with each other.

Basis for the Request

The description of the total output estimated from the mixing models appears to be inconsistent with actual conditions and it is unclear how each of the mixing models is used in conjunction with the other. These models support the groundwater flow and transport models that provide a basis for the CAP completion schedule.

Formulation of the RAI

Please provide a rationale for including the toe drain input to determine the output from the original mixing model and the reformulated mixing model used in the groundwater flow and transport models. Also, provide further clarification as to how the original mixing model and the reformulated mixing model are used in conjunction with one another.

13. Description of the Deficiency

The modeling effort described in Section 5.1 and in further detail in Appendix G allows HMC to (1) evaluate the progress of the CAP, (2) adjust the CAP to changing conditions, and (3) estimate when groundwater restoration will be complete. However, the CAP does not discuss how each of the three items listed above will be evaluated or communicated to the NRC staff in the future.

Basis for the Request

Additional information is needed to understand how the information from the modeling will support modifications to the restoration schedule in the CAP and how that information will be communicated to the NRC.

Formulation of the RAI

HMC should describe how each of the three items listed above will be evaluated and communicated to the NRC staff to ensure that modifications to the CAP are justified and progress is being made in accordance with the restoration schedule. The NRC staff recommends utilizing the methodology employed for the mass removal analysis to evaluate the progress and the effectiveness of restoration in each aquifer and mixing zone of concern.

14. Description of the Deficiency

The CAP does not contain a corrective action monitoring plan. The proposed compliance groundwater monitoring plan does not provide the level of detail necessary to evaluate the performance of the CAP.

Basis of the Request

Criterion 7A of 10 CFR Part 40, Appendix A, requires the licensee to establish and implement a corrective action monitoring program when the groundwater protection standards have been determined to be exceeded. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective actions being implemented by the CAP. The corrective action monitoring program should be a robust monitoring program capable of demonstrating restoration progress and the effectiveness of the CAP within the alluvial aquifer, the Upper, Middle, and Lower Chinle aquifers and their associated mixing zones on an annual basis, both on-site and off-site.

Criterion 7, further states that “Any monitoring program required under this paragraph may be based on existing monitoring programs to the extent the existing programs can meet the stated objective for the program.” The NRC staff considers the proposed compliance monitoring program incapable of meeting the requirements of a corrective action monitoring program and demonstrating the effectiveness of the corrective actions and the annual restoration progress.

Formulation of RAI

Table 7.2.2-1 shall be revised to include a corrective action monitoring program to assess the performance of the groundwater CAP within the alluvial, the Upper, Middle, and Lower Chinle aquifers and their associated mixing zones. This modification will provide an improved understanding of the current locations under groundwater corrective actions for each of the specified aquifers. The designated corrective action monitoring wells will provide a consistent and transparent assessment of the year-to-year performance of the CAP. The proposed corrective action monitoring program should result in a level of detail already provided in the Annual Monitoring Report and Performance Review submitted to the NRC on an annual basis. The NRC staff believes that the additional monitoring program is required to fulfill the regulatory

requirements of Criterion 7A and would satisfy the requirement for additional monitoring wells in License Condition 35B.

15. Description of the Deficiency

Section 2 of Attachment A to Appendix G states that the “subsequent operations and performance data have rendered most of these previous simulations obsolete. However, the initial groundwater modeling effort was based on the different flushing scenarios therefore a description is provided herein.” The flushing cases do not represent the actual or predicted restoration rates shown in Figure G-3 of Appendix G. It is unclear how the operational schedule for groundwater restoration can be relied upon without updating the flushing scenarios.

Basis for the Request

Information provided does not accurately reflect subsequent operations and performance data. This is needed to support the modeled flushing scenarios that support the groundwater flow and transport models, which in turn support the operational schedule for groundwater restoration.

Formulation of the RAI

Please provide updated model flushing scenarios that reflect actual operating conditions and performance data since the scenarios were originally developed in 2004. Additionally, the original mixing model, the reformulated mixing model, VADOSE/W, and the groundwater flow and transport models should also be updated to reflect the updated model flushing scenarios. In addition, validation of the predicted results after the calibration period should be performed and submitted for each of the models used.

16. Description of the Deficiency

A substantial number (842) of additional wells are proposed for plume control in Table I-1 to Appendix I. The supplemental plume control wells are not discussed in sufficient detail.

Basis of the Request

The impacts of the proposed expansion of the plume control program have not been evaluated in the CAP in sufficient detail to determine influences on the local groundwater flow regime, including the current plume control program, and the effectiveness the additional wells will have on completing groundwater restoration within the proposed schedule for inclusion in the license.

Formulation of RAI

Please provide a capture zone evaluation report, as discussed in the CAP, for the plume control program that includes the planned expansion. The capture zone evaluation should include, but not limited to, the following:

- A proposed timeline for implementing the additional network of plume control wells;
- Yearly average injection and extraction rates for the proposed expansion of the plume control program necessary to complete corrective actions within the proposed schedule;
- Yearly average injection and extraction rates within the current plume control program necessary to complete corrective actions within the proposed schedule; and

- Identification of high concentration areas or targeted areas within each aquifer

Review Area - Scope of the CAP

17. Description of the Deficiency

Section 1.1.3.1 states, “Rather than continue to conduct groundwater cleanup activities under the requirements of three competing regulatory programs, it is anticipated that the requirements of this CAP and the updated (pending) DRP will be incorporated into a Remedial Action plan approved by EPA, with NMED and NRC concurrence, under EPA’s CERCLA authority and that the state discharge permits could be terminated.”

Basis for the Request

This statement is incorrect. Under the Atomic Energy Act of 1954, as amended, the NRC is responsible for regulating source material and byproduct material generated from uranium milling. NRC regulations for source material facility licensing are found in 10 CFR Part 40. The NRC regulates site closure and remedial activities in accordance with License SUA-1471. Therefore, the CAP and DRP will be approved by NRC via license amendments to SUA-1471. EPA and the State of New Mexico may impose additional requirements on HMC which are not addressed in the CAP or DRP.

Formulation of the RAI

This statement should be removed from Section 1.1.3.1 of the CAP.

18. Description of the Deficiency

Section 1.1.3.1 states that “HMC uses a secondary groundwater collection and land treatment system for the remediation of portions of the contaminant plumes that have migrated beyond the facility’s licensed boundary. Although this secondary groundwater system is not required as part of the existing CAP...”

Basis for the Request

Recapturing 11.e(2) byproduct material, which has impacted groundwater in the uppermost aquifer and those aquifers in hydraulic connection with the uppermost aquifer due to seepage, is an NRC regulatory requirement under 10 CFR Part 40, Appendix A. In Staff Requirements Memorandum SECY-99-0277 (ML003740380), the Commission determined that the NRC has exclusive jurisdiction over both radiological and non-radiological hazards of 11e.(2) byproduct material. This applies to impacts both on and off site.

Formulation of the RAI

Please clarify the differences between the plume control program and the secondary groundwater collection program. The NRC staff requests that all on-site and off-site locations impacted by 11.e(2) byproduct material be included and discussed as part of the CAP.

19. Description of the Deficiency

Effluent and environmental monitoring required by License Condition 15 at POC wells and background well P is insufficient because the license no longer designates any POC wells.

Basis of the Request

License Amendment 34 revised License Condition 15 to only require reporting of effluent and environmental monitoring for groundwater radionuclide data at the designated POC wells and background well P. License Amendment 39 revised the designation of the POC wells to compliance monitoring wells in License Condition 35B, but License Condition 15 was not modified to be consistent with the new monitoring nomenclature.

Formulation of the RAI

Please propose new groundwater environmental monitoring locations to replace the formerly designated POC wells. The proposed groundwater environmental monitoring locations should be located downgradient of any contaminant sources at the facility boundary to meet the requirements of 10 CFR 20.1501, for surveying and monitoring, and to evaluate the public dose, as defined in 10 CFR Part 20.1003, for compliance with the dose limits of 10 CFR Part 20.1301 for individual members of the public. The proposed groundwater environmental monitoring locations are in addition to the groundwater monitoring locations discussed in NRC RAI number 2.

20. Description of the Deficiency

Section 7.2.1 states that “five point of compliance [POC] wells are designated for the site.” However, the currently approved license does not contain or require any POC wells.

Basis of the Request

The POC wells were removed from the HMC license and renamed compliance monitoring wells. The POC designation for these wells was changed once the wells could no longer fulfill the intended objective, which as stated in 10 CFR 40, Appendix A, Criterion 5B(1), is to provide prompt indication of groundwater contamination on the hydraulically downgradient edge of the disposal area. All monitoring wells are considered compliance wells once corrective actions are determined to be necessary. The purpose of the compliance monitoring program required by 10 CFR 40, Appendix A, Criterion 7A is to determine that the hazardous constituent concentrations in groundwater continue to fall within the standards set by the NRC.

Formulation of the RAI

All references to the POC wells should be removed from the CAP to ensure consistency with License Condition 35.

Review Area - Groundwater

21. Description of the Deficiency

The Chinle Mixing Zones located adjacent to the subcrop locations are not clearly delineated or adequately discussed.

Basis of the Request

The boundaries of the mixing zones should be well defined to ensure that the appropriate standards are enforced.

Formulation of RAI

Please provide figures that clearly define the boundaries of each of the Chinle Mixing Zones and include the proposed compliance and corrective action monitoring locations discussed in more detail in RAI number 14 above.

22. Description of the Deficiency

Section 5.3.2 states that “Unimpacted or slightly impacted water is injected into the alluvial, Upper Chinle, and Middle Chinle aquifers to control the local hydraulic gradient in order to inhibit movement of the contaminant plume. This water has the additional benefit of hydraulically driving more contaminated water to the extraction well....” This section provides additional information about the alluvial plume control program but does not discuss the plume control programs for the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones. Section 6.1-2 further discusses the alluvial plume control program but does not discuss plume control in the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones. Figures 6.1-1 and 6.1-2 show the projected future operations and the future restoration strategies for the plume control program, respectively, but do not provide projected injection and extraction rates required to complete groundwater restoration in the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones. Figure 6.2-1 provides the schedule for the revised CAP, which includes the plume control program, but does not provide a schedule for completion of the plume control program in the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones.

Basis for the Request

The information provided for the plume control program did not provide an adequate description or information for each of the impacted aquifers and associated mixing zones.

Formulation of the RAI

Please provide a general description of the plume control programs utilized in the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones and revise the aforementioned figures to include the projected rates of injection and extraction and schedule for completion for the Upper, Middle, and Lower Chinle aquifers and associated Mixing Zones.

23. Description of the Deficiency

Without input and output files, an assessment of the modeled results could not be performed for each of the models used to determine the completion date for groundwater remediation.

Basis for the Request

Verification of the modeled results will be necessary to evaluate completion schedules.

Formulation of the RAI

Please provide an electronic file with all the input and output files for each of the models used in the CAP and any spreadsheet calculations used to evaluate CAP components and analyses.