NRC Response to Comments on
Homestake Mining Company (HMC)
Updated Corrective Action Program (CAP)

HMC submitted the revised CAP to the U.S. Nuclear Regulatory Commission (NRC) for review and approval on December 15, 2006 (ML070240350) as required by License Condition 35B of License SUA-1471. The NRC completed its review of the CAP and submitted a request for additional information (RAI) to HMC on February 4, 2010 (ML100320466). After numerous discussions with the U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED), HMC submitted the updated Corrective Action Program (2012 updated CAP) on March 15, 2012 (ML12089A052, ML12089A053, ML12089A054, ML12089A055, ML12089A057, ML12089A058, ML12089A059, ML12089A078, ML12089A136, and ML12089A137). The 2012 updated CAP was intended to address NRC's comments from the RAI and concerns raised by EPA and NMED. The NRC developed the RAI on the 2012 updated CAP (ML13360A219) after reviewing HMC's response to NRC's RAI and evaluating EPA, NMED, and public comments on the 2012 updated CAP.

The NRC noticed receipt of the 2006 revised CAP and offered an opportunity for hearing on March 15, 2007 (ADAMS No. ML120860197). NRC also requested public participation in the review of the 2012 updated CAP through a noticed public meeting conducted in Grants, New Mexico on June 7, 2012. The public comment period on the 2012 updated CAP was extended to October 31, 2012, to allow additional time for public comment. The following entities provided comments on the 2012 updated CAP:

1. U.S. Environmental Protection Agency (EPA) (ADAMS No. ML12305A179, ML12305A186);
2. New Mexico Environment Department (NMED) (ADAMS No. ML12306A206, ML12306A203);
3. Bluewater Valley Downstream Alliance (BVDA) (ADAMS No. ML12306A100, ML12310A093);
4. Multi-Cultural Alliance for a Safe Environment (MASE) (ADAMS No. ML12306A102);
5. Information Network for Responsible Mining (INFORM) (ADAMS No. ML12306A300); and
6. Uranium Watch (ADAMS No. ML12307A159).

In accordance with 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," the purpose of NRC's review of the updated CAP is to evaluate the environmental, economic, and technical evidence presented by HMC to demonstrate that the facility will meet the requirements of 10 CFR Part 40, Appendix A, and specific license conditions. Since HMC is already implementing a previously approved CAP, the scope of NRC's review is limited to reviewing proposed changes to the CAP.

License Condition 35B of License SUA-1471 only requires the 2012 updated CAP to include proposed compliance monitoring wells for the Chinle Mixing Zone and the Upper, Middle, and Lower Chinle Non-Mixing Zones. However, since the NRC, EPA, and NMED all have regulatory responsibilities for remedial actions at the HMC site, the agencies requested in a letter dated

January 26, 2012 (ML113390071), that HMC address the regulatory requirements of each agency in the CAP.

The transmittal letter for this response to comments and the RAI can be found in ADAMS at ML13360A217.

RESPONSE TO COMMENTS ON REGULATORY PROCESS

Many of the public comments on the CAP focus on the NRC's regulatory process rather than HMC's demonstration that the reclamation activities will meet NRC's regulatory requirements. Over the past several years, the NRC, EPA, and NMED have had numerous interactions with the public to clarify and discuss the regulatory process for reclamation activities at the HMC site. The NRC's position on several previously discussed issues is provided below.

Regulatory Process Comment Summary 1 – Need for an Environmental Impact Statement (EIS)

Several commenters stated that an EIS should be completed for approval of the CAP.

NRC Response
The NRC's environmental review process is described in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." This NUREG is publicly available from the NRC's public website at: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1748/ or at NRC's Agencywide Documents Access and Management System (ADAMS) accession number ML032450279.

As explained in NUREG-1748, the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.) requires Federal agencies, as part of their decision-making process, to consider the environmental impacts of actions under their jurisdiction. The NEPA process is illustrated in Figure 1 of NUREG-1748. Activities associated with the CAP do not mandate the preparation of an Environmental Impact Statement (EIS). Rather, in accordance with NUREG-1748, the staff must prepare an Environmental Assessment (EA) to provide sufficient evidence and analysis to either support a finding of no significant impact (FONSI) or conclude that preparation of an EIS is necessary. The impacts evaluated in an EA can include direct, indirect, cumulative, long-term and short-term impacts in the areas of ecological; aesthetic; historical; cultural; socioeconomic; and health. The impacts are assessed over the expected lifetime of the action and beyond. If the EA supports a FONSI, the environmental review process is complete. If the EA reveals that the proposed action may significantly affect the environment and cannot be mitigated, then the NRC will proceed to develop an EIS. Therefore, in accordance with NUREG-1748, the NRC will first prepare an EA to evaluate the activities associate with the CAP then either reach a FONSI or develop an EIS.

Regulatory Process Comment Summary 2 –Moving the Large Tailings Pile (LTP)

Several commenters stated that the NRC should require that HMC reevaluate moving the large tailings pile (LTP) to sites in the near vicinity of HMC's property because: removal of the large tailings pile would remove the primary source of contamination from the site, the adjacent communities, and the groundwater; and, because the licensee has not shown that it will be able

to meet the groundwater reclamation standards in the near future therefore delaying the placement of the final radon barrier.

NRC Response

HMC is required to remediate the site to satisfy the requirements in 10 CFR Part 40, Appendix A and its NRC license. At this time, HMC's CAP and decommissioning and reclamation plan lays out a strategy to meet its remediation requirements without having to move the LTP. In relation to the CAP, HMC will be required to demonstrate remediation of the groundwater contamination to groundwater protection standards before the license can be terminated. As part of this demonstration, HMC needs to provide reasonable assurance that any further releases of licensed material (e.g., through seepage) from the LTP will not result in groundwater contamination that exceeds the groundwater protection standards. Based on that requirement, the need to move the LTP has not yet been demonstrated. Therefore, any further evaluation of the feasibility of the moving the LTP is not required at this time. The placement of the final radon cover on the LTP is within the scope of the HMC decommissioning and reclamation plan and is independent of HMC's groundwater remediation under the CAP as soon as the LTP flushing program is complete.

RESPONSES TO SPECIFIC COMMENTS ON THE 2012 UPDATED CAP

Please note that the comments provided below have been reproduced verbatim, not summarized.

New Mexico Environment Department (NMED)

NMED Comment 1

NMED currently is in the process of renewing and modifying Discharge Permit-200 (DP-200), which regulates discharges associated with HMC's operation of its ground water remedial system components in accordance with New Mexico Water Quality Control Commission regulations (20.6.2 NMAC); DP-725, which regulates the operation of two existing collection ponds and three existing evaporation ponds, is not due for renewal until 2015, but may be combined into DP-200 during this renewal process. Although all of the specific conditions for renewal and modification of DP-200 have not yet been determined, the permit generally will specify maximum allowable discharge quantities, in gallons per day, for specific components of the ground water remediation system. Additionally the permit will specify both the wells, and the operational mode of those wells (i.e., extraction, injection, or monitoring) within each of the remedial system components. DP-200 will likely include requirements for reporting and notification to NMED of changes to the operational mode of specific wells or well series. HMC will be required to maintain the quality of any injected fluids in compliance with 20.6.2.3103 NMAC, as well as to demonstrate the ultimate capture of ground water contaminants that are mobilized through its injection activities. HMC also will be required to report discharged water quality and quantities on at least an annual basis, coincident with its current reporting to NRC. NMED may also require HMC to submit interim reporting throughout the year. HMC will be permitted to continue land application of contaminated water for a period of no more than two years following the effective date of the DP-200 renewal; the quality of water discharged within this component of the remedial system must comply with limits that will be specified in the permit. Concurrent with this activity, HMC will be required to progress toward implementation of additional treatment and disposal capacity that can replace the land application by no later than

Spring 2015. Alternatively, pending NMED approval, HMC may implement alternative treatment technologies to replace or offset requirements for additional evaporative capacity, subject to NMED approval. NMED will require HMC to continue its current moisture transport and ground water quality monitoring activities within the land application areas, and to demonstrate that future ground water quality degradation will not result from this activity.

Additional permit conditions that are likely to be included within the final modified DP-200 include the following:

- implementation of dedicated up- and down-gradient monitoring wells that are completed within the upper 20 feet of the San Andres aquifer;
- implementation of a sitewide Data Quality Objectives-based ground water monitoring system;
- require post-closure demonstration of ground water quality restoration stability over at least a 2 year period ("ground water compliance demonstration period"), subject to NMED approval.

NRC Response
A public hearing on the draft NMED DP-200 discharge permit was held on April 29-30, 2014. HMC should review the final discharge permit for any conflicting requirements with the activities proposed in the 2012 updated CAP.

NMED Comment 2
NMED requires HMC to submit detailed work plans for future initiatives related to ground water restoration, such as alternative treatment technologies evaluation, to NMED for review, comment and approval prior to initiating such work.

NRC Response
The NRC is assuming that NMED is requiring HMC to submit work plans and alternate treatment technologies under NMAC 20.6.2.3106(C), which is used for applications and renewals. HMC should be aware that, although NRC regulations do not specifically require work plans for future initiatives related to ground water restoration to be submitted for NRC review and approval, revision of groundwater corrective actions as described in the 2012 updated CAP must be evaluated for significant adverse environmental impacts not previously assessed or that are greater than previously assessed as per NRC License Condition 16.

NMED Comment 3
As discussed in the HMC Executive Steering Committee meeting on June 6, 2012, NMED requests that the license boundary be extended to include the areas where land application has occurred, in order to provide for long-term monitoring for possible impacts to ground water under eventual DOE stewardship. If this extension of the license boundary is not granted, NMED will request to re-examine the existing financial assurance, which is currently held by NRC, to assure that adequate financial safeguard against long-term ground water impacts exists for these areas.

NRC Response
HMC has not requested an extension of the NRC license boundary to include the land application locations. However, in Section 9.7.3 of the Decommissioning and Reclamation Plan (DRP), Update 2013, HMC has committed to survey the land application areas to document the contaminant concentrations in the soil and verify that the levels are below the soil clean-up

criteria. When approved by license amendment, the commitments in the 2013 DRP will become license conditions which must be met before license SUA-1471 is terminated.

NMED Comment 4
Page 2-1 says: The site license boundary occupies an area of approximately 1,085 acres.

Based upon discussions among the regulatory agencies for this site, NMED understands that the license boundary during the remedial process includes all areas in which ground water impacts originating from the site have been identified. Figures 1-1 and 2-1 must be revised to reflect this redefinition.

NRC Response
The NRC disagrees with the comment. The NRC is responsible for regulatory oversight of the NRC licensee to ensure that all contaminants, either on-site or off-site, which were derived from source or byproduct material, are returned to concentrations specified within the NRC license. The NRC requires the licensee to address groundwater impacts contained within and beyond the licensed site boundary to ensure public health and safety. The extent of groundwater contamination is characterized in the 2012 updated CAP, which encompasses the remedial actions for all onsite and offsite impacted groundwater.

The requirement to remain below specified concentration limits beyond the point of compliance is found in Criterion 5B(1) to Appendix A of 10 CFR Part 40, which states, in part, "…Hazardous constituents entering the groundwater from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period…." Furthermore, Criterion 5D states, in part, "…The objective of the [Corrective Action Program] is to return hazardous constituent concentration levels in groundwater to the concentration levels set as standards. The licensee's proposed program must address removing hazardous constituents that have entered the groundwater at the point of compliance or treating them in place…" Therefore, the NRC regulations do not require the licensed site boundary to change, and HMC is not required to submit a license amendment request or to revise the figures and licensed site boundary described in the 2012 updated CAP to include areas where groundwater impacts have been identified.

NMED Comment 5
Page 2-6 says: License Condition No. 39, including the method used to determine the site standard for each COC, is included in Appendix A.

The two versions of the Source Material License that are included within Appendix A indicate that Condition No. 39 was deleted by Amendment No. 31. Please correct the reference.

NRC Response
The NRC agrees with this comment. Page 2-6, Section 2.4.1, 2nd paragraph of the 2012 updated CAP incorrectly references License Condition No. 39, when it should be License Amendment No. 39. The NRC will inform HMC that it must correct the reference.

NMED Comment 6
Section 5.4: The brief descriptions of the alternative treatment technologies that are currently under evaluation indicate that these technologies only address a limited set of COCs. Please clarify or else indicate how these other standards will be achieved if any of these technologies

are proposed for implementation.

NRC Response
Prior to implementation of any alternate treatment technologies, HMC would be required to evaluate the alternate treatment technology for significant adverse environmental impacts not previously assessed or that are greater than previously assessed, as per NRC License Condition 16. NRC approval of the 2012 updated CAP would not provide authorization by itself to proceed with any of the full-scale alternative treatment technologies.

The NRC is not doing a technical or regulatory review of the current descriptions of the alternative treatment technologies in the 2012 updated CAP. The NRC interprets these descriptions as identifying possible alternatives that would be evaluated in the future if they are necessary to augment the current remedial strategy. See NRC Response to NMED Comment 2 for additional information pertaining to alternative treatment technology approval.

NMED Comment 7
Section 6.3.2, 2nd paragraph, says: HMC is considering adding wells to supplement the plume control program. These proposed wells include a series of wells named the B series on the south and southwest sides of the LTP and a series of wells named the S series on the west side of the LTP.

The CAP should provide a more detailed discussion of how these additional wells will achieve plume control in these areas.

NRC Response
The NRC agrees with this comment. The CAP should provide further details about the proposed B and S series wells' ability to provide additional plume control near the LTP. In addition, further detailed information should also be included in the CAP regarding the substantial amount of additional wells proposed for plume control in Table I-1 to Appendix I. The NRC will request that HMC provide additional information for the proposed supplemental plume control wells. See NRC RAI number 16.

NMED Comment 8
Section 7.2.1, 1st paragraph, 1st sentence, says: There are no POC wells for the Middle and Lower Chinle aquifers because they subcrop with the alluvial aquifer outside of the NRC license boundary.

The CAP should address how long-term monitoring of water quality in these aquifers will be conducted to insure standards are achieved.

NRC Response
The NRC agrees with the comment. Additional wells need to be designated to ensure that standards are achieved in the Middle and Lower Chinle aquifers. The use of the term "Point of Compliance" (POC) is no longer relevant once a compliance monitoring program and a corrective action monitoring program have been implemented. POC monitoring is required as part of the detection monitoring program discussed in Criterion 7A of 10 CFR Part 40, Appendix A. The detection monitoring program has two main objectives: to detect leakage of hazardous constituents from the disposal area and to generate data and information to establish groundwater protection standards if leakage is in fact detected. Leakage of hazardous

constituents from the disposal cell was detected and therefore groundwater protection standards have been established in accordance with Criterion 5B.

Once the Commission set groundwater protection standards, a compliance monitoring program was implemented to determine compliance with these standards. Criterion 7A also 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 this program is to demonstrate the effectiveness of the corrective actions implemented under the CAP. In effect, all wells used in the compliance monitoring program and the corrective action monitoring program are considered a point of compliance for the groundwater protection standards. The compliance monitoring program should be used for the establishment of impacted/non-impacted areas and for monitoring unimpacted areas, e.g., areas where monitoring results and analyses are used to show continued compliance. The corrective action monitoring program should monitor impacted areas to provide details of the progress achieved due to implementation of the CAP.

Table 7.2.2-1 of the 2012 updated CAP has proposed additional monitoring locations in the Alluvial aquifer, Upper, Middle, and Lower Chinle non-mixing zones, and one well in the Middle Chinle mixing zone. The proposed compliance monitoring program did not propose wells for the Upper and Lower Chinle mixing zones. The NRC staff will request HMC to revise the proposed compliance monitoring program to include monitoring wells in the Upper and Lower Chinle mixing zones. See NRC RAI number 22.

The second portion of the comment addresses long-term monitoring. Long-term monitoring will be conducted by the designated long-term care agency after adequate rebound monitoring has concluded that all of the impacted zones are in compliance with the groundwater protection standards established under Criterion 5B and the license has been transferred. The long-term monitoring plan will be proposed by the designated long-term care agency as part of their Long-term Surveillance Plan, which will be implemented following NRC approval. HMC will be requested to propose a monitoring period after groundwater corrective action is complete to evaluate rebound of constituents.

NMED Comment 9
Section 9.0, 2nd paragraph, 4th sentence, says: Phosphate treatment would be used in a variety of implementation approaches to remove uranium in situ.

This brief description of in situ phosphate treatment technology does not indicate how other ground water COC exceedances would be addressed.

NRC Response
The NRC disagrees with the comment. Section 9.0 of the revised CAP is the conclusions section, which typically only provides a summary of the previous discussions. Section 5.4.1, entitled In Situ Phosphate Treatment, provides greater detail on the phosphate treatment technology. Section 6.3.6, entitled Alternate Treatment Technologies, states that “If HMC determines that one or more of these alternative treatment technologies might be appropriate for use at the site, they may be implemented after [emphasis added] obtaining necessary agency approval.” Therefore, NRC approval of the 2012 updated CAP does not by itself give HMC the authority to implement phosphate treatment at full scale. If phosphate treatment were

to be implemented at the site, a report detailing the effects on water quality would be expected as part of an impact evaluation per HMC License Condition 16.

U.S. Environmental Protection Agency (EPA)

EPA Comment 1
EPA's comments are focused on regulatory issues that have been identified in the attached December 13, 2011, letter (Re: Comprehensive Environmental Response Compensation and Liability Act (CERCLA) requirements for the HMC Site) submitted to the Nuclear Regulatory Commission (NRC). In that letter the EPA identified CERCLA requirements that are essential for site closure and deletion.

NRC Response
At the October 19, 2011, Executive Steering Committee meeting (ML113201756) it was agreed that the CAP should address all NRC, EPA, and NMED regulatory requirements. EPA agreed to identify the specific outstanding reclamation activities that must be conducted by HMC to meet EPA requirements under CERCLA. In its December 13, 2011 letter, EPA described the CERCLA process but did not identify specific outstanding reclamation activities that had to be incorporated into the CAP to address CERCLA requirements. On March 29, 2012, (ML120870020) the NRC requested that EPA identify any outstanding regulatory requirements that must be addressed in the CAP. EPA comments on the CAP dated May 29, 2012 (ML12305A179), reiterate the CERCLA process and identify no outstanding regulatory requirements.

On December 19, 2013, the NRC informed EPA by letter that in order to make progress in remediating the HMC site, the NRC would continue with implementation of the Memorandum of Understanding (MOU) between the NRC and EPA on remedial action at the HMC site. The MOU includes timeframes on the EPA review of license amendments. As stated in the December 19 letter, since EPA has not yet provided outstanding CERCLA requirements, the NRC is moving forward with its review of the 2012 updated CAP.

EPA Comment 2
HMC has incorporated EPA's site closure requirements in the CAP in Section 1.1.3.4 - Removal from NPL as stated in the December 13, 2011, letter and found in the National Oil and Hazardous Substances Pollution Contingency Plan [National Contingency Plan (NCP)] (40 CFR 300.425(e)). However, the CAP does not include potential Applicable, Relevant and Appropriate Requirements [ARARs] regarding radon emissions from the site. HMC should include the potential ARARs identified in the December 13, 2011 letter.

NRC Response
Since the 2012 updated CAP addresses corrective actions for groundwater contamination, this comment is out of scope. However, this comment will be considered in NRC's review of the HMC Decommissioning and Reclamation Plan for the site. Further, the EPA has already identified and documented the potential ARARs regarding radon emissions from the site in Appendix A of the Superfund Record of Decision (ROD), dated September 1989, for Operable Unit 3 (OU3 or The Radon Operable Unit). The requirements found in Section 121(d)(2) of CERCLA have been fulfilled by the initial review performed in the June 1989 EPA Remedial Investigation and Feasibility Study, which included a review of regulations for consideration as potential ARARs, and documentation of selected ARARs in the ROD for OU3. The 1989 ROD

for OU3 investigated whether radon associated with the uranium mill tailings operation might be influencing outdoor and indoor radon levels in the nearby subdivisions and concluded that the uranium mill and tailings embankments were not a significant source of radon.

EPA Comment 3
The radon emanation modeling that was done in October 1986 assumed that the radium content of the sands is 100 pCi/g; the actual amount is approximately 90 pCi/g. The radium content of the slimes is assumed to be 1,000 pCi/g; the actual amount is approximately 900 pCi/g. The emanation modeling then concludes that if the tailings sand are pushed over the tailings slime they would reduce the emission from the slime. It needs a cover of 15 feet of sand over the slime and then a final one foot cover of compacted soil to reduce the radon emission to levels much lower than the requirements of 40 CFR Part 61 subpart- T of not exceeding 20 pCi/(m2 -sec).

However, the actual flux measurements that were done in 2011 radon flux survey, reported 39 out of 65 measurements were higher than the standard of 20 pCi/(m 2 -sec) in the large Tailing Pile (LTP) and 14 out of 35 measurements exceeded the standard in the Small Tailing Pile (STP). According to 40 CFR part 61 App B, Method-115, 100 radon flux measurements should be taken from each type of region. The two piles were considered to be as one pile. If the two piles are not connected they should be treated as separate piles and 100 radon flux measurement from each pile and region should be collected. Method 115 should be followed or the results would be invalid.

NRC Response
Since the 2012 updated CAP addresses corrective actions for groundwater contamination, this comment is out of scope. However, this comment will be considered in NRC's review of the HMC Decommissioning and Reclamation Plan for the site.

EPA Comment 4
It was reported that three flux measurements (29, 17 and 4) had an average of 165.90 pCi/(m2-sec) and additional interim cover was placed over these areas to reduce the emission down to 36.8 pCi/(m2-sec) and thus reduce the total average to below the 20 pCi/(m2-sec).

Measurements need to be repeated from the top region of the LTP and at a minimum I00 measurements need to be made before concluding that the radon emission is below the standard as per method 115.

NRC Response
See NRC response to EPA Comment 3.

EPA Comment 5
The evaporation pond on the STP was assumed to emit zero radon gas because it is covered with water. However, forced spraying of the evaporation water into the air would release radon into the atmosphere and this was not accounted for in the flux measurements for the STP. Need to provide amount of water forced into air and daily schedule of spraying evaporation pond water into the air.

NRC Response
See NRC response to EPA Comment 3.

EPA Comment 6
Equilibrium factor between radon gas and its progeny. It was assumed that the equilibrium factor between radon gas and its progeny is 20%. The generally accepted equilibrium value is 40%. If an assumption is going to be made, it should be in accordance with the generally accepted value. If a site specific value of 20% will be used, then it has to be justified by actual measurements of the equilibrium factor between radon gas and its progeny on site and at the fence line. In March 2011, the EPA made the recommendation as part of the Remedy System Evaluation recommendations to demonstrate equilibrium by measurement.

NRC Response
See NRC response to EPA Comment 3.

EPA Comment 7
One of the five components of the CAP is land treatment. The EPA has previously recommended as part of the [Remediation System Evaluation] RSE recommendations that HMC consider ground water treatment as opposed to land treatment. HMC has responded that traditional treatment methods such as the ion exchange method do not work based on the water chemistry at the site. HMC should implement alternate treatment methods as soon as practical if current pilot tests are successful in treating extracted ground water.

NRC Response
NMED discharge permit DP-200 for the HMC site was renewed on September 25, 2014. The renewed permit eliminates approval for land discharge (land treatment).

NRC RAI number 37, from the 2006 revised CAP, requested information on how residual soil contamination will be addressed prior to license termination. In Section 9.7.3 of the 2013 DRP, HMC has committed to survey the land application areas to document the contaminant concentrations in the soil and verify that the levels are below the soil clean-up criteria. When approved by license amendment, the commitments in the DRP will become license conditions which must be met before license SUA-1471 is terminated.

EPA Comment 8
On Page 1-2 please provide approximate time frame for submission of the Decommissioning and Restoration Plan (DRP).

NRC Response
HMC submitted the 2013 DRP to the NRC by letter dated April 4, 2013 (ML131070607).

EPA Comment 9
In Section 5.2 Evaluation of Alternate Treatment Technologies additional details should be made available about the pilot test evaluation or referenced to another document that provides the information.

NRC Response
See NRC response to NMED Comment 9

EPA Comment 10
In Section 5.5.2.2, it states that in the RSE report, the authors' conclusion regarding the adequacy of plume control in the alluvial and three Chinle aquifers is incorrect. The RSE report concluded that concentration reductions in the plume are primarily due to dilution than [sic] mass removal. HMC asserts that the RSE team did not fully follow EPA guidance in performing the plume capture analysis and hence arrived at the incorrect conclusion. The EPA recommends that HMC conduct the capture zone analysis to prove this.

NRC Response
Section 5.5.2.2 of the 2012 updated CAP states, "…HMC is considering using the EPA capture zone analysis guidance document to determine whether the performance of the hydraulic barrier can be improved or further optimized." HMC also indicates that the mass removal analysis demonstrates that the hydraulic barrier is effective at containing and removing contaminant mass. While the NRC staff cannot require HMC to perform the capture zone analysis, further analysis for improvements and optimization of the hydraulic barrier and capture zone could better define the groundwater remediation milestone.

The comment will be provided to HMC. See NRC RAI number 3.

Bluewater Valley Downstream Alliance (BVDA)

BVDA Comment 1
According to Section 1.3, Cap Structure, the 2012 CAP was organized differently from the previous CAP submitted to the NRC in 2006 due to the complexity of the nature of the CAP documentation. Section 1.3 states that detailed information has been moved into appendices such that the most relevant and important information is provided in the main text of the CAP. However, based on [Technical Assistance Services for Communities (TASC)] review, a significant amount of important information has been removed from the main text of the CAP requiring a reviewer to navigate through approximately 1,600 pages of appendices to locate the information and develop an interpretation of the data. For example, Section 4.0, Ground Water Quality, is intended to provide a summary of the nature and extent of contamination of contamination within the various plumes, as well as how much contamination has been removed and whether the plumes are growing or shrinking. However, the information presented in Section 4.0 lacks the detail necessary to develop a fundamental understanding of these topics. Examples follow but are not limited to:

BVDA Comment 1a
Section 4.2.1 Characterization: This section refers the reader the 2010 annual monitoring report but does not discuss previous sampling or trends observed. Further, this section refers the reader to Appendix E for a summary of the 2010 monitoring results without any mention of the key findings in the 2010 data. TASC is concerned that the CAP has not adequately communicated the characterization information in order for stakeholders to gain an understanding of the site characterization activities conducted over time. TASC recommends that this section include key conclusions and reserve technical detail to the appendices.

NRC Response
The NRC disagrees with this comment. The licensee can incorporate details pertaining to characterization of the site by reference as indicated in Section 4.1 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. HMC has referenced the 2010 annual monitoring report, which was current at the time the 2012 updated CAP was submitted, and has informed the reader of the location of annual monitoring reports. The annual reports provide detailed characterization of the previous year's operations and water quality information. The CAP is not updated on an annual basis and inclusion of detailed information and analysis already captured in the annual reports would be both repetitive and cumbersome.

BVDA Comment 1b
Section 4.2.2 Extent: This section states that the 2010 data demonstrates that the areas of greatest concern are directly underneath the LTP, within the ground water collection area to the southwest of the LTP and in a few isolated surrounding areas. However, there is no discussion of trends from previous years or reference to plume maps; instead, the reader is referred to Appendix E which only lists a table of areas where the 2010 ground water standard is exceeded with a "yes" or "no". Without discussions on contaminant trends over time it is not possible to understand if the information presented in 2010 is higher, lower or similar to other years of data. TASC recommends that this section be expanded to include contaminant trends for all COCs over time in order to provide full perspective on the progress of ground water restoration.

NRC Response
The NRC agrees in part and disagrees in part with the comment. Section 4.2.2 should provide a general discussion of the areas of concern and is not intended to provide analyses of contaminant trends for all the contaminants of concern. As previously stated, the reviewer should refer to the annual reports for information about contaminant trends over time and for current plume maps. However, this section does not provide a general description of the impacted area for each of the impacted aquifers and mixing zones. The NRC staff will request that HMC provide an adequate description of the extent of the impacted area in each aquifer and mixing zone. See NRC RAI number 6.

BVDA Comment 1c
Section 4.2.3 Attenuation: This section states that the general long-term trend of COC concentrations at the site is decreasing and then refers the reader to the annual monitoring reports to locate information for all COCs in all five aquifers to include concentration-time plots. In addition, this section only discusses the trends observed for uranium and does not discuss selenium or other contaminants of concern that may not necessarily follow the exact same plume geometry as uranium. Further a general statement is made that the "general, site-wide decrease of COC concentrations can be attributed to the successful implementation of the CAP." Focusing on the general long-term trend discussions does not convey where localized issues may still pose a concern and could mask where alternative technologies may need to be targeted to address localized plumes. For example, TASC observed that the high concentrations of uranium underlying the LTP in 2007 as depicted in Figure 4.2.3-3 appears to be expanding in 2010 to the southeast, south, and east of the LTP as shown in Figure 4.2.3-4. TASC recommends that the CAP be expanded to not only focus on general trends but also localized trends of all the COCs since this may help identify specific areas that should be targeted with additional technologies to prevent the transport of higher concentration ground water from the LTP.

NRC Response
The NRC disagrees with the comment. The annual reports provide detailed information, including concentration time-plots that are divided into localized areas to identify specific areas of concern.

BVDA Comment 2
EPA and [Army Corps of Engineers (ACOE)] raised the concern that the heavy pumpage of fresh water from the San Andres Formation to supply water for the injection program to maintain the hydraulic barrier has resulted in significant hydraulic head differences. Consequently, this raised the concern that the pumpage may be inducing downward migration of impacted ground water through secondary permeability features such as faults and fractures. EPA had recommended that use of clean water be minimized and develop alternate sources such as potentially using treated extracted ground water for use in injection into the alluvial and Chinle Formation aquifers. According to Table A-4, Recommendations from September 2011 Five-Year Review Addressed in Updated CAP, HMC indicates that this concern is addressed in Section 5.3.2, Plume Control, and Section 5.4, Evaluation of Alternative Treatment Technologies.

TASC reviewed Section 5.3.2 and 5.4 and it appears that this concern of downward migration has not been specifically addressed. Section 5.3.2 indicates that injected water used in the plume control program is from RO plant product water, less contaminated areas of the alluvial aquifer, the Middle Chinle aquifer, and the San Andres aquifer. There is no discussion how pumping the San Andres Formation would not be expected to result in downward migration of impacted ground water through secondary permeability features such as faults and fractures. TASC identifies this as a significant concern since the San Andres is the most important regional aquifer in the Grants area. TASC recommends that the CAP be revised to specifically address this concern.

NRC Response
The NRC disagrees with the comment. The September 2011 Five-Year Review assumes that a downward hydraulic gradient would allow migration of impacted water from the alluvial aquifer to the San Andres aquifer due to significant head difference between the two aquifers in the site area. The Chinle Formation ranges in thickness from 600 to 800 feet and separates the alluvial aquifer from the San Andres aquifer in the site area. The Upper, Middle, and Lower aquifers are contained in the Chinle Formation and each aquifer is disconnected by the low-permeability Chinle shale. Hydraulic head differences across each of the low-permeability shale units would need to be assessed prior to concluding that a downward hydraulic gradient exists between the alluvial aquifer and the San Andres aquifer. Also, the areas nearest to the injection wells creating the hydraulic barrier would contain the most significant hydraulic head differences. The hydraulic barriers are down gradient of the impacted locations and are created with un-impacted water. Therefore, groundwater near any downward hydraulic gradient that could exist through the thick low permeability Chinle shale would be of similar quality to the injected and background water quality.

Extraction wells used to obtain impacted groundwater for treatment would consequently reduce the hydraulic head in the alluvium and the potential for significant downward hydraulic gradients to exist near the extraction wells.

While the NRC staff does not concur with the conclusion made in the September 2011 Five-Year Review used to support the commenters concern, the NRC staff will be evaluating potential downward migration of contaminants to underlying aquifers near impacted areas and will report the findings in the Safety Evaluation Report (SER) for the CAP.

BVDA Comment 3
EPA raised the concern during the 2011 Five-Year Review that a persistent plume of elevated uranium contamination just south of the former mill site is likely a remnant of the LTP and may continue to impact ground water due to a historic irrigation ditch that presumably was backfilled to original grade during construction of the mill. The CAP has not specifically addressed this former ditch feature as a potential preferential contaminant migration pathway. According to Table A-4, this concern is addressed in CAP Section 4.2 Contaminant Plume. TASC reviewed section 4.2 and this concern has not been addressed, rather, only a general conclusion is made that there is a site-wide decrease of COC concentrations attributed to the successful implementation of the CAP. Section 4.2 further minimizes exceedances that do not follow the decreasing trend to state that the exceedances are "isolated." TASC recommends that the CAP be revised to address specifically how the former ditch feature may or may not serve as a preferential contaminant migration pathway by including supporting information to address this concern. Further TASC recommends that additional detail be provided that justifies that some of the exceedances are considered "isolated" as opposed to an area that may be contaminated due to a preferential migration pathway.

NRC Response
The NRC disagrees with the comment. The historic irrigation ditch is addressed in Section 2.1.4.4, page 2-17, of the Updated 2013 DRP (ML131070607). The NRC staff believes that addressing the irrigation ditch in the 2013 DRP is adequate and therefore no additional information is required in the CAP.

BVDA Comment 4
EPA raised in the 2011 Five-Year Review that the east side slope of the STP/Evaporation Pond 1 had moderate to large furrows and the west side of the westernmost collection pond had moderate furrows, both of which appeared to be the result of rainfall/erosion. The ACOE also raised the concern that the potential for leakage under the evaporation ponds has not been assessed. HMC has not addressed these concerns in the CAP even though these concerns could significantly impact ground water restoration since the evaporation ponds concentrate contaminants. TASC recommends that HMC address this concern in the CAP since any potential breach in the evaporation pond from erosion or leakage could allow for elevated contamination from the pond to be released to ground water.

NRC Response
The NRC disagrees with the comment. The evaporation pond liners and side slopes are visually inspected and their leak detection records are reviewed annually by a State registered professional engineer. The results of the inspection and review, and any required maintenance, are reported in the Homestake annual monitoring report/performance review. Also, construction, operation, and closure of the evaporation ponds are discussed in the 2013 DRP. HMC specifically addressed erosion on east side slope of the STP/Evaporation Pond 1 and the west side of the westernmost collection pond in Section 2.1.4.4, page 2-18, of the DRP. The NRC staff believes that HMC's discussion of the evaporation ponds in the 2013 DRP is the appropriate place for this discussion and that no additional information is required in the CAP.

BVDA Comment 5
Since 2000, “slightly impacted” ground water in two alluvial aquifer zones located west and south of the mill site water had been managed by land treatment on HMC property. In 2010, NMED began to limit the use of land treatment as part of the remediation strategy due to concerns that the soil could impact ground water. HMC claims that land treatment is a critical component of the CAP and any limitations will result in delays for restoration. The CAP discusses alternative technologies for treating impacted ground water collected on-site; however, HMC has not discussed how alternative technologies could be applied to reducing land treatment of off-site ground water. Rather than extending the date when [Ground Water Protection Standards (GWPS)] are achieved, TASC recommends that the CAP consider alternative remedies to handle the slightly impacted ground water collected from off-site locations. For example, can this off-site ground water be sent to the [Reverse Osmosis (RO)] where the water can then be used for injection?

NRC Response
The NRC staff agrees with this comment. The limitations placed on land treatment starting in 2010 and the complete elimination of land treatment in 2012 needs to be addressed relative to the impact the elimination will have on the goals of the CAP if not replaced with another water treatment method. Alternative treatment technologies will likely be used to supplement or enhance remedial efforts in the future. Some of the alternative treatment technologies are currently being pilot tested at the site. The full-scale implementation of any alternative water treatment technology would need to be reviewed against activities that are currently approved under the license. The implementation of any alternative water treatment technologies under the CAP would need to evaluate the alternative’s ability to replace existing methods. Please see NRC RAI number 2 for more information.

BVDA Comment 6
EPA and ACOE raised the concern that contaminant concentrations may rebound (e.g., increase) once the tailings flushing program ceases. According to Table A-4, HMC indicates that this concern is addressed in Section 5.5.1.1, Rebound Evaluation. This section indicates that HMC has initiated a pilot-scale rebound study which has not been completed to include:

- Evaluating the leaching behavior of uranium, molybdenum and selenium from tailings solids in bench-scale tests;
- Conducting a tracer study in a portion of the LTP to characterize the flow regime and evaluate the connectivity of the well network before discontinuing flushing; and
- Monitoring relevant geochemical parameters after flushing has been discontinued for one year.

According to HMC, preliminary results of the rebound studies suggest that rebound of COCs upon completion of flushing is highly unlikely. TASC believes HMC’s conclusion is premature since the type of bench-scale leaching studies are not described nor has the geochemical information been provided. TASC recommends that the CAP include the necessary documentation to support conclusions that rebound of contamination in ground water at the cessation of the flushing program is unlikely to occur.

NRC Response
The NRC disagrees with the comment, because HMC discusses its on-going tailings pile rebound study in Section 2.1.4.4, page 2-15 and 2-16, of the DRP. The results of the rebound

study, including the leaching behavior of constituents from the tailings solids, the tracer study, and post-flushing monitoring of relevant geochemical parameters, will be needed to support HMC's plans for post-remediation monitoring, i.e., stability monitoring, of the tailings before license termination.

BVDA Comment 7
EPA raised the concern during the 2011 Five-Year Review that the flushing program is likely decreasing the stability of the LTP due to the increased saturation of the pore spaces. This specific concern appears to have been overlooked as it is not included in Table A-4 of the CAP. Although an earthquake stability analysis had been conducted in the past, this analysis assumed unsaturated tailings and did not account for the increased percentage of fluid-filled pore space resulting from the relatively recent tailings flushing program. TASC recommends that the CAP address this concern to demonstrate whether additional studies are needed or whether information is available to demonstrate that the stability of the LTP has not been compromised by the flushing program.

NRC Response
The NRC disagrees with the comment. HMC discusses the stability of the LTP in Section 2.1.4.4, pages 2-16 and 2-17, of the DRP. The NRC staff believes that the 2013 DRP is the appropriate document for this discussion and that no additional information is required in the CAP.

The potential effect of the flushing program on stability was recognized by HMC as part of its annual stability assessment in 2009. Homestake commissioned a stability analysis that examined the impact of the increased phreatic surface. The report, entitled "Stability Analysis of the Large Tailing Impoundment, Homestake Grants Project, Grants, New Mexico," dated January 21, 2010, is available in NRC's ADAMS system at accession number ML13345A017. HMC conducts an annual inspection of the tailing impoundments and ponds. The results of the inspections are provided in an appendix to the "Annual Monitoring Report /Performance Review for Homestake's Grants Project Pursuant to NRC License SUA-1471 and Discharge Plan DP-200."

BVDA Comment 8
Throughout the CAP, descriptions are provided how each operational component of the CAP is implemented to remove contamination from the LTP pore water and underlying ground water. However, the disposition of the contaminants that are removed is not provided. For example, the CAP explains that contaminated ground water collected from on site is pumped to either the RO plant for treatment and aquifer reinjection or to the two collection ponds. The water in the collection ponds is then piped to one of three lined evaporation ponds along with RO treatment wastes. However, it is unclear how the contaminants concentrated in the evaporation ponds are managed over time as contaminant levels accumulate. Consequently, there is a concern that HMC has created new sources of uranium and metal contamination that may serve as secondary sources to ground water (e.g., evaporation pond concentrate). TASC recommends that the CAP provide a transparent understanding of the lifecycle of the contamination removed from the ground water; currently the CAP only focuses on the water balances without any emphasis on the disposition of the removed contamination concentrating in the evaporation ponds.

NRC Response
The NRC disagrees with this comment. The contamination in the evaporation ponds on the small tailings pile is addressed in the 2013 DRP in Section 2.2.2.2 "Tailings Pile Reclamation," and in Section 9.2 "Ponds." The NRC believes that this is the appropriate document to address these issues.

BVDA Comment 9
The CAP repeatedly states that "unimpacted to slightly impacted water" will be injected back into the site's ground water for source control and plume control. This raises the concern that the site restoration activities are only spreading the contamination rather than removing and isolating the contamination. TASC recommends that the terms "unimpacted to slightly impacted water" be clearly defined. In addition, TASC recommends that the CAP also clarify how the use of "unimpacted to slightly impacted water" for the ground water restoration remedies would not compromise the goal of ground water restoration activities achieving the cleanup standards.

NRC Response
The NRC agrees with the comment. The NRC will request HMC to define the terms "un-impacted and slightly impacted water". See NRC RAI number 1.

BVDA Comment 10
The CAP summarizes the success of land treatment in Sections 5.3.5, and Section 6.3.5, based on the total amount of uranium and selenium retained in the soil column following spray irrigation. However, there is no discussion on the rest of the COCs specifically molybdenum, sulfate, chloride, total dissolved solids (TDS), nitrate, vanadium, thorium-230, and radium-226/-228. Appendix G, Land Treatment, explains that uranium and selenium are considered the primary COCs for land treatment since they sorb significantly to soils and are accumulated in shallow soil intervals, while TDS, sulfate, and chloride are classified as secondary COCs because the very small amount of water that moves through the unsaturated zone can potentially result in measurable concentration increases in the local ground water. It should be noted that the remaining COCs (nitrate, vanadium, thorium-230, and radium-226/-228) are not discussed in the CAP with respect to land treatment. Based on the information provided throughout the CAP, TASC is concerned that focusing on the contaminant transport behaviors of only two COCs in soil may not address the contamination transport behaviors of other COCs. Consequently, if the other COCs do not behave in a similar manner as uranium and selenium, the potential exists that the success of land treatment is not fully known and actually could be less if other COCs are not addressed. TASC recommends that the CAP justify why only a subset of COCs are discussed regarding the success of land treatment and explain why secondary COCs (TDS, sulfate, and chloride) and remaining COCs (nitrate, vanadium, thorium-230, and radium-226/-228) would not impact the success rate of land treatment.

NRC Response
The NRC agrees in part and disagrees in part with the comment. The land treatment program was not regulated under the NRC license but rather under the NMED discharge permit. The NMED discharge permit does not cover all of the constituents that are identified in the NRC license as ground water protection standards.

However, NRC's RAI number 37, from the 2006 CAP revision, requested information on how residual soil contamination will be addressed prior to license termination. In Section 9.7.3 of the 2013 DRP, HMC has committed to survey the land application areas to document the

contaminant concentrations in the soil and verify that the levels are below the soil radiological clean-up criteria. However, this commitment does not address clean-up of non-radiological hazards as required by 10 CFR Part 40, Appendix A, criterion 6(7). This will be addressed in NRC comments on the DRP. When approved by license amendment, the commitments in the DRP become license conditions which must be met before license SUA-1471 is terminated.

BVDA Comment 11
Throughout the CAP statements are made that as remedial operations continue at the Grants site, the CAP has been repeatedly modified to optimize performance. However, the CAP was originally prepared in 1989 and then modified only twice, once in 2006 and then in 2012 which raises the concern that stakeholders are not able to routinely provide feedback on modifications to the CAP if the CAP is only updated 6 to 17 years. TASC recommends any concerns that arise and associated modifications to the restoration operations be included on an annual basis as a part of the annual monitoring reports to ensure stakeholders are informed on timely basis of all issues and concerns.

NRC Response
The NRC disagrees with the comment. To clarify, to date the NRC has not approved any changes to the original 1989 "CAP document." But there have been changes to the corrective action program being implemented by HMC via license amendment without changing the CAP document. Changes have included: (1) addition of the reverse osmosis system in 1998; (2) changes to the groundwater protection standards in July 2006; and (3) addition of evaporation pond 3 in August 2008. Since these major changes were made via license amendment, stakeholders did have an opportunity to provide feedback on changes made to the corrective action program. Because a number of changes have been made to the corrective action program, but not documented in the CAP document, the NRC requested that HMC revise the 2006 revised CAP submittal to be a stand-alone document that describes the entire corrective action program. Modifications made to the restoration operations have been, and will continue to be required to be reported in the annual monitoring reports.

BVDA Comment 12
Executive Summary, Page xiv: The executive summary states that pore water seeping from the LTP has impacted shallow ground water, specifically in the alluvial aquifer beneath and downgradient of the LTP. However, according to the September 2011 Five-Year Review the LTP has impacted the Chinle aquifer, including the upper, middle, and lower zones. TASC recommends that the executive summary indicate that the LTP has impacted the alluvial aquifer as well as all three zones of the Chinle aquifer in order to clearly portray the site conditions.

NRC Response
The NRC agrees with the comment. HMC will be asked to clarify this discrepancy. See NRC RAI number 21.

BVDA Comment 13
Section 4.0 Ground Water Quality, Page 4-1: This section is of extreme interest to stakeholders since it is intended to provide a summary of the nature and extent of the ground water contamination over time as well as plume movement. However upon review of this section, only general statements are made requiring the reader to locate the referenced documents and develop an interpretation of this information. TASC recommends that this chapter and associated subsections summarize all important conclusions associated with each subsection in

order to provide information that is useful to gain a basic understanding of the contaminant trends and patterns.

NRC Response
The NRC agrees in part and disagrees in part with the comment. The NRC staff believes that information contained in the annual report regarding trends and patterns should remain in the annual report. The CAP is not a living document and information specific to a single point in time would not be appropriate. However, the NRC staff believes that the CAP does not contain enough general plume characteristics for each of the aquifers to give the reader a basic understanding of where impacts have occurred. See NRC response to BVDA comment 1b and NRC RAI number 6 for more information.

BVDA Comment 14
According to Section 1.3 of the CAP (Page 1-23) "the most relevant and important information is provided in the main text of the CAP and details are summarized in the appendices." However, Section 4.1.1 does not discuss the site characterization results or exceedances of standards, rather, the reader is deferred to locating the annual monitoring reports for detailed information about the results of the previous year's monitoring as well as appendix E which contains limited information regarding the 2010 monitoring results. TASC recommends that Section 4.2.1 not only discuss the 2010 data but also include discussions regarding relevant previous data that led to the various modifications since the 2006 CAP. TASC also recommends that this section at a minimum provide a summary of contaminant trends observed over time, where exceedances occurred, and the magnitude and pattern of exceedances.

Further, Section 4.2.1 section states that Table E-1 in Appendix E summarizes the results of the 2010 monitoring report (HMC and Hydro-Engineering 2011), including exceedances in 2010 of the relevant site standards and where these exceedances occurred. However, this is misleading since Table E-1 does not list any contaminant concentrations to gain an understanding of the magnitude of the exceedances. In addition, it is unclear that Table E-1 only represents 2010 data. TASC recommends that Section 4.2.1 and Appendix E be revised to include more detail that provides a summary of the standards and actual magnitude of exceedances of the standards to more adequately support proposed changes/modification to ground water restoration operations.

NRC Response
The NRC agrees in part and disagrees in part with this comment. Refer to NRC responses to BVDA comments 1a and 13, and refer to NRC RAI number 6 for more information.

The licensee can incorporate details pertaining to characterization of the site by reference as indicated in Section 4.1 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 (NUREG-1620, Rev. 1). HMC has referenced the 2010 annual monitoring report, which was current at the time the 2012 updated CAP was submitted, and has informed the reader of the location of historic and future characterization information, i.e., annual monitoring reports. The annual reports provide detailed characterization of the previous year's operations and water quality information. The CAP is not updated on an annual basis and inclusion of detailed information and analysis already captured in the annual reports would be both repetitive and cumbersome.

The NRC staff believes that information contained in the annual report regarding trends and patterns should remain in the annual report. The CAP is not a living document and information specific to a single point in time would not be appropriate. However, the NRC staff believes that the CAP does not contain enough general plume characteristics for each of the aquifers to give the reader a basic understanding of where impacts have occurred.

BVDA Comment 15
Section 4.2.2 Extent, Page 4-2: This section states that dissolved concentrations of uranium exceeding 1.0 milligram per liter (mg/L) generally are confined to the immediate vicinity of the tailings, west of the LTP and in the southern portion of the Felice Acres subdivision. This statement is misleading with respect to communicating the expansiveness of the contaminant plumes since the GWPS presented in Table 1.1-1 (Site Standards) for uranium range from 0.03 mg/L to 0.18 mg/L depending on the aquifer zone; these GWPS are 6 to 30 times more stringent than the comparison level of 1.0 mg/L. This information suggests that the uranium plumes are much smaller than if discussed relative to the more stringent GWPS. TASC recommends that Section 4.2.2 expand on the discussion of the extent of contamination relative to the GWPS for each aquifer zone to promote clarity in the expansiveness of the ground water contamination on- and off-site.

NRC Response
The NRC staff agrees with this comment. This section should provide a general description of the extent of groundwater impacts for each of the COCs with respect to the NRC GWPS or a general description of the maximum extent the contamination has migrated. This general description should contain the entire impacted area as previously stated in NRC responses to BVDA comments 1 and 13. Please see NRC RAI number 6 for more information.

BVDA Comment 16
Section 5.0 Page 5-1: The fourth paragraph of Section 5.0 states that “results from the evaluation of alternate treatment technologies and from the optimization evaluations are too preliminary to present in this document, but relevant details will be reported in future updates to the CAP and under separate cover, as appropriate.” This statement raises a concern that there is an uncertainty when stakeholders will be informed since the CAP is only periodically updated even though modifications are routinely made to the system as site conditions change. TASC recommends that the CAP specify what type of modifications are considered significant to justify when all stakeholders should be informed and under what type of cover this information will be presented. TASC further recommends that a section (s) of the annual monitoring reports be devoted to summarizing any significant changes to the ground water restoration operations in order to keep all stakeholders informed of any changes or impacts to the progress of restoration activities.

NRC Response
The NRC disagrees with the comment. To clarify, significant changes, such as addition of a new facility, operation, or revision of a regulatory standard for which the impact has not been previously assessed or would be greater than previously assessed would require a license amendment, and stakeholders would have an opportunity to provide feedback on license amendments. See NRC response to BVDA comment 11 for examples of changes to the corrective action program that HMC implemented via license amendment without changing the CAP document. Minor changes (e.g., reduced or increased injection rates that do not impact the program’s performance or change the scope of the CAP) do not require a license

amendment. The annual report describes current and future operations and updates well completions and the data collected from the various aquifers monitored.

BVDA Comment 17
Section 5.1 Ground Water Modeling, Page 5-2: Section 5.1 states that ground water modeling is performed to; (1) evaluate the progress of the CAP, (2) adjust the CAP to changing conditions, and (3) estimate when ground water restoration will be complete. This section further states that to meet these objectives, the model is set up to simulate the effects of seepage from the LTP into the alluvial aquifer and predict the performance of site restoration activities. However, this section does not describe whether the monitoring data collected over time validate the predictive modeling resulting in a high level of uncertainty with the models results and interpretation. According to Appendix G, the model was calibrated based on a comparison of predicted and observed uranium concentrations over the simulation period from 2000 through 2004. To provide confidence in the modeling conclusions that "model simulations show that the site standards will be met at the POC wells by 2020" and "site closure and reclamation is scheduled to add 2 more years out to 2022", TASC recommends that Appendix G also consider calibrating the model with more current data and provide a summary of the model and calibration results in Section 5. TASC also recommends that a brief explanation be provided on why uranium was the only COC used in the calibration and whether the results for uranium would also address the other 9 COCs in ground water.

NRC Response
The NRC staff agrees with this comment in part. The conclusions presented in the updated CAP must be supported by validated model simulations. However, calibration of the model with current data should only occur after model validation indicates a model deficiency between the model predicted results and the actual data. See NRC RAI numbers 8, 9, 10, 12, 13, 15 and 23 for further information.

BVDA Comment 18
Section 5.1 Ground Water Modeling, Page 5-3: Section 5.1 states the model simulations show that the site standards will be met at the point-of-compliance (POC) wells by 2020 if active flushing of the LTP continues until the average uranium concentrations within the tailings is 2 mg/L or less and active ground water treatment is continued. However, the basis for identifying 2 mg/L as the benchmark within the LTP for predicting compliance at the POC wells has not been summarized. Since the GWPS for uranium range from 0.03 to 0.18 mg/L depending on the aquifer being monitored, TASC presumes that the target level of 2 mg/L or less takes into account attenuation and retardation of the plume using the LTP as the primary source. TASC recommends that this section be further expanded to clearly explain the basis of the 2 mg/L metric. Further, TASC recommends that this section also discuss other COCs to ensure that achieving the 2 mg/L for uranium will also achieve the GWPS of all COCs in the POC wells by 2020 or sooner.

NRC Response
The NRC staff agrees with the comment. Section 5.1 should be expanded to include a summary of model assumptions and processes expected to achieve the groundwater protection standards at the POC wells. See NRC RAI number 4 and 8.

BVDA Comment 19
Section 5.3.3 Reverse Osmosis Treatment, Page 5-7: This section states that the RO plant is used to treat water from the alluvial aquifer and recycled water from the collection ponds; however an explanation is not provided why water extracted from the LTP was not treated by the RO plant in 2010. TASC recommends this section be revised to promote clarity in the CAP by explaining why extracted water from the LTP was not treated in 2010 and if HMC plans to continue to treat extracted water from the LTP in the future.

NRC Response
The NRC disagrees with the comment. An explanation is provided in Section 5.3.1 regarding why the extracted water was not sent to the RO plant: "Historically, some of the water collected from the tailings extraction wells has been sent to the RO plant for treatment, but the immoderate chemistry of pore water in the LTP inhibited effective treatment via RO operation." Also, the TASC recommendation appears to assume that water from the LTP was not treated in 2010. Section 5.3.1 describes that water extracted from the LTP and toe drains was routed directly to the evaporation ponds and the remainder of the water either seeped into the alluvium below the LTP for subsequent removal by the alluvial collection wells or was retained within the LTP.

BVDA Comment 20
Section 5.3.4 Evaporation, Page 5-8: This section explains the two types of evaporation techniques used to handle the contaminants in the brine water and the water from the LTP extraction wells. However, it does not explain how the concentrated contamination in these ponds is managed. According to the 2011 Five Year Review, Evaporation Pond-1 has a single asphalt-emulsion liner, constructed in 1990, and no dedicated leak detection system. This raises a concern that the 20+ year old pond may present a potential threat to ground water if a breach occurs in the liner. Since the evaporation ponds concentrate contamination and thus, represent potential threats to ground water in the event the evaporation ponds overflow or are breached, TASC recommends that the CAP clearly explain how contaminants in all three evaporation ponds are managed, the integrity of the liners, and what contingency plans are in place in the event a breach occurs or a leak is detected.

NRC Response
The NRC disagrees with the comment. The evaporation pond liners and side slopes are visually inspected and their leak detection records are reviewed annually by a State registered professional engineer. The results of the inspection and review, and any required maintenance, are reported in the Homestake annual monitoring report/performance review. Also, construction, operation, contamination and closure of the evaporation ponds are discussed in the 2013 DRP. The NRC staff believes that HMC's discussion of the evaporation ponds in the 2013 DRP is the appropriate place for this discussion and that no additional information is required in the CAP. See also NRC responses to BVDA Comments 4 and 8.

BVDA Comment 21
Section 5.3.5 Land Treatment, Page 5-9: The third paragraph states that ground water from all five aquifers is used in the land treatment program; ground water that does not meet the land treatment standards is blended with unimpacted water to dilute uranium and selenium concentrations in order to comply with these standards before land treatment application. However, over time uranium and selenium could continue to accumulate in soil, resulting in a new secondary source to ground water. TASC recommends that additional explanation be

provided that explains how the accumulation of uranium and selenium in soil at land treatment areas will be addressed to avoid creating a secondary source to ground water.

NRC Response
The NRC neither agrees nor disagrees with the comment at this time. The soil cleanup standards required to ensure that uranium and selenium does not impact the groundwater in the future will be addressed during NRCs review of the DRP (ML131070607). Information on the land treatment program is available in the Evaluation of Years 2000 through 2013 Irrigation with Alluvial Ground Water report (ML14120A187).

BVDA Comment 22
Section 5.3.5 Land Treatment, Page 5-10: Section 5.3.5 indicates that the majority of the uranium and selenium present in the water that is applied to the land treatment areas is bound to the soil column. This section then discusses the small percentage of uranium and selenium that is lost from the soil profile (approximately 5 percent of uranium and up to 33 percent of selenium) following land treatment and concludes that essentially all of the applied uranium and a large percentage of the selenium applied to the fields is still in the upper soil profile. TASC is concerned that there still remains a percentage of uranium and selenium that is lost from the soil and could possibly re-contaminate the alluvial aquifer. While TASC understands that standards were established for ground water intended to be used for land treatment and these standards have been approved, the CAP does not clarify how the loss of uranium and selenium from soil correlate with the land application standards. For example, some uranium and selenium is lost from the soil even though the irrigation water has met the approved standards for land application, yet the relative significance of this loss is not explained with respect to ground water concentrations detected beneath or downgradient of the land treatment areas. TASC recommends that this section be expanded to explain why the loss of uranium and selenium will not negatively impact ground water following land treatment.

NRC Response
The NRC disagrees with the comment. Under the draft NMED renewed discharge permit DP-200, land treatment with impacted water will no longer be allowed. Residual constituents of concern in the soil are addressed in Section 9.7.3 of the 2013 DRP, and HMC has committed to survey the land application areas to document the contaminant concentrations in the soil and verify that the levels are below the soil clean-up criteria. When approved by license amendment, the commitments in the 2013 DRP become license conditions which must be met before license SUA-1471 is terminated.

BVDA Comment 23
Section 6.1.1 Predicted Concentrations, Page 6-1: This section states that the results from the ground water model in Section 5.1 and Appendix G indicate that the site standards will be met at the POC wells “if the average uranium concentration in the LTP is 2 mg/L or less.” However, this section does not provide a contingency plan if the LTP is not 2 mg/L or less. TASC recommends that the CAP explain what contingencies are in place in the event the average uranium concentration exceeds 2 mg/L.

NRC Response
The NRC disagrees with the comment. The NRC does not require licensees to develop contingency plans for missed clean up target concentrations. HMC is required to achieve compliance with groundwater protection standards to terminate its license. If HMC determines

that the LTP target concentration is not achievable, HMC is then required to propose an alternate method for achieving compliance.

BVDA Comment 24
Section 6.3.4 Evaporation, Page 6-4: This section states that HMC is planning to continue evaluating the condition of the spray evaporation equipment and may replace the forced evaporative spray systems if necessary to improve performance. However, this section has not discussed the parameters or criteria that are being measured to determine if the spray system needs to be replaced. TASC recommends that the CAP be more specific with the criteria or metrics that will be measured and what conditions must be met to justify a change in the evaporation systems currently being used.

NRC Response
The NRC disagrees with the comment. The evaporation ponds contribute to the overall water balance at the site. The NRC does not specify what performance level must be met with respect to the evaporative spray equipment as long as the overall water balance at the site is being met. Therefore, the NRC would not require HMC to maintain a performance level for the forced evaporative spray systems as long as HMC maintains the overall water balance at the site.

BVDA Comment 25
Section 6.3.5 Land Treatment, Page 6-4: This section indicates that HMC is planning to the lower the standards HMC has proposed to address NMED concerns associated with ensuring that re-contamination of the alluvial aquifer is avoided in the four land treatment units. However, an explanation of how these revised standards would be more protective of the alluvial ground water has not been provided. While the proposed treatment standards as presented in Table 6.3.5-1 are lower in 2011, they are scheduled to be higher from 2012 until 2018 and lower in 2019. TASC recommends that this section be revised to clarify how the revised standards would be more protective of soils leaching to the alluvial ground water.

NRC Response
The NRC disagrees with the comment. The lower standards reported for 2011 were from actual sampling results rather than the proposed maximum concentration limits for land treatment. These levels were set based on HMC site standards for chloride and uranium and levels below the site standards for TDS, sulfate and selenium HMC letter to NMED on “HMC Irrigation Report, Monthly #2,” dated October 10, 2012 (ML12292A055). The concern of re-contaminating the alluvial aquifer was based on the possibility of irrigation water containing constituent concentrations higher than the GWPS migrating to the alluvial aquifer without contaminant retention in the soils. HMC has annually sampled and analyzed soil, soil moisture, and groundwater to estimate the level of constituent retention in the soils and to evaluate impacts to the alluvial aquifer due to land treatment. Sample results and detailed information can be found in the most recent annual report, “Evaluation of Years 2000 through 2013 Irrigation with Alluvial Ground Water” (ML14120A187).

BVDA Comment 26
Section 6.3.6 Alternative Treatment Technologies, Page 6-4: This section states that one or more alternate treatment technologies may supplement the five existing technologies to be used as "polishing" options for final treatment of “moderately to slightly impacted water.” However, this section does not define what criteria or metrics are used to classify impacted water as either

moderately or slightly impacted. Without an explanation of what constitutes moderately or slightly impacted ground water, it is unclear how HMC will decide when an additional technology is needed as a polishing step. The decision logic for determining the different classifications of impacted water is not presented to justify what decisions may be made with respect to including alternative treatment technologies or modifying existing ones. TASC recommends the CAP be reviewed in its entirety and clearly define qualitative classifications of contamination with specific criteria or metrics to promote clarity in the selection of different technologies or in justifying any modifications to the existing operations.

NRC Response
The NRC agrees with the comment. See NRC RAI number 1. Also, the NRC will evaluate the capabilities of the alternate treatment technologies if HMC determines that the scope of their safety and environmental impact is beyond that already reviewed and approved and they are submitted for NRC review. The treatment capacity of each technology will then be required to be clearly identified prior to NRC approval.

BVDA Comment 27
Section 6.3.1 Source Control, Page 6-2: This section states that injection of water into the LTP will continue through 2014, and extraction of water from the LTP will continue through 2016, however the basis for these forecasts is not provided. This section refers the reader to Appendix I for a summary of information that supports the predicted future operation of the source control program; however, the referenced information only provides a table summarizing the historic and planned tailings injection/extractions from 1995 to 2016. Appendix I does not discuss the basis for the projected dates. TASC recommends that the CAP include at a minimum, a summary discussion that explains how these dates were determined to inform stakeholders of the basis for discontinuing injections and extractions at specific time periods.

NRC Response
The NRC agrees with the comment. The NRC needs to see the basis for these time estimates to determine if they are realistic, because these dates support the remediation and closure milestones that will be specified in the amended license. Therefore, the NRC will request that HMC provide a discussion of the basis for the dates associated with flushing the LTP. See NRC RAI numbers 4, 5, 9, 10, and 11.

BVDA Comment 28
Section 7.0, Ground Water Monitoring Program, Page 7-6: This section states that ground water monitoring started in 1975, however according to Section 2.4 Groundwater Remediation History, quarterly monitoring was required as early as 1950 for the site. TASC recommends that this section correct this discrepancy and clarify when monitoring of ground water began for the site to promote consistency in the document.

NRC Response
The NRC agrees with the comment. The NRC will informally request that HMC revise Section 7.0 to correct the discrepancy.

BVDA Comment 29
Section 7.0, Ground Water Monitoring Program, Page 7-6 (editorial): The pagination of this section appears to be incorrect. The first page of this section begins with page number 7-6 rather than page 7-1. TASC recommends correcting the pagination in Section 7 as well as the

table of contents to promote clarity in the document.

NRC Response
The NRC agrees with the comment. NRC will informally request that HMC revise Section 7.0 to correct the editorial issues identified.

BVDA Comment 30
Section 7.2.1 Network, Page 7-7: This section states that there are no point-of- compliance (POC) wells for the Middle and Lower Chinle aquifers because these aquifers subcrop with the alluvial aquifer outside of the NRC license boundary. HMC further supports this decision by stating that ground water from the edge of the tailings must migrate in either the alluvial or Upper Chinle aquifers for more than a mile before reaching the subcrops of the Middle and Lower Chinle aquifers, where impacted water could potentially enter these aquifers. This information suggests that compliance monitoring of the Upper Chinle further will indirectly characterize the Middle and Lower Chinle based purely on a hypothesis rather than confirming this hypothesis with actual monitoring data. TASC recommends that the CAP confirm that this hypothesis is valid by demonstrating with monitoring data that monitoring only the alluvial aquifer and Upper Chinle aquifer at the POC wells will adequately address contamination that may be present further down gradient where the alluvial and Upper Chinle aquifers subcrop into the middle and lower Chinle aquifers.

NRC Response
NRC staff agrees that additional wells need to be designated to ensure that standards are achieved in the Middle and Lower Chinle aquifers. However, the use of the term “Point of Compliance” (POC) is no longer relevant once a compliance monitoring program and/or a corrective action monitoring program have been implemented. POC monitoring is required as part of the detection monitoring program discussed in Criterion 7A of 10 CFR Part 40, Appendix A. See also NRC response to NMED Comment 8.

BVDA Comment 31
Table E-3: Well Network and Data Inputs for Mass Removal Analysis: The mass removal analysis was conducted in response to stakeholders’ concern that the restoration activities were diluting the uranium concentrations in ground water rather than removing the uranium. The data that is used in the mass removal analysis presented in Table E-3 to include a summary of dissolved uranium data from 2001 to 2009. However, there appears to be an error in this table as the last two columns are listed as 2001 and 2002 maximum uranium concentrations yet the information listed in these two columns are the well identification number and well type, respectively. Consequently TASC raises the concern that the input data into the mass removal analysis may be in error. TASC recommends that Appendix E be revised to ensure the appropriate data were considered in the evaluation and revise the table and text accordingly and any conclusions made in the main body of the CAP.

NRC Response
The NRC agrees in part with the comment. The NRC believes the error is editorial and the data used in the analysis was correct based on the staff review of the mass removal analysis. The NRC will informally request that HMC revise the editorial error in Table E-3 of Appendix E. See NRC RAI number 3.

BVDA Comment 32
Reorganization of the CAP: Since the 2006 CAP, much of the information necessary to justify the direction of ground water restoration activities has been relocated into a number of appendices. This reorganization has resulted in the main report being too vague and lacking sufficient detail to gain an understanding of the current status of the ground water restoration operations. Consequently, one must navigate through the numerous appendices to gain a general understanding of the progress of remediation for each CAP component as well as challenges that may have arisen in the implementation of a particular component as site conditions changed. TASC recommends that key observations and conclusions presented in the appendices be brought forth into the main report to provide a fundamental understanding of the progress and challenges that were overcome in the implementation of restoration components. The CAP could be a useful communication tool to all stakeholders if such information is summarized in the main report.

NRC Response
The NRC disagrees with the comment and will not request this change. However, the NRC will pass this comment on to HMC in the form of an observation about the clarity of the document.

BVDA Comment 33
Possible Downward Migration of Contamination: Heavy pumpage of fresh water from the San Andres Formation used to supply water for the injection program to maintain the hydraulic barrier has resulted in significant hydraulic head differences. This raises the concern that the pumpage may be inducing downward migration of impacted ground water through secondary permeability features such as faults and fractures. TASC identifies this as a significant concern since the San Andres is the most important regional aquifer in the Grants area. TASC recommends that the CAP specifically outline how this concern will be addressed to minimize the use of the San Andres water and develop an alternate source such as treatment of extracted ground water for use in injection.

NRC Response
The NRC disagrees with the comment. This comment appears to be based on assumptions in the EPA September 2011 Five-Year Review* that a downward hydraulic gradient would allow migration of impacted water from the alluvial aquifer to the San Andres aquifer due to significant head difference between the two aquifers in the site area. While the NRC staff does not concur with the conclusion made in the September 2011 Five-Year Review, the NRC staff will be evaluating potential downward migration of contaminants to underlying aquifers near impacted areas and will report the findings in the Safety Evaluation Report (SER) for the CAP. See also NRC response to BVDA comment 2.

*EPA September 2011 Five-Year Review - (http://www.epa.gov/region6/6sf/newmexico/homestake_mining/nm-homestake-mining-3rd-5yr_review.pdf)

BVDA Comment 34
Persistent plume of elevated uranium contamination just south of the former mill: This plume is likely a remnant of the LTP and may continue to impact ground water due to a historic irrigation ditch that presumably was backfilled to original grade during construction of the mill. TASC recommends that the CAP specifically address this former ditch feature and explain the relative

significance of this feature as it relates to contaminant migration.

NRC Response
The NRC disagrees with the comment. The historic irrigation ditch is addressed in the updated 2013 DRP (ML131070607). The NRC staff believes that addressing the irrigation ditch in the 2013 DRP is adequate. See also NRC response to BVDA comment 3.

BVDA Comment 35
Liner and Slope Integrity of Collection and Evaporation Ponds: Moderate to large furrows on the east side slope of the STP/Evaporation Pond 1 and west side of the westernmost collection pond have been documented in the 2011 Five-Year Review. Further, stakeholders have raised the concern that the integrity of the pond liners is not known, however, the CAP does not address these specific concerns. TASC recommends that these concerns be addressed in the CAP since they potentially could impact future restoration activities in the event the tailing piles collapse or breaches occur in the evaporation ponds where contaminants removed from ground water are stored.

NRC Response
The NRC disagrees with the comment. The evaporation pond liners and side slopes are visually inspected and their leak detection records are reviewed annually by a State registered professional engineer. The results of the inspection and review, and any required maintenance, are reported in the Homestake annual monitoring report/performance review. Also, construction, operation, and closure of the evaporation ponds are discussed in the 2013 DRP. The NRC staff believes that HMC's discussion of the evaporation ponds in the 2013 DRP is the appropriate place for this discussion and that no additional information is required in the CAP. See also NRC response to BVDA comment 4.

BVDA Comment 36
Rebound Study: HMC states that preliminary results from the ongoing rebound study suggest that rebound of COCs upon completion of flushing is highly unlikely. TASC considers HMC's conclusion to be premature since the CAP has not specified what type of bench-scale leaching studies have been conducted nor has the geochemical information been provided. TASC recommends that the CAP or other deliverable include the necessary documentation to support conclusions regarding rebound of contamination in ground water at the cessation of the flushing program.

NRC Response
The NRC disagrees with the comment, because HMC discusses the tailings pile rebound study in the 2013 DRP. The results of the rebound study will be needed to support HMC's plans for post-remediation monitoring of the tailings before license termination. See also NRC response to BVDA Comment 6.

BVDA Comment 37
Stability of the LTP: The flushing program likely has decreased the stability of the LTP due to the increased saturation of the pore spaces. This concern does not appear to be addressed by the CAP. TASC recommends that the CAP address this concern to demonstrate whether additional studies are needed or whether information is available to support that the stability of the LTP has not been compromised by the flushing program.

NRC Response
The NRC disagrees with the comment. HMC discusses the stability of the LTP in the 2013 DRP. The NRC staff believes that the 2013 DRP is the appropriate document for this discussion and that no additional information is required in the CAP. See also NRC response to BVDA Comment 7.

BVDA Comment 38
Background Contributors to Contamination: The CAP has not described how the upgradient contributions from other facilities is controlled. Although HMC is not responsible for remediating upgradient ground water, the CAP should still discuss what action plan is in place if HMC monitors upgradient conditions and the concentrations are increasing thereby impacting HMC's site conditions. TASC recommends that a contingency plan be included in the CAP in the event HMC detects increasing concentrations in upgradient wells. This plan should explain how the appropriate responsible parties and regulatory agencies will be notified to mitigate any potential upgradient impacts that are not the responsibility of HMC.

NRC Response
The NRC disagrees with the comment. To clarify, HMC currently monitors background groundwater conditions up gradient of the site. If up gradient background wells detect increasing concentrations that are not a result of operations, HMC could submit a license amendment requesting updated groundwater protection standards pursuant to Criterion 5B(5) to Appendix A of 10 CFR Part 40. The NRC would notify both the State and the EPA about any potential changes to HMC's groundwater protection standards and any concerns of contaminant migration up gradient of the HMC site.

BVDA Comment 39
Ten Chemicals of Concern: The CAP predominantly focuses on addressing the uranium plumes in ground water, yet EPA had identified ten chemicals of concern in groundwater that were required to be addressed by a remedial response action. The CAP has not explained how focusing cleanup on uranium would also address the other 9 COCs. The remedies for uranium may not be effective in cleaning up the other COCs, or if they are effective, the CAP has not explained if the other COCs are co-located and the rate of cleanup would be the same. For example, the presence of selenium in down-gradient ground water was the trigger for connecting down-gradient residences to municipal water which suggests that selenium may be more mobile than uranium. TASC recommends that the CAP provide clear rationale for only focusing on a subset of COCs and whether this approach is protective for all ten COCs.

NRC Response
The NRC agrees in part and disagrees in part with the comment. License Condition 35B of NRC License SUA-1471 identifies the groundwater protection standards established for each designated aquifer. Section 5 of the CAP states, "The objective of the CAP is to restore the concentrations of the ten COC's at the site to the standards established for each aquifer…" While the objective clearly identifies that all 10 COCs are of concern at the site, the NRC agrees that clarification on how all of the COCs are being addressed in the CAP is needed. See NRC RAI number 8.

BVDA Comment 40
Alternative Remedies: TASC understands based on stakeholder feedback in the 2011 Five-Year Review and during meetings that there is a desire to remove the entire LTP to a location

30 miles from the current location, similar to what occurred at another mining site in Moab, Utah. In response to this concern, HMC prepared a feasibility study to address the various options to remediate the piles. The extremely high costs to remove the LTP (approximately $2 billion) along with the corresponding high human health risk suggest that total pile removal is not technically feasible or protective of human health. However, TASC is of the opinion, as are other stakeholders, that other technologies may be promising to secure site closure more effectively. HMC is currently evaluating additional ground water remediation technologies that could enhance existing technologies to treat ground water. However, these additional treatment technologies do not consider alternative technologies to prevent contaminated ground water from moving from the site. The ACOE has raised a concern that the current system may not be as effective a barrier for contaminant migration as a slurry wall. A slurry wall has not been evaluated as a more cost-effective option in the feasibility study which focused only on removing the LTP. TASC recommends that a slurry wall technology also be considered as an alternative technology to be considered in preventing the migration of contaminated ground water further from the site.

NRC Response
The NRC disagrees with the comment. The NRC cannot require a specific remediation technology, only that HMC remediate the site and groundwater to the standards in the regulations and identified in the license. However, if HMC cannot meet the remediation requirements with its current system it may need to look at other alternatives.

Multicultural Alliance for a Safe Environment (MASE)

MASE Comment 1
The CAP fails to address the continuing radiological issues caused by radon emissions from the mill site that were presented to the United States Environmental Protection Agency and the NRC in a May 2010 TASC report on radon level prepared by Chris Shuey of Southwest Research and Information Center (SRIC). Mr. Shuey's report showed that HMC is using unsupported assumptions to demonstrate compliance with the NRC's 100-mrem-year rule. Fenceline levels of Rn were shown to be consistently elevated over background. Mr. Shuey asserted that this demonstrated that HMC was out of compliance based upon the data and dose calculations. Although EPA has authorized preparation of a forthcoming risk assessment that will include measuring Rn at background sites and indoors and outdoors in the neighborhoods adjacent to the HMC site, the CAP does not address this issue in terms of on-site Rn emissions.

NRC Response
The NRC disagrees with the comment. The purpose of the CAP is to document the status of ground water reclamation activities at the HMC site and describe the activities necessary to restore the site groundwater to the standards established in License SUA-1471. Monitoring radon emissions from the site and demonstrating compliance with the annual radiation protection standards is an operational issue, and thus outside the scope of the CAP.

In its regulations, the NRC requires HMC to meet two specific dose standards. First, 10 CFR 20.1301(a)(1) requires HMC to meet an operational public radiation dose standard of 0.1 rem/yr (100 mrem/yr) Total Effective Dose Equivalent (TEDE). The TEDE is a product of combination of internal and external radiation dose measurements over a period of time. Second, HMC must comply with the air emissions limit of 10 mrem/yr TEDE (excluding Radon 222) established in 10 CFR 20.1101(d).

Radon levels inside and outside a resident's house near the HMC site are due to the presence of background radon and possibly radon emanating from the HMC site. EPA evaluated the impact of the HMC site on the adjacent subdivisions in its 1989 Record of Decision (ROD), and determined that no action was required to address indoor radon gas. EPA determined that, although the radon concentrations were elevated, the principal cause was not related to the site, but to natural sources of radon. Since the 1989 ROD, EPA has issued two Five-Year Reviews that have concluded that the no action remedy remains protective.

Even though HMC is currently in compliance with all of NRC standards and EPA's annual whole body dose limit of 25 mrem, in September 2009 EPA initiated a risk assessment to assure any risk to the public is within CERCLA's acceptable risk range during the on-going clean-up. This risk assessment is still in progress.

MASE Comment 2
Significant data gaps exist for the drainage of the San Mateo Creek and Rio San Jose and their connection to the regional aquifers at the Homestake Superfund site. Any conclusions in the CAP which rely upon this questionable or non-existent data to project the limits of the extent of groundwater contamination to the boundaries of the Homestake Superfund site within the San Mateo Creek drainage are suspect. Therefore, to the extent the CAP relies on such projections, MASE requests that the NRC require HMC to supplement the CAP by conducting studies to develop accurate data points upon which it would be reasonable to make such projections.

NRC Response
Without specific references to where the data gaps are in the CAP and how HMC may have reached conclusions in the CAP without sufficient data, the NRC cannot further evaluate and respond to this comment.

MASE Comment 3
Financial assurance for the site, as required under Criterion 9 of 10 CFR Part 40 Appendix A, is not sufficient to cover closure of the site when the on-going costs of groundwater remediation are taken into account. The CAP should not be approved until HMC demonstrates that there is sufficient financial assurance for closure including all necessary and on-going site remediation costs.

NRC Response
The NRC disagrees with the comment. In accordance with License Condition 28, HMC is required to continuously maintain financial surety in an amount sufficient to cover the cost of decommissioning by an independent third party that the NRC reviews and approves. HMC is not out of compliance with this requirement or Criterion 9 of 10 CFR Part 40, Appendix A. Without further details about specifically how the commenter believes financial assurance is insufficient, the NRC cannot further evaluate or respond to this comment.

MASE Comment 4 – This comment is summarized in Regulatory Process Issue 1.

MASE Comment 5
The March 2012 version of the HMC CAP fails to identify water quality data for the area affected by Homestake operations in the neighborhoods down gradient of the tailings piles. This deficiency in the 2012 CAP is striking as it demonstrates HMC's failure to respond to a specific

questions about background water quality in the neighborhoods and other early water quality data raised in NRC 2010 “Request for Additional Information” (RAI) addressing deficiencies in the 2006 HMC CAP. The 2010 NRC RAI, at RAI 4, specifically requested HMC provide water quality data for the residential areas in the 1960s and 1970s, along with Atomic Energy Commission (AEC) required groundwater monitoring data from the site gathered in the 1950s identified by HMC.

NRC Response
The NRC disagrees with the comment. Current water quality data for the area affected by HMC operations in neighborhoods down gradient of the tailings pile is presented in detail within the Annual Monitoring Reports. In regard to the NRC’s RAI, HMC was not able to respond to the request for water quality data for the residential areas in the 1960s and 1970s and the AEC-required groundwater monitoring data from the site in the 1950s with information in their records. HMC’s statement about the quality of the water on or near the site before or during site operations is not relevant to the requirements in their license for groundwater remediation. The NRC has established groundwater remediation standards for the site based on the analysis done for License Amendment 39, dated July 10, 2006 (ML061710354), and as reflected in License Condition 35B. Those remediation standards are based on more current values of up gradient background concentrations. No further response from HMC is required on this point.

MASE Comment 6
MASE along with its coalition partner Bluewater Valley Downstream Alliance (BVDA) take the positions that (1) based upon the U.S. Army Corps of Engineers (ACE) report that forms an Appendix to the RSE for the HMC site, flushing is not working, is spreading contamination in the groundwater, and should be stopped; (2) neither the ACE Appendix or HMC have considered removing the large tailings pile to a prepared, geologically appropriate repository within the vicinity or even on nearby property that HMC owns. The NRC should require, as part of the CAP, that HMC request the ACE to reevaluate its findings based upon study of sites within the near vicinity to HMC and on HMC's property. Removal of the large tailings pile will remove the primary source of contamination of the site, the adjacent communities, and the groundwater.

NRC Response
NRC neither agrees nor disagrees with the first part of this comment at this point as NRC is requesting additional information as to the efficacy of the flushing program relative to the goals of the CAP (see RAIs 3, 4, 5, and 15). NRC disagrees with the second part of this comment in that HMC is not required to consider moving the large tailings pile at this point in the process. See also NRC response to Regulatory Process Issue 2.

MASE Comment 7
The Grants site was originally added to the National Priorities List (NPL) in 1983, establishing it as a Superfund site and therefore subject to the National Contingency Plan (NCP) and Remedial Investigation /Feasibility Study (RI/FS) Process. The reviewer therefore assumed that the information provided for the site, as well as the site history, would at a minimum provide some similarity to typical Superfund protocols for site characterization, data collection and availability, risk assessment, alternatives analysis, feasibility evaluations, and determination of proposed plans and implementation follow-up. Instead, the CAP describes activities which have been conducted since 1977 as part of a corrective action plan to address contamination discovered at that time, prior to the site being added to the NPL. While some modifications have been made to the CAP during that time, the site has clearly not undergone a

comprehensive evaluation and determination as to the best methods for remediation and ultimate final closure as one would expect given the sites Superfund status.

MASE Comment 8
Based on our review of the available information as contained by the CAP and supporting documents, a full RI/FS should be performed by EPA for the site. As noted by the CAP (p. 1-10), deletion would require that:

- The responsible party under CERCLA or other designated party(s) has implemented all appropriate response actions required.
- All appropriate fund-financed response under CERCLA has been implemented, and no further response action by the responsible party is appropriate.
- The Remedial Investigation (RI) has shown that the release poses no significant threat to public health or the environment; therefore, taking of remedial measures is not appropriate.

NRC Response to MASE comments 7 and 8
The NRC disagrees with the comment. The purpose of the CAP is to describe the activities necessary for restoring impacted groundwater to the standards established in NRC License SUA-1471. EPA is currently evaluating the part of the site that it has designated “operable unit 1” (contamination of the ground-water aquifer from tailings seepage) using the CERCLA protocol.

MASE Comment 9
In our professional opinion:

- It is highly likely that significant additional response actions will be necessary at this site beyond those described in the CAP.
- The existing remedial actions described in the CAP are not appropriate because they are inconsistent with recognized best practice and agency approaches at other similar sites as discussed further in our comments.
- In addition EPA and NMED ARARs must be considered which the present actions described in the CAP do not adequately address.
- It is also highly likely, based on the site characteristics and similarities to other hardrock mining sites, that long-term maintenance and monitoring will be required to protect any final remedy together with long-term water management and treatment activities.
- Although long-term funding might be addressed by financial assurance, unless a mechanism that can assure funding in perpetuity, versus the standard of 30-100 years can be demonstrated, funding for the site, particularly if it becomes a DOE property (p. XX), will eventually fall to the public domain.

NRC Response
These issues will be addressed through the EPA CERCLA process and the process DOE uses to accept sites under UMTRCA Title II.

MASE Comment 10
Unless an new and thorough remedial investigation is performed showing no threat to public health or the environment, it is improbable that this site will meet the criteria for delisting within the next 25 years, if ever, particularly if the present remedy proposed in the CAP is not significantly altered. Given the contaminants of concern and their likely geochemical nature and concentrations in the source material there is a high likelihood of rebound and long-term

seepage for some time (50+ years) following closure. Given the numerous pathways which could lead to human exposures via groundwater, it is highly unlikely that a RI, provided it is properly conducted, will find no threat to public health or the environment at this site.

It is our opinion that additional supplemental RI data in terms of site characterization (source characterization including geochemical leaching characteristics, draindown, and seepage predictions, hydrological characterization, human health risk assessment) will be required for EPA to adequately address the site in accordance with [National Contingency Plan (NCP)] requirements. It is further our opinion that EPA should require a complete Feasibility Study to be conducted including consideration of all viable technological alternatives to those presently proposed in the CAP. This should include a full range of alternatives including relocation alternatives (distant isolated repository versus local repository). Failure by the PRP to conduct such an analysis in an unbiased manner, and by NRC to require the PRP to do so, suggests that EPA should assume primary responsibility for oversight and potentially conduct of the RI/FS process.

NRC Response
This comment is out of scope of what HMC is required to do under the CAP and NRC regulatory authority.

MASE Comment 11
According to the CAP (p. xv) flushing of the tailings is being performed to expedite the draindown of seepage from the LTP to the groundwater. The CAP does not provide information how continuing to maintain the tailings in a saturated condition expedites draindown, when draindown is a direct function of discontinuing actions which maintain the tailings in a saturated condition thereby allowing them to drain of residual fluids. The flushing appears to prolong, rather than expedite, the draindown for as long as it is being performed.

The Nevada Department of Environmental Protection together with the Bureau of Land Management (BLM) have developed a protocol for tailings fluid management during the draindown period based on their extensive experience with tailings sites in Nevada and elsewhere. Figure 5.32 shows the various phases of draindown that are recognized. Phase 1, consisting of recirculation, is similar to the present “flushing” activity taking place at the site. As the figure demonstrates, once phase I is completed, draindown proceeds (and a final cover is placed on the tailings) which is typically followed by 30 years or more of decreasing seepage flow until steady state conditions, reflective of seepage conditions at final closure, will be realized. By continuing flushing as part of the CAP draindown and eventual final closure of the tailings is being delayed at the Grants site rather than expedited.

Source controls for hardrock mining applications are described in numerous publications and guidance documents including EPA’s 2005 Draft Hardrock Mine Cleanup Guide and the Global Acid Rock Drainage Guide (GARD 2012). Those highly regarded sources of information identify source controls to include materials handling and management methods such as selective disposal of acid generating or reactive materials into repositories or specially designed facilities. Source controls also include engineered methods intended to prevent or reduce the occurrence of contaminant leaching by preventing or minimizing infiltration of oxygen and meteoric water as well as flow of groundwater into source materials. Commonly used methods employ a variety of covers or caps to limit infiltration. The use of liners below potential sources to protect

groundwater and recover seepage is also gaining in acceptance as a source control method. In some cases neutralization may also be used as a source control method.

None of the measures which have been identified by industry references or regulatory agencies, with the exception of a few sites under NRC jurisdiction including the Grants site, have recognized much less utilized tailings flushing as a source control measure. Heap leach flushing is sometimes performed in the gold mining industry, however that practice has largely been discontinued because of failure to effectively remove residual process solution, and eventual rebound of contamination in seepage after rinsing is discontinued. In many cases rinsing has also been demonstrated to cause unpredicted undesirable effects such as leading to conditions where the solubility of a particular constituent, such as more alkaline conditions increasing arsenic or selenium mobility, have unintentionally occurred.

While the author knows of no examples of tailings flushing being practiced elsewhere in the hardrock mining industry in the US outside of those with NRC jurisdiction, from an engineering practices standpoint the same outcomes, namely that of incomplete flushing and high likelihood of rebound, would be likely to occur.

We recommend that immediate implementation of conventional source controls be evaluated for this site to expedite cleanup activities. This lack of typical process further demonstrates the need for an RI/FS to be conducted by EPA. This should include not only evaluation of measures to cover/cap the tailings in place, but also measures involving moving the tailings to a suitable nearby, or regional repository. Such a repository could be built using a lined system thereby preventing release of contaminants to the maximum extent.

NRC Response
The NRC disagrees with the comment on the tailings flushing program (source control program) at this point as the NRC's evaluation of it is still in progress. The source control program is designed to reduce the COC source term located within the LTP. Section 5.3.1 of the CAP provides a more detailed discussion of the source control program. The NRC has evaluated the source control program relative to how it addresses the goals of the CAP. The NRC has several requests for information relative to the source control program (see RAIs 3, 4, 5, and 15). The EPA is currently conducting activities to produce a Record of Decision for remediation and closure of the tailings pile.

MASE Comment 12
According to the CAP (p. xv) the plume control program involves the creation and maintenance of a hydraulic barrier downgradient of the LTP to inhibit the flow of contaminated groundwater and "[m]aintenance of the hydraulic barrier requires [the] pumping of large volumes of groundwater." The water balance around the system is apparently maintained by the use of a land application disposal (LAD) method for discharging excess contaminated water. Beginning in 2010, however, NMED began to limit HMC's use of land treatment as part of its remediation strategy. According to the CAP, "if these land treatment limitations continue, additional delays should be expected, as this strategy is a critical component of the CAP."

NMED is concerned that HMC's practice of blending contaminated water with groundwater from the San Andres aquifer that presently achieves site alluvial aquifer groundwater standards. This practice essentially constitutes dilution followed by discharge of contaminants directly into groundwater, which is specifically disallowed by the New Mexico Water Quality Act. NMED has

required HMC to provide a demonstration, underpinned by observational data, that the continued land application of blended contaminated water as proposed in the CAP will not cause exceedance of site ground water standards at any time in the future. If HMC is unable to make this demonstration, NMED will not allow such land application to continue. NMED has also required HMC to submit preliminary plans for evaporation pond construction, which is a proven water treatment methodology that can replace land application, in the event that HMC cannot make the required demonstration, and to submit a comprehensive feasibility study of its work to date in evaluating alternative ground water treatment methods. The NMED is entirely correct in their concerns about the viability of LAD systems to not result in exceedances. LAD systems have been notoriously unpredictable and in many circumstances have resulted in either undesirable ecosystems (e.g. forage containing high quantities of contaminants) or impacts to water quality. Given New Mexico's highly protective groundwater regulations it is doubtful that any LAD system could be successfully operated to result in no discharge to groundwater of contaminants above standards if the discharge contains significant concentrations or quantities of contaminants. If an LAD system is to be used the following information needs to be collected and evaluated:

- Survey of surface waters (locations of streams, springs, lakes, wetlands).
- Depth of the shallowest water table or ground water aquifer.
- Hydrogeological characteristics of the disposal area.
- Ground water quality (State regulation).
- Soils and subsurface lithology, including attenuation analysis as needed.
- Vegetative survey including representative nearby riparian and wetland areas within a defined area of influence even if not included in area of disturbance.
- Ecological survey.
- Screening Level Ecological Risk Assessment/Ecological Risk Assessment.

These analyses would include, but not be limited to, state-required analyses for potential degradation of waters of the State. This should also include methods for validating operators' predictions, such as monitoring wells, lysimeters, and water-quality sampling.

As noted by NMED, there are alternatives to LAD which are much more environmentally acceptable than infiltration and dilution. In addition to passive evaporation, which is presently used at the site, active evaporation, using mechanized spray machines which enhance evaporation are routinely used throughout the mining industry for this purpose. In addition, evapotranspiration cells, wetlands and other means are available for discharge and are generally more acceptable and reliable than LAD systems.

Also according to the CAP (p. xvi) in 2001, the total mass of dissolved uranium in the alluvial plume was estimated to be 80,000 kilograms (kg) and in 2009, the total mass was estimated to be 30,000 kg. The CAP goes on to state that "furthermore, the results of this analysis directly address EPA and NMED concerns by conclusively demonstrating that the decrease in dissolved uranium concentrations observed in the plume is due to mass removal, not dilution from injected water. HMC conducted a mass removal analysis of dissolved uranium to demonstrate the effectiveness of the plume control program.

The results HMC presents are anything but conclusive. The "mass removal analysis" conducted by HMC is an unorthodox approach that is limited to consideration of the plume as defined by the model. It does not account for loss to groundwater outside of the plume and most importantly, does not account for the fate and transport of the total mass of 50,000kg dissolved

uranium that mysteriously disappears from the plume in the mass removal analysis. A more orthodox approach would have been to conduct a standard site wide mass balance for all sources of contamination, existing contamination in groundwater, pumping and water treatment operations, LAD and evaporation operations, and any operations which might actually remove uranium from the site other than by discharges to the LAD system or losses to groundwater.

NRC Response
On the issue of land application, the NMED discharge permit, DP-200, for the HMC site was renewed on September 25, 2014. The renewed permit eliminates approval for land discharge (land application disposal). The decommissioning of the land application area will need to be addressed in the HMC Decommissioning and Reclamation Plan for the site.

On the issue of HMC's mass removal analysis, the NRC staff agrees in part and disagrees in part with the comment. The analysis did not evaluate changes in uranium concentrations beyond the modeled boundary, which could account for a small portion of the total mass removed. However, the modeled boundary remains constant throughout the analysis while the uranium plume boundary retreats from the modeled boundary. The loss of uranium outside of the plume would be accounted for in the area between the plume boundary and the modeled boundary. Additionally, loss of uranium outside the modeled boundary would be limited due to the unsaturated, no flow boundaries that exist for much of the modeled boundary in the alluvial aquifer. The 50,000 kg of dissolved uranium cannot be accounted for by fate and transport analysis because it was collected from the uranium plume in the alluvial aquifer by the extraction wells and treated. However, the NRC staff does have concerns with the capabilities of the mass removal analysis to demonstrate effectiveness of the plume control program. See NRC RAI number 3 for further information.

MASE Comment 13
According to the CAP (p. xvi) HMC has completed and is currently conducting numerous evaluations to determine if the performance and/or operation of the five existing components of the CAP has been effective or can be further optimized. While continued evaluation and operation of the existing CAP is one option, the project should be evaluated in terms of application of reclamation and closure practices contemporaneous with current development of the science and engineering underlying those practices. Over the past 30 years, essentially after the current remedial approach was developed and implemented in large part (the plume control program at the site began in 1977 (CAD p. 2-8) much has been learned about the practice of mined land reclamation and methods to address potential sources of seepage related to geochemical leaching of residual toxic materials contained in mining and mineral processing sources. The recognized approach today is to utilize source controls which minimize or prevent infiltration or collect all discharges at the source and to only utilize methods which rely upon continuous water management and treatment as a last resort. But perhaps the most important development has been the recognition that a full tool-box of reclamation and closure measures needs to be considered, in the context of site specifics including current rather than historic adjacent land use.

A contemporaneous project evaluation would include the following:

- An updated source characterization providing detailed information on the tailings piles and their present geochemical composition including whole rock, static and kinetic testing as warranted.

- An updated hydrological characterization providing detailed information on the existing water (and elemental) balance for the site as well as evaluating likely post-present scenario hydrologic conditions under a variety of final remediation scenarios.
- A detailed fate and transport analysis showing the predicted discharge and groundwater quality as a result of various final remediation scenarios.
- Scenarios should be developed based on a consideration of all viable technological alternatives and a clearly understood set of remedial action objectives based on current ARARs.
- At a minimum the project alternatives considered should include: 1) an option for immediate cessation of tailings flushing and installation of a final reclamation source control cap on the tailings, 2) removal of the tailings to a repository (local or regional).

NRC Response
The NRC disagrees with the comment. The NRC does not prescribe how HMC must remediate its site; therefore, the NRC cannot require HMC to undertake the various studies or require HMC to pursue the various scenarios and alternatives the commenter recommended. Rather, the NRC sets regulatory standards that HMC must meet to have its license terminated. HMC is responsible for demonstrating that the regulatory requirements have been met such that the license can be terminated under the regulations in 10 CFR Part 40, Appendix A.

MASE Comment 14
In 1983, the site was placed on the NPL. At that time, the EPA did not require additional response actions to remediate the groundwater because HMC was already implementing a state- approved plan. A Record of Decision (ROD) for OU3 was signed by the EPA on September 27, 1989, with the final selected remedial action being that no further action was required. However, the decision presented in the ROD did not constitute a finding by the EPA that adequate protection had been achieved within the neighboring subdivisions. Based on sampling of the soils and air in the neighboring subdivisions, the EPA continues to review outdoor monitoring and particulate data collected at the site boundary. Under CERCLA, EPA may reopen the administrative record to include new information. The EPA has been collecting air and soil sampling data in support of the development of a Human Health Risk Assessment, which includes both indoor and outdoor radon samples. A final Human Health Risk Assessment is expected to be issued by the EPA in the spring of 2012 (EPA 2011a). Therefore, determination of the protectiveness of the OU3 remedy will be deferred until the risk assessment report is completed.

The reviewer finds it remarkable that at this site, after almost 30 years of being listed on the NPL, there has yet to be a determination of whether the remedial actions are protective, and in fact has not yet conducted adequate site characterization/remedial investigation work to allow community members to have any confidence in their own health and welfare with respect to potential risks from this site. This is not to discount the work that has been done, but to point out that the health risks present at a site such as this are very real and significant and warrant a much higher level of concern that has been shown to date by both HMC and the government agencies involved. Inaction has potentially allowed the community to unnecessarily be exposed for more almost 30 years beyond when it was first determined to be a potential threat.

NRC Response
The NRC takes its responsibility for ensuring the protection of the public health and safety regarding the civilian use of nuclear materials very seriously. While the remedial actions being

conducted on NRC licensed material, and under the NRC regulations, are ongoing, NRC has maintained oversight of HMC's measurement and calculation of impacts on public health and safety and has determined that NRC requirements have been met. A determination as to HMC actions being adequate to terminate their NRC license will be made at the conclusion of reclamation and decommissioning, and will be done through the NRC licensing process.

MASE Comment 15
Based on my experience at the Anaconda Smelter Superfund site and other sites, these early NPL mining sites have demonstrated a propensity to have allowed inadequate and in some cases erroneous remedial approaches due to the lack of overall as well as agency specific experience in both the art and science of mined land reclamation and remediation of associated impacts such as to groundwater. In addition, most of those sites have not established the necessary institutional controls to ensure present or future protectiveness of either the remedial action in the future, or individual protectiveness of those community members living in close proximity to the site. This requires a substantive institutional capacity at the county or state level to provide both development controls (e.g. well drilling restrictions) and community health programs (e.g. medical monitoring) as well as an ability to enforce and fund such programs. Without a competent remedial plan in place it is not possible to develop an institutional controls program.

One of the main requirements under Superfund is to establish an effective ICs program at Superfund sites, and in the reviewer's opinion this is even more important at hardrock mining sites such as Grants where the risk of contaminant migration and exposure is relatively high and likely to be long-term.

Deed restrictions, without compensation, are likely unenforceable and provoke the likelihood of tort (takings) actions from property owners who are involuntarily subjected to them.

NRC Response
HMC is required to remediate the site to meet NRC requirements for termination of the license and then transfer the site to State or federal ownership for long-term care. Institutional controls that are required by the NRC outside of the State or Federally owned portion of the site are only necessary when conditions do not ensure the protection of public health and safety. The State or Federal long-term care provider is required by the requirements found in 10 CFR 40.28 to maintain institutional control of the transferred site and any additional institutional controls beyond the transferred site boundary if necessary.

MASE Comment 16
The San Andres/Glorietta Aquifer directly underlies (subcrops) the alluvial aquifer approximately 2.5 miles southwest of the Homestake Mining Company's (Homestake) tailings pile. In the subcrop area, groundwater from the alluvial aquifer flows into the San Andres/Glorietta Aquifer. Thus, contaminants in the alluvial aquifer may enter the San Andres/Glorietta Aquifer.

Samples collected in 1998 and 2010 show that contaminants emanating from the tailings pile have migrated through the alluvial aquifer to less than a half mile from the San Andres/Glorietta Aquifer subcrop. Contaminants may have reached the subcrop, but this cannot be determined because no alluvial wells have been installed above the subcrop. Only one San Andres/Glorietta well (0911) appears to have been installed in the subcrop area.

Conclusion: Homestake does not appear to have investigated the possibility that contaminants from the alluvial aquifer may have entered the San Andres/Glorietta Aquifer via the subcrop. Homestake should monitor the subcrop area of the San Andres/Glorietta Aquifer to determine whether it has been affected by contaminants emanating from the tailings pile.

NRC Response
The NRC disagrees with the comment. HMC monitors water quality conditions within the alluvial aquifer down gradient of monitoring wells currently out of compliance with the site specific groundwater protection standards. These down gradient wells extend from the maximum extent of the impacted area to the San Andres/Glorietta aquifer subcrop. The maximum extent of each COC is identified in the Annual Monitoring Reports. The 2013 Annual Monitoring Report (ML14093A303, ML14093A304, ML14093A305, ML14093A306, ML14093A308, ML14093A310) demonstrates that concentrations of all constituents in the alluvial aquifer near the San Andres/Glorietta aquifer subcrop continue to remain below the site specific groundwater protection standards.

MASE Comment 17
In 1995 Homestake began injecting water into the large tailings pile. The purpose is to flush uranium and other contaminants from the pile. In 2010 approximately 190 injection wells pumped a combined 193 gpm (approximately 300 ac-ft/yr) into the pile. Most of the injected water is captured in either; 1) extraction wells installed in the pile, 2) extraction wells in the alluvium beneath the pile, or 3) toe drains installed along the perimeter of the pile. A portion of injected water remains, at least temporarily, in the pile.

Homestake plans to stop injecting water into the pile after 2014 because it predicts that by then, the vast majority of uranium will have been flushed from the pile. However, this prediction is questionable for several reasons.

First, the permeability the slime fraction of the tailings is probably much lower than that of the sand fraction. As a result, the injected water will tend to flow around rather than through the slimes. Thus, the slimes will, at best, be incompletely flushed and uranium in the pore water within the slimes will continue to be released after flushing ceases.

Second, the solid uranium in the tailings is likely to be mobilized as oxygen-rich precipitation percolates through the pile.

Third, Homestake used the model VADOSE/W to predict seepage rates through the large tailings pile. However, we cannot have confidence in the predictions produced by this model (see comment 4 below).

Finally, Homestake's predictions of uranium concentrations in the pile have not matched-up well with measured concentrations. This mismatch is illustrated in figure 1.

Conclusion: Although the injection of water has increased the rate at which uranium has been flushed from the pile, a significant reservoir of uranium will probably remain in the pile after injection is ceased. This uranium may continue to leach from the pile for many years or decades. Homestake should not rely on flushing to reduce this leaching to acceptable levels.

NRC Response
The NRC agrees in part and disagrees in part with the comment. Water is injected directly into the tailings slimes to force out the pore water in the slimes. Sample results have shown a reduction of uranium concentration in the pore water of the slimes over time. Continued seepage from the tailings impoundment is anticipated after the flushing program is complete. The continued seepage will be collected in the toe drains, tailings extraction wells, and from alluvial extraction wells until seepage conditions ensure compliance with the NRC groundwater protection standards.

The flushing program was not used to reduce the amount of uranium currently in the solid phase. The uranium in the solid phase has gone through significant processing in order to extract the uranium capable of being recovered. Therefore, it is anticipated that once the flushing program ends, there will not be significant leaching from the large tailing pile.

The NRC is requesting additional information from HMC regarding the use of updated data and model validation to ensure that the flushing program will produce tailings conditions that will not adversely impact the groundwater. See NRC RAI number 15 for additional information.

The NRC is also requesting additional information from HMC to ensure that the final uranium metric will be properly measured and that all constituents of concern will be reduced to concentrations that will not adversely impact the groundwater. See NRC RAI number 4 and 8 for additional information.

MASE Comment 18
Homestake used the coupled models MODFLOW and MT3DMS to simulate groundwater flow and contaminant transport. The models were calibrated for the years 2000 through 2004. In order to have confidence in model results, calibration is a necessary, but not a sufficient step. The models must also be verified. Homestake does not appear to have verified the models.

Verification would involve performing model simulations for years not in the calibration period (e.g., 2005 - 2010) and comparing the model results with historical data (e.g., water levels, uranium concentrations). If the model is able to reproduce the historical data, it is verified and we can have confidence in its ability to predict future conditions. Conversely, if the model is unable to reproduce the historical data, it is unverified and we cannot have confidence in its ability to predict future conditions.

Conclusion: Homestake should attempt to verify the groundwater flow and contaminant transport models. Until the models are verified, we cannot have confidence in their predictions of future conditions.

MASE Comment 19
Homestake used the partially saturated flow model VADOSE/W to predict the rate of seepage from the large tailings pile. Seepage rates were predicted through the year 2050. VADOSE/W was calibrated for the years 2000 through 2004. However, Homestake does not appear to have verified VADOSE/W.

Homestake should attempt to verify the seepage rate model. Until the model is verified, we cannot have confidence in its predictions of seepage rates.

NRC Response to MASE comments 18 and 19
The NRC agrees with the comments. The NRC is requesting that HMC validate the reformulated mixing model results for the years following the calibration period, provide updated model flushing scenarios that reflect actual operating conditions and performance data, update the original mixing model, the reformulated mixing model, VADOSE/W, and the groundwater flow and transport models to reflect the updated model flushing scenarios, and perform validation of the predicted results after the calibration period. See NRC RAI numbers 10 and 15 for additional information.

MASE Comment 20
Homestake is treating contaminated water from the alluvial aquifer by using it to irrigate fields near the former uranium mill. Contaminants (primarily selenium and uranium) in the water are partially immobilized in the soil. The contaminated water is blended with uncontaminated water to keep contaminant concentrations below the land treatment standards established by the Nuclear Regulatory Commission (NRC) and the New Mexico Environmental Department (NMED).

Four fields, ranging from 24 acres to 150 acres are irrigated. Alfalfa, triticale, sorghum/sudan grass, canola, camelina, and winter wheat have been grown on the irrigated fields. The amount of water applied to the fields from 2000 through 2010 ranged from 201 acre-feet to 1054 acre-feet. The average amount applied each year was 820 acre-feet (approximately 270 million gallons per year, or 500 gpm).

Modeling performed by Homestake predicts that the uranium in the irrigation water will never reach the groundwater beneath the irrigated fields. The model used to make this prediction appears to be LEACHP. However, the CAP contains no description of LEACHP or any indication that the model was calibrated or verified. Given this lack of information, it is not possible to have any confidence in the predictions produced by this model.

There is, however, evidence that contaminated water has moved a significant distance through the material beneath the irrigated fields. Samples collected from suction lysimeters show that contaminants have reached a depth of at least 15 feet in section 28, and a depth of at least 16 feet in section 33.

Homestake is monitoring wells near the irrigated fields to determine whether any contaminants have reached the underlying groundwater. However, many of the wells are not well-suited to this task. First, according to Homestake, contaminant concentrations in at least some of these wells may be affected by the groundwater restoration program. Second, some of the monitor wells are also used as irrigation wells. Thus, the water extracted from them is a mixture of water drawn from all directions around the well. Finally, the contaminant plume emanating from the large tailings pile passes directly beneath the irrigated area in section 28. Contaminants in the plume could mask contaminants originating in the irrigation water.

Still, two monitor wells display increases in contaminants that could be caused by the irrigation. These wells are 844 (increases in uranium and selenium) and 846 (increases in sulfate, chloride, total dissolved solids, and selenium).

Conclusion: Homestake's contention that contaminants from the irrigated fields will not reach the underlying groundwater is not supported by the evidence. Lysimeter samples show that

selenium and uranium from the irrigation water have already reached a depth of at least 15 feet. Two monitor wells contain elevated concentrations of contaminants that may have originated in the irrigation water. In addition, Homestake has not provided the information necessary to show that its LEACHP modeling is reliable.

NRC Response
NRC agrees that any areas that have been impacted by site operations, such as the land application areas, will need to be decommissioned. However, the HMC plan for this would be in the 2013 DRP. If activities in the land application areas are found to have impacted groundwater, these areas would also need to be added to the CAP. HMC would be required to remediate impacted groundwater to the standards approved in their NRC license, minimize residual radioactivity at the site in accordance with 10 CFR Part 40, Appendix A, Criterion 6, and survey potentially impacted areas of the site in accordance with 10 CFR 20.1501.

MASE Comment 21
The Nuclear Regulatory Commission (NRC), U.S. Environmental Protection Agency, and the New Mexico Environment Department have agreed on site standards (groundwater contaminant concentrations) that must be achieved by Homestake. These standards must be met at five point-of-compliance (POC) wells. Three of the POC wells are completed in the alluvial aquifer and two are completed in the Upper Chinle Aquifer. All of the POC wells are within the NRC license boundary.

However, the groundwater contaminants emanating from the Homestake facility extend thousands of feet beyond the NRC license boundary. It is not clear what groundwater cleanup standards apply beyond the license boundary.

Conclusion: Cleanup standards should be established for all groundwater that has been contaminated by the Homestake facility.

NRC Response
The NRC agrees with the comment. The NRC approved groundwater protection standards have been established for each aquifer. The groundwater protection standards apply on-site and off-site. The purpose of the groundwater restoration program is to restore all on-site and off-site water quality to the site standards established for each aquifer. Refer to the NRC response to NMED Comment 8 for additional information on POC wells.

MASE Comment 22
Homestake does not appear to have investigated surface water quality in the vicinity of its facility. Windblown contaminants from the tailings piles could be deposited in stream channels and subsequently entrained up by streamflows. This could affect both surface water quality and the quality of groundwater that receives recharge from an affected stream.

Conclusion: Homestake should determine whether windblown tailings have been deposited in stream channels near its facility. If they have, Homestake should determine whether they have affected water quality.

NRC Response
The NRC agrees with the comment. Off-site deposition of tailings material is addressed in reclamation plans as defined in 10 CFR Part 40, Appendix A. In that regard, HMC has

investigated windblown tailings near the HMC site. Windblown tailings evaluation and removal was conducted in accordance with the NRC currently approved 1993 Reclamation Plan. The 1993 Reclamation Plan is publicly available in ADAMS at ML091490367 and ML091490469. HMC's completion of surface reclamation and windblown tailings removal is documented in the Completion Report – Reclamation of Off-Pile Areas (ADAMS No. ML092990193).

MASE Comment 23
RAI 2: The collection for re-injection program should have its own section to describe well locations and water quality for each extraction well. The water quality of the reinjection area should be discussed including the effectiveness the program will have on the injection area.

Homestake states that this RAI is addressed in Section 5.3.2 of the CAP.

This section of the CAP contains no information regarding the water quality for each extraction well. Nor does it discuss the water quality of the reinjection area.

NRC Response
NRC agrees and has requested HMC to define the terms "unimpacted" and "slightly impacted" regarding the re-injection program. See NRC RAI number 1 for more information.

MASE Comment 24
RAI 4: Section 2.3, paragraph 1, page 9: The statement that "natural water quality was generally poor" is not supported with actual data.

Provide water quality data from the Atomic Energy Commission's required monitoring program for groundwater protection that started in the 1950s (mentioned in paragraph 2 of this section). Also, include available water quality results from domestic wells that were installed in the 1960s and 1970s to justify your statement.
Homestake states that this RAI is addressed in Section 4.1 of the CAP.

This section of the CAP contains no information regarding the Atomic Energy Commission's required monitoring program for groundwater protection that started in the 1950s. Nor does it include available water quality results from domestic wells that were installed in the 1960s and 1970s.

NRC Response
The NRC disagrees with the comment. Past groundwater quality down gradient from the site is not relevant. The NRC has established groundwater remediation standards for the site, as reflected in License Condition 35B, based on more contemporaneous up gradient water quality data. No further response from HMC is required on this point. See NRC response to MASE comment 5 for more information.

MASE Comment 25
RAI 13: Section 2.4.3, paragraph 1, page 17: The future impacts to the Middle Chinle aquifer need to be addressed in this section.

Homestake states that this RAI is addressed in Section 4.2 and Appendix E of the CAP.

These parts of the CAP contains no information regarding … *future impacts to the Middle*

Chinle aquifer … .

NRC Response
The NRC disagrees with the comment. Well locations and groundwater elevations for the Middle Chinle aquifer are shown on Figures 3.2.3.2-3 and 3.2.3.2-4. The NRC's conclusion is that HMC's response to RAI 13 on the 2006 revised CAP is adequate based on the information presented in Section 3.2.3.2 of the 2012 CAP.

MASE Comment 26
RAI 15: Section 2.4.4, paragraph 1, page 18: HMC needs to support the statement "natural water quality of the major constituents in the shaley Lower Chinle aquifer is poor".

Homestake states that this RAI is addressed in Section 3.2.3.3 of the CAP.

This section of the CAP contains only qualitative information to support the statement "natural water quality of the major constituents in the shaley Lower Chinle aquifer is poor". The statement is not supported by chemical analyses of water from the Lower Chinle aquifer.

NRC Response
The NRC disagrees with the comment. The NRC's conclusion is that the HMC's response to RAI 15 on the 2006 revised CAP is adequate based on the information presented in Section 3.2.3.3 of the 2012 CAP.

MASE Comment 27
RAI 20: Section 2.5, paragraph 2, pages 20 and 21: HMC should provide data to support its conclusion "… that baseline water quality in the alluvial aquifer may change in the future. Discharge of groundwater from past mine dewatering in Ambrosia lake area (north and upgradient of the site) to San Mateo alluvial aquifer had elevated levels of the same constituents as are elevated in the Grants tailings impoundments. Travel time calculations and preliminary information from far upgradient wells indicates selenium, uranium and other constituents from mine discharges to the alluvial aquifer could reach the Grants site in the next 20 years." HMC should include a comparison of current discharges from the tailing piles into the alluvial aquifer and the up-gradient groundwater quality of the alluvial aquifer.

Further, HMC should discuss how former up-gradient mine discharges to the alluvial aquifer will impact efforts to remediate the effects of the tailing piles on the down- gradient groundwater in the alluvial aquifer.

Homestake states that this RAI is addressed in Section 4.1 and Appendix E of the CAP. Neither part of the CAP contains data or analyses to support the statements that 1) baseline water quality in the Alluvial aquifer may change in the future. 2) Discharge of groundwater from past mine dewatering in Ambrosia lake area (north and upgradient of the site) to San Mateo Alluvial aquifer had elevated levels of the same constituents as are elevated in the Grants tailings impoundments. Nor did they contain Travel time calculations and preliminary information from far upgradient wells indicates selenium, uranium and other constituents from mine discharges to the Alluvial aquifer could reach the Grants site in the next 20 years.

Homestake states: The natural water quality of the aquifer is poor due to the low permeability of the shale and the associated long residence time for groundwater. (HMC, 2012a, page 3-13).

These sections do not discuss how former up-gradient mine discharges to the alluvial aquifer will impact efforts to remediate the effects of the tailing piles on the down-gradient groundwater in the alluvial aquifer.

NRC Response
The NRC disagrees with the comment. The statement about the natural water quality of the aquifer on page 3-13 of the 2012 updated CAP is discussing conditions that exist in the Lower Chinle aquifer. NRC RAI 20 on the 2006 revised CAP is explicitly about the alluvial aquifer. Far up gradient monitoring wells P and Q are currently being monitored to evaluate potential changes to the background conditions due to known up gradient water quality conditions. The NRC's conclusion is that HMC's response to this RAI is adequate based on the information presented in Section 4 and Appendix E of the 2012 CAP.

MASE Comment 28
RAI 23: Sections 3.1 and 3.2, page 22, should be revised to include a discussion of the objectives of the tailings injection/extraction program. The discussion should include an explanation of how the final injection/extraction dates were determined. Provide a table with past injection/extraction rates compared to model predicted rates. Describe why past rates have been sufficient or insufficient to meet remediation goals and timelines. Explain how the seepage into the alluvial aquifer is being contained and remediated since more water is being injected than extracted.

Homestake states that this RAI is addressed in Section 5.3.1 of the CAP.

This section of the CAP does not include an explanation of how the final injection/extraction dates were determined. Nor does it describe why past rates have been sufficient or insufficient to meet remediation goals and timelines.

NRC Response
The NRC disagrees with the comment. Further discussion on the tailings injection/extraction program is provided in Section 2.2.1 and Attachment A of Appendix G of the 2012 updated CAP. Past injection and extraction rates are provided in Table F-3 in Appendix F. Table I-3 provides both historic and projected tailings injection and extraction rates over the 1995 to 2016 timeframe. The NRC's conclusion is that HMC's response to this RAI is adequate based on this information presented in the 2012 CAP.

MASE Comment 29
RAI 24: HMC needs a more thorough discussion of the tailing toe drain and the french-drain. How do they differ? Are they interconnected?

Homestake gives no information on where this RAI is addressed.

NRC Response
The NRC agrees with the comment. While the 2012 updated CAP removed the term "French drain NRC's conclusion is that HMC's response to RAI 24 on the 2006 revised CAP is inadequate and the NRC has requested additional information concerning the difference between the French drain system and the tailing toe drain system. See the NRC's response to RAI 24 on the 2006 revised CAP.

MASE Comment 30
RAI 26: Additional clarification is required on the effectiveness of extraction well P2 that pumps approximately 40 gpm of "clean groundwater" up-gradient from the Large Tailings Pile.

Homestake states that this RAI is addressed in Section 5.3.2 of the CAP.

This section of the CAP does not discuss the effectiveness of extraction well P2 that pumps approximately 40 gpm of "clean groundwater" up-gradient from the Large Tailings Pile.

NRC Response
The NRC agrees in part and disagrees in part with the comment. Section 5.3.2 states that the up gradient alluvial collection system reduces the amount of water flowing under the LTP. The NRC staff assumes that the reduced flow rate under the LTP increases the effectiveness of the extraction program near the LTP. However, the NRC has requested further clarification from HMC regarding the up gradient extraction well. See the NRC's response to RAI 26 on the 2006 revised CAP and NRC RAI number 9 on the 2012 updated CAP.

MASE Comment 31
RAI 29: Section 3.6, page 24 discusses the Upper Chinle extraction wells. However, the description does not provide enough detail for the staff to determine exactly where the 5 gpm is being injected and what is the concentration level of this water.

Section 3.6, paragraph 1, page 24 should describe exactly where the 5 gpm is being injected and what the contaminate concentration level of this water is.

Homestake states that this RAI is addressed in Figure 5.2-1 of the CAP. This appears to be a typo. Pumping from the Upper Chinle is illustrated in Figure 5.2.2.

However, neither figure contains … enough detail for the staff to determine exactly where the 5 gpm is being injected and what is the concentration level of this water.

NRC Response
The NRC disagrees with the comment. Figure 5.2-1 of the 2012 CAP provides a general flow diagram of the site restoration strategies and Figure 5.2-2 provides the level of detail necessary to determine operational flow rates for 2010. HMC annually updates figure 5.2-2 in the annual groundwater report. The NRC's conclusion is that HMC's response to RAI 29 on the 2006 revised CAP is adequate based on the information presented in these figures.

MASE Comment 32
RAI 30: Sections 3.5, 3.7 and 3.9, pages 23-24, should provide the minimum injection rate needed in each well to create an effective hydraulic barrier and how these rates are achieved, as well as how these rates were determined to be effective.

Homestake states that this RAI is addressed in Section 5.3.2 of the CAP.

This section of the CAP refers to appendix M which lists pumping rates for wells at the Homestake facility. However, it does not 1) provide the minimum injection rate needed in each well to create an effective hydraulic barrier, or 2) explain how these rates are achieved, or 3)

explain how these rates were determined to be effective.

NRC Response
The NRC agrees in part and disagrees in part with the comment. Section 5.3.2 of the 2012 updated CAP discusses injection flow rates for 2010 rather than the estimated minimum or anticipated future injection rates determined to be necessary for maintaining an effective hydraulic barrier. Section 5.3.2 states that 1,230 gpm was used for plume control in 2010 for the alluvial aquifer. Figure 6.1-2 provides historic and future estimates for plume control in the alluvial aquifer. The reported 2010 injection rate of 1,230 gpm is inconsistent with the approximately 550 gpm flow rate shown in Figure 6.1-2 for 2010. The NRC will request that HMC explain how the projected injection rates for the alluvial aquifer provided in Figure 6.1-2 were determined to be effective. See the NRC's response to RAI 30 on the 2006 revised CAP and NRC RAI numbers 5, 7, and 16 on the 2012 updated CAP.

MASE Comment 33
RAI 31: Please describe which San Andres wells are being pumped to supply the injection water for the Upper Chinle aquifer.

Homestake states that this RAI is addressed in Section 5.3.2 and Appendix F of the CAP.

Neither Section 5.3.2 or Appendix F identify any San Andres wells being pumped to supply the injection water for the Upper Chinle aquifer.

NRC Response
The NRC disagrees with the comment. Figure 3.2.4-2 and Section 6.3.2 of the 2012 CAP identify the San Andres wells being used for injection water. Figure 5.2-2 provides a diagram depicting the major operational flows for each of the hydrogeologic units. The NRC's conclusion is that HMC's response to this RAI is adequate based on this information provided in the 2012 CAP.

MASE Comment 34
RAI 32: Please describe which San Andres wells are being pumped to supply the injection water for the Middle Chinle aquifer.

Homestake states that this RAI is addressed in Section 5.3.2 and Appendix F of the CAP.

Neither Section 5.3.2 or Appendix F identify any San Andres wells being pumped to supply the injection water for the Middle Chinle aquifer.

NRC Response
The NRC disagrees with the comment. Figure 3.2.4-2 and Section 6.3.2 of the 2012 updated CAP identify which San Andres wells are being used for injection water. Figure 5.2-2 provides a diagram depicting the major operational flows for each of the hydrogeologic units. The NRC's conclusion is that HMC's response to this RAI is adequate based on this information provided in the 2012 CAP.

MASE Comment 35
RAI 33: Section 3.12, paragraph 1, page 25: A discussion on past and future treatment rates for the RO plant and constituent levels for pre- and post-treated water needs to be included in

this section. Provide a discussion on the RO systems optimum treatment rate for successful remediation. A comparison of actual rates to projected rates should be provided and discussed to determine if HMC is staying on track with the remediation timeline. Please explain why the RO treatment plant is running at 43% efficiency and include options to increase the capacity.

Homestake states that this RAI is addressed in Sections 5.3.3 and 5.5.3, and in Appendices F and I of the CAP.

Section 5.5.3 indicates that some of the issues raised in this RAI will be addressed in the future. However, neither of the sections or appendices explain why the RO treatment plant is running at 43% efficiency.

NRC Response
The NRC agrees in part and disagrees in part with the comment. The 600 gpm maximum operating rate of the RO plant is not feasible when averaged over time. General maintenance of the RO plant and periodic backwashing of the filters to remove accumulated solids reduces the RO plant efficiency.

An expanded RO water treatment system is presently under construction. The expanded facility will augment the 600 gpm RO Water Treatment System (WTS), if required, and will provide a total RO WTS treatment capacity of approximately 900 gpm on a continuous basis. According to the 2013 DRP, the expanded RO WTS will be operated from 2016 through 2020 (see page 9-19 of the DRP). While NRC believes that RAI 33 on the 2006 revised CAP was addressed, NRC will request that HMC provide further detail on the RO plant's efficiency to demonstrate how its output can support the remediation schedule in the CAP. See NRC RAI number 2.

MASE Comment 36
RAI 36: Section 3.14, page 25, states that clean groundwater is pumped from extraction wells screened in the San Andres formation (Figure 34) and in the un-impacted areas of the alluvial aquifer and injected into the Alluvial, upper, and middle aquifers. However, the discussion does not identify where the extraction wells are located in the alluvial aquifer, and what the contaminant concentrations are to justify the un-impacted area designation.

Please identify where the extraction wells are located in the alluvial aquifer, and what the contaminant concentrations are to justify the un-impacted area designation.

Homestake states that this RAI is addressed in Section 5.3.2 and Appendix F of the CAP.

Neither Section 5.3.2 or Appendix F identify what the contaminant concentrations are to justify the un-impacted area designation.

NRC Response
The NRC agrees with the comment. Figure 3.2.2-1 of the 2012 CAP identifies the alluvial aquifer collection well locations. The 2012 revised CAP also changed the text to include "slightly impacted water" in the designation of the water pumped from the alluvium. The NRC will request HMC to define the terms "unimpacted" and "slightly impacted." See NRC response to BVDA Comment 9 and NRC RAI number 1.

MASE Comment 37
RAI 45: HMC should provide the following items for the groundwater calibration: (1) a comparison of measured versus simulated groundwater levels or U concentrations and other chemicals of concern concentrations at wells or model nodes; (2) statistical analysis like the root-mean square approach; (3) information on the acceptable calibration criteria; and (4) more details on the calibration approach (trial and error changes, apparently a manual approach was used instead of a numerical approach).

With regard to transport modeling, only U concentrations are compared in the discussion. HMC should provide comparisons of observed versus simulated concentrations of the other chemicals of concern at the site.

Homestake states that this RAI is addressed in section 5.1 and appendix G of the CAP. Neither Section 5.1 or Appendix G contains 1) statistical analysis like the root-mean square approach, 2) information on the acceptable calibration criteria or, 3) comparisons of observed versus simulated concentrations of the other chemicals of concern at the site.

NRC Response
The NRC agrees in part and disagrees in part with the comment. Figures G-6 through G-17 of Appendix G to the 2012 CAP provides a sufficient level of information for the calibrated conditions. However, pre-calibration figures during 2004 and information on the acceptable parameter variance for model calibration should also be provided. The NRC will request that HMC provide further information to resolve concerns about model predictions and capabilities. See NRC RAI numbers 8, 10 and 15 on the 2012 updated CAP and the NRC response to HMC's response to NRC RAI 45 on the 2006 revised CAP.

Uranium Watch

Uranium Watch Comment 1 - This comment is summarized in Regulatory Process Issue1.

NRC Response
Activities associated with the CAP do not mandate the preparation of an EIS. Rather, in accordance with NRC NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," the staff must prepare an EA to provide sufficient evidence and analysis to either support a FONSI or conclude that preparation of an EIS is necessary. See NRC Regulatory Process Issue 1 – Need for an Environmental Impact Statement (EIS) at the beginning of this document.

Uranium Watch Comment 2
The 1993 Reclamation Plan and EA did not address the reclamation of the sites where Homestake conducted uranium recovery operations at uranium mines. The uranium recovery operations using ion exchange (IX) columns were incorporated into the Homestake Mill license. IX effluents were discharged at the mine sites and some effluents were re-injected into uranium mines. These uranium recovery operations contaminated soils and water courses, with no evidence of a remedial action plan. The Revised and Updated CAP and the NRC's NEPA Review must address the contamination of water from the operation of the IX columns, old-stope leaching, and other off-site uranium recovery operations (licensed or unlicensed) that provided feed to the Homestake Mill. This would include any old-stope leach or mine-water removal operations owned by other mine operators that were the source of effluents that were

processed through the IX columns or directly at the Mill.

NRC Response
This comment is out of scope. The IX Plant in McKinley County was removed from License SUA-1471 in Amendment 29. Removal of the IX plant from the license was based on a Decommissioning Report for the IX Plant dated October 23, 1997 (ML13051A400). Therefore, removal of the IX Plant does not need to be reconsidered in the CAP.

See also Regulatory Process Comment Summary 1 – Need for an Environmental Impact Statement (EIS).

Uranium Watch Comment 3
3.1 On October 4, 2012, the NRC issued License Amendment 45 to SUA-1471. The amendment revised the reclamation milestones in License Conditions (LCs) 36.A(3), 36.B(1) and 36.B(2), which had been improperly extended by the NRC on August 7, 2008, via License Amendment 41. Amendment 45 returned the reclamation milestone dates to those approved by the NRC on February 6, 2004 (Amendment 36). The milestones affected were for the placement of final radon barrier, placement of erosion protection, and completion of ground-water corrective actions to meet performance objectives specified in the ground-water corrective action plan. However, by returning these enforceable reclamation dates to those approved in 2004, the milestone for the completion of the ground-water corrective actions in LC 36.B(2) (ie., December 31, 2011) is now past. Therefore, the Licensee is now out of compliance with LC 36.B.(2). The NRC has not acknowledged this, nor explained what they intend to do regarding this non-compliance with an enforceable license condition.

3.2. Although the Licensee proposed new CAP milestones in the 2012 Updated CAP, the NRC has not noticed those milestones for public comment and opportunity for the public to request a hearing. Instead, the NRC told the Licensee, “The NRC staff expects HMC to request revisions to these license conditions in the near future with the submittal of the updated Reclamation Plan.” And, “It should be noted that reclamation dates proposed in the updated Reclamation Plan should be consistent with the dates provided in the updated groundwater Corrective Action Plan (CAP) currently under review by NRC.” Therefore, the NRC has no intention of issuing a *Federal Register* notice to provide an opportunity for public comment and an opportunity to request a hearing on the reclamation milestones extensions requested in the 2012 Updated CAP. A public notice and opportunity to request an adjudicatory hearing is a requirement for reclamation milestone extension requests. It seems that the NRC does not want the public to have an opportunity at this time to consider all aspects of the Updated CAP; that is, the reclamation milestones included in the Updated CAP. That, I believe, is contrary to the intent of NRC and Environmental Protection Agency (EPA) regulation and the 1991 Memorandum of Understanding between the EPA, NRC, and NRC Agreement States.

3.3 The original projected date for the completion of the ground-water corrective actions was May 1, 2010. This was extended in 2004 to December 31, 2011(License Amendment 36). The milestone was extended by the NRC to December 31, 2017, pursuant to the proposed date in the 2006 Revised CAP. In the 2012 Updated CAP, HMC proposed to extend the milestone to 2020, 10 years beyond the original estimated date for completion of ground-water corrective action. Clearly, HMC and the NRC have not accurately assessed the length of time required for the groundwater clean-up process. HMC and the NRC must fully explain the reasons for this extensive delay and the reasons why they have not been able to accurately determine the time

it will take to meet the required cleanup standards.

NRC Response
The NRC agrees in part and disagrees in part with the comment. As noted in the comment, on September 27, 2012, the NRC issued License Amendment 45 to HMC material License SUA-1471 (ML12250A455). License Amendment 45 was issued to correct administrative errors made to the milestone completion dates in License Condition 36, paragraphs A and B, when License Amendment 41(ML080920584) was processed.

On November 26, 2012, HMC responded to the milestone dates provided in License Amendment 45 by providing a status summary of the groundwater remediation and final reclamation and decommissioning activities at the site (ML13022A485). HMC acknowledged that groundwater corrective actions were not completed as projected by December 31, 2011, as required by the license condition. HMC also informed the NRC that HMC would not complete placement of the final radon barrier on the Large Impoundment by December 31, 2012, as required by the license condition (since the final radon barrier is not scheduled to be placed until after the groundwater reclamation is complete).

The milestone dates stated in License Condition 36 are based on the remedial actions described in the CAP.

HMC was unable to meet the project milestone dates identified in License Conditions 36.A(3) and 36.B(2) of License SUA-1471 because groundwater reclamation activities have not been completed as projected by December 31, 2011. However, HMC requested NRC approval to revise the reclamation activities and schedules with submittal of a revised CAP in December 2006, with revisions on March 15, 2012. As a result of the NRC's effort to address all concerns regarding the CAP raised by EPA, NMED and the public, the NRC review has taken longer than typical, and the NRC was not able to approve the 2012 updated CAP, including changes to the milestone dates in License Condition 36, before the milestone dates in License Condition 36.A(3) and License Condition36.B(2) passed.

Because the NRC was unable to process HMC's request to revise the milestone dates in License Condition 36.A(3) and License Condition 36.B(2) via approval of the CAP, the NRC has exercised its enforcement discretion and decided not to cite HMC for failure to meet the milestone dates. The enforcement decision is documented in a letter to HMC dated April 8, 2013 (ML13010A238).

The NRC did provide notice and an opportunity for hearing with respect to the the 2013 DRP on June 27, 2013 (78 FR 38736). All of the milestone dates identified in the CAP are replicated in the DRP, and the public was provided the opportunity to comment and request a hearing on the same milestone extensions as were requested in the CAP.

The plan for amending the license regarding compliance dates is to revise them to the dates in the 2013 DRP if and when it is approved. The new dates could be incorporated into the license by reference to the DRP or put into license conditions as they are now. The revised dates would be established under the same license amendment request as was submitted for approval of the DRP.

The difficulty with accurately assessing the length of time it takes the groundwater restoration process is due in part to the uncertainty inherent in the characterization and analysis of natural systems such as groundwater aquifers and the effectiveness of the systems used in the remediation. This can be remedied somewhat by further data collection and more refined analysis. NRC has three RAIs (RAIs 2, 4, and 5) that directly address additional information needs for the evaluation of the groundwater restoration schedule and several more RAIs that indirectly address it.

Uranium Watch Comment 4
The proposed EA, or the EIS that should be developed by the NRC, must include a full description of all groundwater corrective actions that have taken place since 1976, the effectiveness of those actions, and impacts of those actions on the environment. The NEPA review must provide information regarding whether those actions were within the scope of the existing CAP and within the scope of any applicable EA.

Uranium Watch Comment 5
The NRC NEPA review must look at all of the assumptions, explanations, justifications, and reasoning behind all of the groundwater corrective actions (the proposals, technical reviews, EAs, and related documentation) and determine whether there is currently any basis for the previous assumptions, explanations, justifications, and reasoning.

Uranium Watch Comment 6
The NRC must list all the NRC, EPA, and State of New Mexico regulations related to the CAP and show how the Licensee will comply with and demonstrate compliance with each specific regulatory provision.

NRC Response to Uranium Watch Comments 4, 5, and 6
The NRC's review of the 2012 CAP covers the past groundwater corrective actions, and the effectiveness of those actions. The scope of the NEPA review will be within the requirements of 10 CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and the Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (NUREG-1748). See also Regulatory Process Issue 1 – Need for an Environmental Impact Statement (EIS) at the beginning of this document.

Uranium Watch Comment 7
There has been ongoing concern regarding the potential for contamination from up-gradient sources, such as Ambrosia Lake and the Anaconda mine. This contamination and the contamination sources must be clearly characterized and delineated.

NRC Response
The NRC recognizes that contamination is coming onto the HMC site from up gradient sources. The groundwater protection standards established in License Condition 35B of SUA-1471 recognized that higher ambient (background) concentration levels coming onto the Homestake site were not related to onsite milling activities.

Uranium Watch Comment 8
The NEPA review of the Revised and Updated CAP must also evaluate the impacts related to the extensive delay of the completion of the placement of the final radon barrier caused by the ground-water remediation program. This must include a complete analysis of the Licensee's

compliance with the 10 C.F.R. §§ 20.1301 and 20.1302 for dose limits for individual members of the public. The Licensee and the NRC must show that compliance is based on proper measurement techniques, accurate data for radon and radioactive particulate emissions, and accurate and timely data for the radon and radioactive particulates that nearby members of the public are exposed to.

NRC Response
The scope of the NEPA review will be within the requirements of 10 CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and the Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (NUREG-1748). See Regulatory Process Issue 1 – Need for an Environmental Impact Statement (EIS) at the beginning of this document.

NRC regulations require HMC to meet three specific dose standards during its decommissioning operations. First, 10 CFR 20.1301(a)(1) requires HMC to meet an operational public radiation dose standard of 0.1 rem/yr (100 mrem/yr) Total Effective Dose Equivalent (TEDE). The TEDE is a product of combination of internal and external radiation dose measurements over a period of time. Second, HMC must comply with the air emissions limit of 10 mrem/yr TEDE established in 10 CFR 20.1101(d). Finally, HMC must demonstrate compliance with the annual whole body dose limit of 25 mrem established by EPA (10 CFR Part 40, Appendix A, Criterion 8). This annual whole body dose limit excludes dose from radon and its daughters. HMC demonstrates compliance with these standards in the Semi-Annual Environmental Monitoring Reports.

Radon levels inside and outside houses near the HMC site are due to the presence of naturally occurring radon, and radon emanating from the HMC site. EPA evaluated the impact of the HMC site on the adjacent subdivisions in its 1989 Record of Decision (ROD), and determined that no action was required to address indoor radon gas. EPA determined that although the radon concentrations were elevated, the principal cause was not related to the site, but to natural sources of radon. Since the 1989 ROD, EPA has issued two Five-Year Reviews that have concluded that the no action remedy remains protective.

Even though HMC is currently in compliance with the NRC standards, including EPA's annual whole body dose limit of 25 mrem, in September 2009, EPA initiated a risk assessment to assure any risk to the public is within the CERCLA or Superfund acceptable risk range during the on-going clean-up. EPA's final Risk Assessment Report has not yet been published.

Uranium Watch Comment 9
The NRC NEPA review must consider the alternative of removing the tailings to a geologically and hydrogeologically appropriate tailings repository. The unending source of contamination must be removed, since the Licensee has not shown that it will be able to meet the groundwater reclamation standards in the near future. Therefore, the placement of the final radon barrier will be delayed indefinitely. The solution to this problem must not be deferred for decades, as has happened since groundwater contamination was first identified in the 1970s, almost 50 years ago.

NRC Response
The scope of the NEPA review will be within the requirements of 10 CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory

Functions," and the Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (NUREG-1748). See also Regulatory Process Issue 2 – Feasibility of Moving the Large Tailings Pile (LTP) at the beginning of this document.

Uranium Watch Comment 10
The NRC must demand that HMC provide all the information requested in the NRC 2010 Request for Additional Information. This includes water quality data for the residential areas and the groundwater monitoring data required by the Atomic Energy Commission.

NRC Response
RAI 4, in the 2010 Request for Additional Information, is the request concerning past residential water quality. Enclosure 1 to this Request for Additional Information contains NRC's evaluation of the HMC response to the 2010 Request for Additional Information. NRC no longer feels that the information requested in RAI 4 from 2010 is relevant to the CAP. The statement about the quality of the water on or near the site before or during site operations is not applicable to the requirements in their license for groundwater remediation. See also NRC response to MASE Comment 5.

Uranium Watch Comment 11
The current CAP is creating a greater problem by permitting the use of contaminated water for irrigation. The NEPA review must provide a complete assessment of this practice. The cumulative impact from the surface disposal of thousands of gallons of contaminated water at the Homestake site is technically and environmentally indefensible.

NRC Response
The draft renewed NMED discharge permit DP-200 will no longer permit the use of impacted groundwater for land application. The irrigation areas will need to be surveyed before they can be released for unrestricted use under NRC's decommissioning regulations. This will be addressed in the NRC's review of the DRP. The scope of the NEPA review of the DRP will be within the requirements of 10 CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and the Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (NUREG-1748).

Information Network for Responsible Mining (INFORM)

INFORM Comment 1 – This comment is summarized in Regulatory Process Issue 1.