



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

March 16, 2020

EA-16-114

David Pierce
Closure Manager
Grants Reclamation Project
Homestake Mining Company of CA
P.O. Box 98/Highway 605
Grants, NM 87020

**SUBJECT: HOMESTAKE MINING COMPANY OF CALIFORNIA, U.S. NUCLEAR
REGULATORY COMMISSION REVIEW OF THE ROOT CAUSE ANALYSIS
AND CORRECTIVE ACTION PLAN SUBMITTED PURSUANT TO CONDITION
2 OF THE CONFIRMATORY ORDER EA-16-114, DOCKET 04008903,
LICENSE SUA-1471**

Dear Mr. Pierce:

By letter dated March 28, 2017,¹ the U.S. Nuclear Regulatory Commission (NRC) issued Confirmatory Order No. EA-16-114 (CO) to the Homestake Mining Company of California (HMC, the licensee) regarding apparent violations that took place at the Grants Reclamation Project (Grants) site that were identified in NRC's letter dated October 4, 2016.² The CO was issued as a result of Alternative Dispute Resolution mediation between HMC and the NRC.

Section V of the CO modifies License No. SUA-1471 to include 16 conditions. Condition 1 of the CO requires the licensee to develop a root cause protocol. Condition 2 of the CO requires that the licensee use the root cause protocol to analyze the reasons for the five apparent violations documented in NRC's letter dated October 4, 2016, and to document the outcome in a root cause analysis (RCA). Condition 2 also requires that the licensee submit any proposed corrective actions to the NRC for review and approval within 60 days of completing the RCA. The licensee submitted its RCA and Corrective Action Plan by letters dated September 15, 2017,³ and November 14, 2017,⁴ respectively. Additionally, by letter dated July 17, 2018,⁵ HMC provided an update to the status of its corrective actions previously submitted in its November 14, 2017, letter.

In accordance with the NRC enforcement policy, the NRC expects the licensee to evaluate and implement comprehensive corrective actions to address the root causes that led to the apparent violations to prevent recurrence of the noted apparent violations and future violations.

¹ Agencywide Document Access and Management System (ADAMS) Package Accession No. ML17060A752.

² ADAMS Accession No ML16251A526.

³ ADAMS Accession No. ML17263A125.

⁴ ADAMS Package Accession No. ML17320A118.

⁵ ADAMS Accession No. ML18200A068.

D. Pierce

As required by Condition 2 of the CO, HMC used the root cause protocol submitted as required by Condition 1 of the CO to analyze reasons for the apparent violations as documented in the NRC's October 4, 2016, letter. Further, HMC submitted its proposed corrective actions within 60 days of completing the RCA as required.

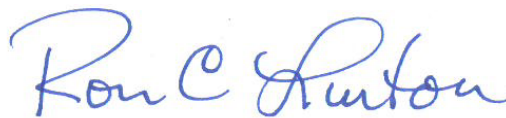
The NRC staff has completed its review of the RCA report and proposed Corrective Action Plan and determined that the root cause analysis and proposed corrective actions are adequate with the exception of the items and recommendations, as identified in the attached review. The NRC staff's approval of the proposed corrective actions is contingent upon HMC's evaluation of the items and recommendations identified herein and taking appropriate action to address them. The NRC staff's understanding is that, in accordance with CO Condition 5, HMC will submit a license amendment request(s) to License SUA-1471, and/or implement procedure changes, to incorporate the corrective actions listed in HMC's letters dated November 14, 2017 and July 17, 2018, with updates to address the items and recommendations identified by NRC in this review.

HMC completion of CO Condition 1 requirements is documented in NRC inspection reports.⁶ The NRC staff will evaluate HMC's implementation of the items and recommendations in this NRC review in future NRC inspections. HMC completion of implementation of CO Conditions 2 and 5 requirements will be confirmed through future submittals from HMC and through NRC inspections, including confirmation of implementation of the corrective actions HMC has identified, and confirmation of appropriate license amendment requests and procedure updates.

In accordance with Title 10 of the *Code of Federal Regulations* part 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions regarding this matter, please contact me at 301-415-7777, or via email at ron.linton@nrc.gov.

Sincerely,



Ron C. Linton, Project Manager
Uranium Recovery
and Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No.: 040-08903
License No.: SUA-1471

Enclosure: NRC Staff Review

⁶ ADAMS Accession No ML19129A405 and ML18303A199.

D. Pierce

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REGULATORY COMMISSION REVIEW OF THE ROOT CAUSE ANALYSIS
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2 OF THE CONFIRMATORY ORDER EA-16-114, DOCKET 04008903,
LICENSE SUA-1471 **DATE: March 16, 2020**

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**NRC STAFF REVIEW
ROOT CAUSE ANALYSIS AND CORRECTIVE ACTION PLAN
HOMESTAKE MINING COMPANY OF CALIFORNIA
GRANTS RECLAMATION PROJECT
DOCKET NO: 040-08903
LICENSE NO: SUA-1471
ORDER NO: EA-16-114**

1.0 INTRODUCTION

By letter dated March 28, 2017,¹ the U.S. Nuclear Regulatory Commission (NRC) issued Confirmatory Order No. EA-16-114 (CO) to the Homestake Mining Company of California (HMC, the licensee) regarding violations that took place at the Grants Reclamation Project (Grants) site. The CO was the result of an Alternative Dispute Resolution mediation between HMC and the NRC to resolve five apparent violations identified by the NRC and documented in a letter dated October 4, 2016.²

Section V of the CO includes 16 Conditions which require licensee implementation. Condition 2 of the CO requires that the licensee use the root cause protocol (RCP), required to be submitted by Condition 1, to analyze the reasons for the five apparent violations documented in NRC's letter dated October 4, 2016, and to document the results in a root cause analysis (RCA). Condition 2 additionally requires that the licensee submit any proposed corrective actions to the NRC for review and approval within 60 days of completing the RCA.

In letter dated August 23, 2017,³ the licensee requested that the due date for submission of the RCA be extended to September 15, 2017. NRC approved the extension via e-mail dated August 24, 2017.⁴ By letter dated September 15, 2017,⁵ the licensee submitted its RCA. The NRC provided formal approval of the extension request and acknowledgement of the RCA submittal by letter dated October 19, 2017.⁶ The licensee submitted its Corrective Action Plan for the five apparent violations by letter dated November 14, 2017.⁷ Additionally, by letter dated July 17, 2018,⁸ HMC provided an update to the status of its Corrective Action Plan.

This review provides the NRC staff evaluation of the information that HMC submitted in its RCA and Corrective Action Plan, via letters dated September 15, 2017, November 14, 2017, and July 17, 2018.

¹ Agencywide Document Access and Management System (ADAMS) Package Accession No. ML17060A752.

² ADAMS Accession No. ML16251A526.

³ ADAMS Accession No. ML17237C046.

⁴ ADAMS Accession No. ML17243A234.

⁵ ADAMS Accession No. ML17263A125.

⁶ ADAMS Accession No. ML17241A299.

⁷ ADAMS Package Accession No. ML17320A118.

⁸ ADAMS Accession No. ML18200A068.

Enclosure

2.0 NRC STAFF EVALUATION OF HMC RCA AND CORRECTIVE ACTION PLAN

To complete the RCA associated with the five apparent violations, the licensee determined that the “Five Whys Method” should be used to determine the underlying common factors between the violations. The method was proposed in the RCP that was required to be submitted by Condition 1 of the CO, as discussed above. The NRC inspectors reviewed the RCP and the “Five Whys Method” during the September 2017, inspection at the Grants Site. The NRC inspectors determined that using the “Five Whys Method” was adequate for use as the RCP as documented in Inspection Report (IR) 040-08903/2017-002, issued by letter dated December 20, 2017.⁹ This review focuses on the licensee’s determination for the root causes of the five apparent violations and its proposed corrective actions.

2.1 Apparent Violation 1

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40, Appendix A, Criterion 5D requires, in part, that the licensee submit the proposed groundwater Corrective Action Program (GCAP) and supporting rationale for Commission approval prior to putting the program into operation. The currently approved GCAP is a requirement of Condition 35C of Materials License SUA-1471 (License Condition 35C), which, in part, requires the licensee to implement the GCAP as described in the September 15, 1989,¹⁰ submittal, as modified by the January 15, 1998,¹¹ submittal.

Contrary to the requirements above, from 1995 to 2014, the licensee performed groundwater corrective actions without prior NRC approval and in a manner that was inconsistent with the approved GCAP by means of collection and direct reinjection (i.e., the Reinjection Program) of groundwater, which was neither fresh water nor reverse osmosis (RO) treated water (i.e., impacted water), in the shallow alluvial aquifer. Additionally, impacted water containing concentrations above the Groundwater Protection Standards (GWPS) listed in License Condition 35B was injected into the alluvial aquifer as part of the Reinjection Program.

In summary, Apparent Violation 1 is “Implementation of the Reinjection Program in a manner inconsistent with the approved GCAP.”

2.1.1 Review of the Root Cause Analysis Associated with Apparent Violation 1

In its review of the root cause associated with Apparent Violation 1, HMC started the “Five Whys Method” by asking, “Why was the Reinjection Program implemented in a manner inconsistent with the [GCAP]?” In answering this question, the licensee stated that it made an assumption that compliance with the State of New Mexico Environmental Department (NMED) permit DP-200 would suffice without an amendment to the GCAP and that compliance with DP-200 would ensure consistency with the GCAP. Additionally, HMC assumed that since the NRC was aware of the Reinjection Program, through inspection, and had not provided any feedback regarding this remediation method, that the program had received “approval” by the NRC.

⁹ ADAMS Accession No. ML17353A414.

¹⁰ ADAMS Accession No. ML12222A088.

¹¹ ADAMS Accession No. ML12291A910.

Further, the licensee assumed that as long as changes to the groundwater restoration program improved performance, it did not have to get approval of every change from the NRC.

Following asking the “Why” questions associated with Apparent Violation 1, HMC determined that the Specific Root Cause was inadequate communications between HMC and the NRC at the time. HMC determined that the Detection Root Cause was that licensee personnel did not understand the regulatory obligations at the site and that new managers, subsequent to the manager at the time of a program’s initiation, assumed that ongoing programs had received proper authorization. Additionally, HMC determined that the Systemic Root Cause was that site managers were busy and failed to prioritize proactive communications with the NRC.

The NRC staff has reviewed the root cause analysis and associated “Five Whys Method” evaluation performed by HMC for Apparent Violation 1 and agrees that a root cause for this apparent violation is lack of communication between the licensee and the NRC. Also, the licensee’s allocation of additional resources to focus on regulatory requirements could have been useful. However, the NRC staff does not agree with the licensee that this lack of communication between HMC and NRC is the primary root cause. Although a lack of communication is a contributing factor, the NRC staff believes the Detection Root Cause, as noted by HMC, is a more accurate primary root cause for this apparent violation. Understanding that further clarification could have been provided regarding the ReInjection Program, a better understanding of the regulatory requirements and how they were to be applied at the Grants site could have prevented this issue.

The NRC staff also notes that the Systemic Root Cause that site managers were busy and failed to prioritize proactive communications with the NRC, may have contributed to the apparent violation along with the lack of communication with the NRC. In addition, the use of License Condition 16 to allow the Safety and Environmental Review Panel (SERP) to make changes contributed to the lack of communications between NRC and HMC. The NRC staff has evaluated the use of License Condition 16 as a performance-based license condition authorizing the use of a SERP to make changes in the license application, other license amendment applications, or to conduct tests and experiments as utilized in HMC’s Standard Operating Procedure (SOP) 10. While NRC has in the past accepted HMC’s use of SOP-10 to use the SERP to make changes to approved licensing documents and has not questioned its use in NRC inspection reports, the NRC staff has determined that License Condition 16 of Material License SUA-1471 does not specifically authorize the development of a SERP. Additionally, License Condition 16 does not authorize the licensee to use SOP’s to develop a SERP or make changes to the license application, other license amendment applications, or to conduct tests and experiments.

Further, NRC believes that an additional contributing factor is a lack of a questioning attitude by licensee management. A questioning attitude by licensee management would have led to discussions with the NRC staff regarding the program, rather than assuming that because the program was implemented under a previous manager that all approvals had been received. A questioning attitude would have led to discussions regarding whether compliance with NMED permit DP-200 assured compliance with HMC’s NRC license, and whether water used in the ReInjection Program needed to be compliant with the 1989 GCAP. Finally, the NRC staff notes that compliance with an NRC license is the responsibility of the licensee. The licensee should

not assume that approval is granted for actions undertaken by the licensee that are not authorized by the license if violations are not issued regarding such actions.

2.1.2 Review of the Corrective Actions Proposed for Apparent Violation 1

Section 2.1 of the Corrective Action Plan provides corrective actions that have been completed for Apparent Violation 1. Specifically, in this section HMC states that in August 2016 it ceased the Reinjection Program previously described and submitted the "Collection for Re-Injection Mass Balance/Removal Analysis" by letter dated July 26, 2017,¹² as required by Condition 8 of the CO. The NRC staff agrees that these corrective actions are appropriate to address the violation, and notes that NRC audit of the July 26, 2017, submittal was completed on October 29, 2019.¹³

Section 3.1 of the Corrective Action Plan discusses additional corrective actions proposed for Apparent Violation 1. Specifically, in this section HMC states that future corrective actions for communications will include leading frequent conference calls with the NRC and other government agencies, proposing that following these conference calls HMC document key points of discussion and action items, communicating with the NRC to obtain "buy-in" before HMC proceeds with any new action or change in existing procedures or license conditions, and that at the corporate level (Barrick Gold, HMC's parent company) will more actively interface with the NRC.

Further, HMC states that future corrective actions will include the hiring of a full-time on site Environmental Compliance Professional and other needed personnel, the development of an Environmental Obligations Register which will assist with tracking regulatory license and permit requirements, the development of the self-assessment report as required by Condition 3 of the CO, the development of a Regulatory Training Program as required by Condition 7 of the CO, and the modification of SOP 10, *Procedure for Conducting a Safety and Environmental Review Panel [SERP]*. Additional corrective actions for Apparent Violation 1 are listed in Table 3 of the November 14, 2017, Corrective Action Plan, "Summary of Additional Corrective Actions by Apparent Violation."

HMC noted the potential challenges in implementing these corrective actions including causing a change in culture that includes increased corporate focus on site needs, increased transparency with regulatory agencies, and better HMC staff ownership and responsibilities to recognize license and permit obligation compliance actions and adherence to applicable regulations.

The NRC staff has reviewed the proposed corrective actions as outlined in Section 3.1 and Table 3 of the Corrective Action Plan and determined that they appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation and to evaluate licensee performance on a routine basis. The NRC staff notes that the monthly conference calls with multiple regulatory agencies, the additional monthly conference call specifically with the NRC to discuss ongoing actions and CO status, and further communications by Barrick Gold with the NRC have been mutually beneficial. However, while the NRC staff agrees that more

¹² ADAMS Accession Package No. ML17212A010.

¹³ ADAMS Accession No. ML19221B533.

communication and summary documentation of the monthly calls between HMC and the regulatory agencies could be useful, the NRC staff will not 'concur' on the conclusions or action items in these summaries authored by HMC. The NRC staff can, however, review the document for accuracy. Additionally, the NRC staff does not provide 'buy-in' related to new actions or procedure changes made by licensees outside of the NRC's formal approval processes.

One of the proposed corrective actions is that HMC will hire additional full-time staff (two Environmental Technicians, one Engineer, and one Hydrologist) to increase staff resources to address inadequate resources devoted to compliance-related matters and insufficient resources to resolve RO system performance issues. The NRC staff agrees that assigning HMC staff with experience in these areas to the applicable tasks and creation of additional site documents should assist to address inadequate and insufficient resources. The licensee's letter dated July 17, 2018, provided the completion dates for these actions. The proposed dates appear reasonable, and completion will be reviewed during a subsequent NRC inspection.

In the NRC staff review of the July 26, 2017, submittal, regarding the collection for re-injection mass balance/removal analysis, completed on October 29, 2019, the NRC staff provided three recommendations to the licensee. These recommendations from NRC's October 29, 2019, response are reproduced here for convenience and NRC expects they will be addressed as HMC addresses the additional recommendations in this current review:

Recommendation 1

Further clarity is needed concerning the effects of the clean water injection on contaminant concentrations measured for the control area and how HMC's mass balance analysis incorporates these potential dilution effects into the mass balance analysis.

Recommendation 2

The contribution of contaminants from both the contents of the LTP and the underlying partially saturated zone of alluvium to the control area is highly qualitative. Further clarity is needed on how this qualitative uncertainty is considered in the analysis of the mass balance in the control area.

Recommendation 3

The RMM [reformulated mixing model] model had been rerun with data from 2000 to 2015 and a hard copy of the RMM model input and output was provided in the attachment to HMC's July 26, 2017, report. However, the NRC staff was not provided the electronic version of the model with electronic input and output files. These electronic files are needed for the NRC staff's independent review and verification of the satisfactory use of the model and modeled estimates.

The NRC staff notes that changes to the Training Program and SOP-10 have already been completed. As documented in IR 040-08903/2018-001, issued by letter dated May 3, 2018,¹⁴ the NRC inspectors reviewed the changes to the training program and SOP-10. The inspectors

¹⁴ ADAMS Accession No. ML18115A480.

determined that the training program and documentation were adequate but would continue to be evaluated in the future and that the changes to SOP-10 were sufficient to ensure that future environmental reviews would be completed as required.

SOP-10 outlines a SERP process, however the NRC staff has evaluated the use of License Condition 16 as a performance-based license condition authorizing the use of a SERP to make changes in the license application, other license amendment applications, or to conduct tests and experiments as utilized in HMC's SOP-10. While NRC has in the past accepted HMC's use of SOP 10 to use the SERP to make changes to approved licensing documents and has not questioned its use in NRC inspection reports, the NRC staff has determined that License Condition 16 of Material License SUA-1471 does not specifically authorize the development of a SERP. If HMC intends to continue use of License Condition 16 as a performance-based license condition, HMC must submit an amendment, in accordance with CO Condition 5, to request the current License Condition 16 be amended and replaced with a performance-based license condition that specifically allows for the formation of a SERP and SERP procedures

Further, in IR 040-08903/2018-001, the NRC inspectors noted that the changes to SOP-10 did not adequately address the cultural resources inventory as required, and as such the NRC staff review of SOP-10 with respect to cultural resources inventory remains open. Changes to SOP-10 to adequately address the cultural resources inventory are required.

2.1.3 NRC Staff Conclusions Regarding the Root Cause and Corrective Actions Associated with Apparent Violation 1

The NRC staff agrees that the licensee's RCA and proposed corrective actions associated with Apparent Violation 1 generally appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation, with the exception of the recommendations outlined in the NRC staff's October 29, 2019, review (also captured as Recommendations 1 through 3, in this review).

The NRC staff agrees that there will be challenges in implementing these corrective actions. Particular attention should be given to HMC staff ownership and responsibilities to recognize license and permit obligation compliance actions and adherence to applicable regulations. As previously stated, the NRC staff believes that this is the underlying root cause associated with Apparent Violation 1.

2.2 Apparent Violation 2

As stated by the NRC staff in letter dated October 4, 2016, License Condition 35C requires, in part, that the licensee implement the GCAP as described in the September 15, 1989, submittal, as modified by the January 15, 1998, submittal. As a condition of the January 15, 1998, approval by the NRC, Sample Point 2 (SP2) was included as an additional sampling location. Monthly composite samples from the RO system were required to be in compliance with the GWPS at SP2.

Contrary to the above, the licensee exceeded the applicable GWPS for uranium and/or molybdenum for a total of 67 monthly composite samples from 1999 through 2014 at SP2.

In summary, Apparent Violation 2 is, "Discharge of liquid effluents at SP2 in excess of the site GWPS established in the license."

2.2.1 Review of the Root Cause Analysis Associated with Apparent Violation 2

In its review of the root cause associated with Apparent Violation 2, HMC started the "Five Whys Method" by asking, "Why were liquid effluents at SP2 discharged at concentrations above the Site GWPS established in the license?" In answering this question, the licensee stated that the RO system did not produce effluent with sufficiently low concentrations to meet site GWPS, even after mixing with fresh water from the San Andres-Glorieta Aquifer (SAG) water. This was due to the technical issues experienced by the original and upgraded RO system and amplified by the lack of training and preventative maintenance programs established by the licensee. It was also noted that the licensee was unable to monitor, troubleshoot, and correct the RO system issues in a timely manner. Further, the licensee stated that the lack of clear wording in the license concerning the required sampling of SP2, and that the NRC did not indicate any compliance issues or review SP2 compliance, contributed to the apparent violation.

Following asking the "Why" questions associated with Apparent Violation 2, HMC determined that one of the Specific Root Causes was that there was no preventative maintenance program for the RO system and that the RO system would produce treated water with higher-than anticipated concentrations. HMC determined that another Specific Root Cause was that SP2 was not identified in the license as a point of compliance, although SP2 was listed in License Condition 35C as a sample location. HMC determined that the Detection Root Cause was that the NRC was either not aware of the SP2 exceedances because they were not reported, or because the NRC had the same interpretation of the wording in the license.

The NRC staff has reviewed the RCA and associated "Five Whys Method" evaluation performed by HMC for Apparent Violation 2 and agrees that the primary root cause for this apparent violation is the lack of training and maintenance programs for the RO system. A proper training and maintenance program could have assisted with the ability to troubleshoot the issues with the RO system and ensure compliance at SP2. Additionally, the NRC staff agrees that the lack of clear wording in the license could have been a contributing factor. However, the NRC staff does not agree with the licensee's determination that the lack of previous violations for exceedances at SP2 was a root cause. As previously discussed for Apparent Violation 1, a better understanding of the regulatory requirements for the site could have prevented this issue. The NRC staff does agree with the determination that an insufficient focus on compliance by HMC site managers was a pervasive element of this apparent violation.

Further, as previously discussed, a questioning attitude by licensee management could have led to discussions with the NRC staff regarding the ambiguity in the license, rather than assuming that because no violations were issued that the program was in compliance. Finally, the NRC staff again notes that compliance with an NRC license is the responsibility of the licensee, and it should not be assumed that the lack of the issuance of violations denotes compliance. The purpose of sampling SP2 was to ensure that the GWPS were being met prior to injection of the treated water. Injection of treated water that did not meet the GWPS did not assist with the remediation of the alluvial aquifer and should not have been injected until it met the GWPS.

2.2.2 Review of the Corrective Actions Proposed for Apparent Violation 2

Section 2.2 of the Corrective Action Plan provides corrective actions that have been completed for Apparent Violation 2. Specifically, in this section HMC states that in September 2016, it adjusted operations to better ensure compliance with the GWPS at SP2, as indicated in letter dated April 27, 2017,¹⁵ and required by Condition 9 of the CO. HMC noted that the amount of fresh water pumped from the SAG to be mixed with water from the RO system increased to a consistent 300 gallons per minute (gpm). HMC also noted that Condition 11 of the CO changed License Condition 35C to specifically require that composite samples from SP2 be taken monthly and analyzed for the constituents listed in License Condition 35B, and that the results of these analyses will be reported as required by License Conditions 15 and 42. Additionally, as required by Condition 10 of the CO, HMC submitted the "Analysis of the Impact of the Exceedances of [GWPS] in Injection Water," by letter dated July 26, 2017,¹⁶ and submitted SOP-15, Post Treatment Tank (SP-2) Water Sampling, Analysis, and Reporting Requirements, as required by Condition 12 of the CO, by a separate letter dated July 26, 2017.¹⁷

The NRC staff agrees that these completed corrective actions are appropriate. The NRC staff review of the July 26, 2017, submittal regarding the exceedance and re-injection project reports was completed on October 29, 2019.¹⁸ The NRC inspector review of SOP-15 was documented in IR 040-08903/2018-001, wherein the inspector determined that the procedures were adequate and will ensure that monthly composite samples are obtained from SP2. The NRC inspector also noted that the results of the monthly samples were reported in the semi-annual report dated February 22, 2018,¹⁹ as required by License Condition 15.

Section 3.2 of the Corrective Action Plan discusses additional corrective actions proposed for Apparent Violation 2. Specifically, in this section HMC states that in order to address potential issues with the RO system operations and lack of preventative maintenance program, HMC will identify and contact a third-party consultant with expertise in the operation of RO system and other water treatment plants. The intent of using a third-party consultant is to potentially modify components of the RO system to operate the systems at treatment rates closer to the design capacity and to identify additional maintenance needs and potential upgrades. Further, as noted in letter dated July 17, 2018, the licensee has reached out to water treatment plant and HMC RO system component consultants to gain additional information regarding RO system operation. The licensee has also hired a staff engineer who will be assigned to RO system operations. Additional changes involve the implementation of a Quality Assurance Plan, a Data Management Plan, and an Environmental Monitoring Plan to assist with ensuring that the measurements at SP2 are taken and meet the applicable regulatory requirements. HMC also noted that changes to the training program will be made to ensure that individuals are properly trained on RO system operations. The licensee stated that they have begun using a Kinetic Phosphorescent Analyzer to analyze samples from SP2 for uranium concentration before the samples are sent to a laboratory. The purpose is to get a timely result and more quickly identify whether there are potential operating issues associated with the RO system that may result in

¹⁵ ADAMS Accession No. ML17121A311.

¹⁶ ADAMS Accession Package No. ML17212A010.

¹⁷ ADAMS Accession No. ML17212A025.

¹⁸ ADAMS Accession No. ML19289B451.

¹⁹ ADAMS Accession No. ML18066A088.

an exceedance. Additional corrective actions for Apparent Violation 2 are listed in Table 3 of the Corrective Action Plan.

The NRC staff has reviewed the proposed corrective actions as outlined in Section 3.2 and Table 3 of the Corrective Action Plan and determined that they are reasonable and appropriate to ensure that the root causes behind Apparent Violation 2 do not reoccur. The NRC staff notes that the changes to the license as required by the CO and site procedures to specifically mention that SP2 should be sampled and the results reported to the NRC would ensure that the NRC staff has the opportunity to review the information in its oversight role. Changes to other site documents should also assist with these concerns. It is particularly important that more attention be paid to the RO system operations and the reasons behind exceedances. As documented in letter dated June 4, 2018,²⁰ there are still issues with the operation of the RO system that require additional HMC attention. Specifically, this letter noted that in March and April of 2018, monthly composite samples at SP2 exceeded the GWPS. The NRC staff agrees that assigning licensee staff with experience in these areas to the applicable tasks and creation of additional site documents should assist with these actions. The licensee's letter dated July 17, 2018, provided the completion dates for these actions, which will be reviewed during a subsequent NRC inspection. The NRC staff also notes that the RO system continues to operate under its design capacity as noted in IR 040-08903/2018-001 and 040-08903/2018-002.²¹ Performance and efficiency of the RO system continues to be of concern. In the NRC staff review of the July 26, 2017, submittal regarding the exceedance and re-injection project reports, completed on October 29, 2019, the NRC staff provided one recommendation to the licensee. The recommendation from NRC's October 29, 2019, response is reproduced here for convenience and NRC expects it will be addressed as HMC addresses the additional recommendations in this current review:

Recommendation 4

The additional monitoring with increased frequency to provide early indications on potential exceedances, including: (1) daily conductivity measurements, (2) weekly measurements using a kinetic phosphorescence analyzer to detect uranium, (3) monitoring of molybdenum concentrations with a Hach meter, and (4) the review of preliminary laboratory results to mitigate exceedances of the GWPS in injection water, as documented in NRC Inspection Report 040-08903/2018-002 dated November 26, 2018, should be reflected in HMC's onsite procedures.

2.2.3 NRC Staff Conclusions Regarding the Root Cause and Corrective Actions Associated with Apparent Violation 2

The NRC staff agrees that the licensee's RCA and proposed corrective actions associated with Apparent Violation 2 generally appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation, with the exception of the recommendation outlined in the NRC staff's October 29, 2019, review (also captured as Recommendation 4, in this review).

The NRC staff agrees that there will be challenges in implementing these corrective actions, similar to the challenges associated with Apparent Violation 1.

²⁰ ADAMS Accession No. ML18159A037.

²¹ ADAMS Accession No. ML18303A199.

2.3 Apparent Violation 3

As stated in NRC's letter dated October 4, 2016, License Condition 15 requires, in part, that the results of all effluent monitoring required by the license be reported to the NRC.

Contrary to the above, the licensee did not report the results of all effluent monitoring required by the license to the NRC. Specifically, the licensee failed to report any of the effluent results from the RO system at Sample Point 1 (SP1) and any results at SP2 from 2000 through 2014.

In summary, Apparent Violation 3 is, "Failure to report to NRC the results of all effluent monitoring required by the license, specifically for SP1 and SP2."

2.3.1 Review of the Root Cause Analysis Associated with Apparent Violation 3

In its review of the root cause associated with Apparent Violation 3, HMC started the "Five Whys Method" by asking, "Why did HMC fail to report effluent monitoring results from [SP1 and SP2]?" In answering this question, the licensee noted it interpreted License Condition 15 to mean that only the analytical results from certain compliance wells needed to be reported. HMC felt that License Condition 15 was ambiguous by stating that "all effluent" shall be reported but then stated that only groundwater radionuclide data from compliance wells and background Well P needs to be reported. Additionally, HMC assumed that because a violation had not previously been issued by the NRC for not reporting the effluent results from SP1 and SP2 and because the inspections reports indicated that the licensee was compliant with License Condition 15 that it was in compliance with License Condition 15.

Following asking the "Why" questions associated with Apparent Violation 3, HMC determined that the Specific Root Cause for the apparent violation was that the HMC Site Manager did not confirm with the NRC that the interpretation of License Condition 15 was correct. HMC determined that this was because the Site Manager did not believe such communication was necessary given that no previous violations had been issued. The licensee also noted that it did not completely understand the requirements of License Condition 15 due to unclear language and did not clarify the requirements with the NRC.

The NRC staff has reviewed the RCA and associated "Five Whys Method" evaluation performed by HMC for Apparent Violation 3 and agrees with the licensee that the root causes for the apparent violation are due to the ambiguous language of License Condition 15. Additionally, the NRC staff agrees that there is a root cause associated with the lack of understanding and communication regarding the condition. The licensee should have requested further clarification from the NRC staff on this license condition.

However, as previously noted, an additional root cause that should be added to the RCA is the lack of a questioning attitude by the licensee. A questioning attitude by licensee management, regarding License Condition 15, could have led to discussions with the NRC staff regarding the requirements. Finally, the NRC staff again notes that compliance with an NRC license is the responsibility of the licensee.

Recommendation 5

An additional root cause that should be added as a supplement to the RCA is the lack of a questioning attitude by the licensee.

2.3.2 Review of the Corrective Actions Proposed for Apparent Violation 3

Section 2.3 of the Corrective Action Plan provides corrective actions that have been completed for Apparent Violation 3. Specifically, in this section HMC states that License Condition 15 was changed as required by Condition 13 of the CO. License Condition 35C was also modified as required by Condition 11 of the CO. Further, as previously discussed, HMC submitted SOP-15 as required by Condition 12 of the CO, by letter dated July 26, 2017. The NRC staff has determined that the changes to License Conditions 15 and 35C, as required by Order Conditions 11 and 13 respectively, provide the necessary clarification to the license. Modifications to License Condition 15 and 35C were included in license amendment 49 issued on March 28, 2017.²² Additionally, as discussed above, the review of SOP-15 was documented in IR 040-08903/2018-001, wherein it was determined that the procedures were adequate to ensure that monthly composite samples are obtained from SP2.

Section 3.3 of the Corrective Action Plan discusses additional corrective actions proposed for Apparent Violation 3. Specifically, in this section HMC states that the corrective actions associated with this apparent violation are similar to those for Apparent Violations 1 and 2. This includes the preparation of additional site documents, the hiring of the Site Environmental Compliance Professional, the development and implementation of a regulatory training program, increased communication between corporate and site staff, and increased communication with the NRC and other regulatory agencies. Additional corrective actions for Apparent Violation 3 are listed in Table 3 of the Corrective Action Plan.

The NRC staff has reviewed the proposed corrective actions as outlined in Section 3.3 and Table 3 of the Corrective Action Plan and determined that they are reasonable and appropriate to ensure that the root causes behind Apparent Violation 3 do not reoccur. The NRC staff agrees that assigning licensee staff with experience in these areas to the applicable tasks and creation of additional site documents should assist with these actions. The licensee's letter dated July 17, 2018, provided the completion dates for these actions, completion of which will be reviewed during a subsequent NRC inspection.

2.3.3 NRC Staff Conclusions Regarding the Root Cause and Corrective Actions Associated with Apparent Violation 3

The NRC staff agrees that the licensee's RCA and proposed corrective actions associated with Apparent Violation 3 generally appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation, with the exceptions outlined above.

The NRC staff agrees that there will be challenges in implementing these corrective actions. Particular attention should be given to HMC staff ownership and responsibilities to recognize

²² ADAMS Accession No. ML17061A464.

license and permit obligation compliance actions and adherence to applicable regulations. As previously stated, the NRC staff believes that this is the underlying root cause associated with Apparent Violation 3.

2.4 Apparent Violation 4

As stated in letter dated October 4, 2016, License Condition 35C requires, in part, that composite samples from SP1 and SP2 be taken monthly and analyzed for applicable constituents to ensure compliance with the GWPS.

Contrary to the above, the licensee failed to monitor SP1 and SP2 multiple times from 1999 through 2014. Specifically, the licensee failed to obtain a total of 10 monthly composite samples from SP2 during this time. Records of sampling at SP1 identify that only sporadic sampling occurred after August 2000.

In summary, Apparent Violation 4 is, "Failure to obtain monthly composite samples as required by the license, specifically for SP1 and SP2."

2.4.1 Review of the Root Cause Analysis Associated with Apparent Violation 4

In its review of the root cause associated with Apparent Violation 4, HMC addressed the apparent violation with two separate "Why" analyses, one for each sampling point. HMC started the "Five Whys Method" for SP1 by asking, "Why was there a failure to collect composite samples from SP1?" In answering this question, the licensee noted that it did not completely understand the requirements of License Condition 35C, which only listed sampling requirements for SP2. Additionally, the Technical Evaluation Report issued by the NRC associated with the January 15, 1998, submittal stated that composite samples will be taken monthly for the first year of RO system operation and the decrease in sampling is dependent on demonstrating acceptable levels of constituents. HMC assumed that it was not required to affirmatively seek NRC approval of implementing changes to the sampling plan based on decreasing constituent levels.

HMC started the "Five Whys Method" for SP2 by asking, "Why was there a failure to collect all monthly composite samples from SP2 during the period from 1999 through 2014?" In answering this question, the licensee noted that it appears that these routinely performed tasks were overlooked by an HMC staff person and were not double-checked by another HMC staff person with quality control responsibilities to confirm data entry and sample collection were complete. Specifically, HMC noted that 9 of the 10 samples were reported as missing in site records. No record of the tenth sample could be found.

Following asking the "Why" questions associated with Apparent Violation 4 for SP1, HMC determined that the Specific Root Cause was that it did not recognize NRC's intent for sampling as required and thought it was only a plant start-up requirement because the requirement was not incorporated by reference in License Condition 35C. Additionally, HMC noted that the NRC did not indicate the non-compliance during subsequent inspections. Following asking the "Why" questions associated with Apparent Violation 4 for SP2, HMC determined that the Specific Root Cause was that it did not have quality control procedures in place to ensure that all collected

samples with laboratory analytical results were properly entered into the site database or that samples were collected.

The NRC staff has reviewed the root causes analysis and associated "Five Whys Method" evaluation performed by HMC for Apparent Violation 4 for both SP1 and SP2 and agrees that a root cause for this apparent violation is a lack of clarity in the wording of License Condition 35C. Also, additional procedures to ensure quality control could have been useful. However, the NRC staff does not agree with the licensee that this is the primary root cause for SP1. Understanding that further clarification could have been provided regarding the intention of the requirements for SP1, a better understanding of the regulatory requirements could have prevented this issue.

Further, a questioning attitude by licensee management could have led to discussions with the NRC regarding the program. Rather than assuming that a program required by the license could be changed without receiving specific approval, a questioning attitude could have led to discussions regarding whether approval was needed for the change. Finally, the NRC staff notes that compliance with an NRC license is the responsibility of the licensee, and it should not be assumed that approval is granted if violations are not issued regarding a change that did not receive the proper approval.

2.4.2 Review of the Corrective Actions Proposed for Apparent Violation 4

Section 2.4 of the Corrective Action Plan provides corrective actions that have been completed for Apparent Violation 4. Specifically, in this section HMC notes that Condition 11 of the CO revised License Condition 35C to exclude all of the sampling requirements for SP1 and specifically indicate that composite samples from SP2 will be collected monthly and analyzed for constituents listed in License Condition 35B and that these results will be provided in the semi-annual and annual report. Additionally, HMC noted that they changed SOP-15 to include monthly sampling and reporting requirements for SP2. The NRC staff determined that the changes to License Conditions 35C as required by the CO provides the necessary clarification to the license. Additionally, as discussed above, the NRC inspector review of SOP-15 was documented in IR 040-08903/2018-001, wherein the inspector determined that the procedures were adequate and will ensure that monthly composite samples are obtained from SP2.

Section 3.4 of the Corrective Action Plan discusses additional corrective actions proposed for Apparent Violation 4. Specifically, in this section HMC states that the proposed corrective actions for Apparent Violation 4 are similar to those for Apparent Violations 1 through 3, which include regular communications to the NRC, the preparation of additional site documents to document the samples for SP2, the development and implementation of a regulatory training program, and the hiring of additional on-site staff. Additional corrective actions for Apparent Violation 4 are listed in Table 3 of the Corrective Action Plan.

The NRC staff has reviewed the proposed corrective actions as outlined in Section 3.4 and Table 3 of the Corrective Action Plan and determined that they are reasonable and appropriate to ensure that the root causes behind Apparent Violation 4 do not reoccur. The NRC staff agrees that assigning HMC staff with experience in these areas to the applicable tasks and creation of additional site documents should assist with these actions. The licensee's letter

dated July 17, 2018, provided the completion dates for these actions, which will be reviewed during a subsequent NRC inspection.

2.4.3 NRC Staff Conclusions Regarding the Root Cause and Corrective Actions Associated with Apparent Violation 4

The NRC staff agrees that the licensee's RCA and proposed corrective actions associated with Apparent Violation 4 generally appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation.

The NRC staff agrees that there will be challenges in implementing these corrective actions. Particular attention should be given to HMC staff ownership and responsibilities to recognize license and permit obligation compliance actions and adherence to applicable regulations. As previously stated, the NRC staff believes that this is the underlying root cause associated with Apparent Violation 4.

2.5 Apparent Violation 5

As stated in letter dated October 6, 2016, 10 CFR 40.3 requires, in part, a person subject to the regulations in this part may not dispose of byproduct material or residual radioactive material as defined in this part or any source material after removal from its place of deposit in nature, unless authorized in a specific or general license issued by the Commission under the regulations in this part.

10 CFR 40.41(c) requires, in part, that each person licensed by the Commission pursuant to the regulations in this part shall confine possession and use of source or byproduct material to the locations and purposes authorized in the license.

10 CFR 40, Appendix A, Criterion 5D requires, in part, that the licensee submit the proposed GCAP and supporting rationale for Commission approval prior to putting the program into operation, unless otherwise agreed to by the Commission.

10 CFR 20.2002 states, in part, that a licensee may apply to the Commission for approval of proposed procedures, not otherwise authorized in the regulations in this chapter, to dispose of licensed material generated in the licensee's activities. Additionally, the provisions in 10 CFR 20.2002 require compliance with the radiation dose limits for individual members of the public in 10 CFR 20.1301, and a demonstration of compliance with these limits as provided in 10 CFR 20.1302.

Contrary to the above, the licensee discharged effluents containing byproduct material to land application areas, effectively disposing of the byproduct material without authorization in NRC Materials License SUA-1471 and per the requirements of 10 CFR 40.3. Specifically, in order to dispose of the byproduct material at the land application areas, the licensee discharged effluents containing byproduct material to unauthorized areas located outside of the licensed site boundary, which is contrary to the requirements found in 10 CFR 40.41(c). This method of disposing of byproduct material was implemented as an unapproved groundwater remediation method in support of the operations necessary to continue and complete the GCAP, which is contrary to 10 CFR 40, Appendix A, Criterion 5D. The licensee failed to obtain approval for the

disposal of licensed material in a manner not listed in Subpart K of 10 CFR 20. The licensee discharged effluents containing site derived byproduct material for the unauthorized purpose of disposal, by means of land application for agricultural irrigation, within four fields located outside of the authorized site boundary from 1999 through 2012. The licensee disposed of byproduct material without first obtaining NRC approval per the requirements of 10 CFR 20.2002, which includes an independent assessment of the possible impacts of the proposed method on members of the public, on the environment, and on any other groups or facilities that may be affected by the use of land application for agricultural irrigation.

In summary, Apparent Violation 5 is, "Discharge of liquid effluents containing byproduct material to land application areas without first obtaining NRC approval."

2.5.1 Review of the Root Cause Analysis Associated with Apparent Violation 5

In its review of the root cause associated with Apparent Violation 5, HMC started the "Five Whys Method" by asking, "Why were liquid effluents containing byproduct material discharged to land application areas without first obtaining NRC approval?" In answering this question, the licensee noted that it had requested approval of the land application program prior to the start of the program in 1999. At that time, the licensee proposed to use alluvial groundwater for the program and both the NRC and NMED stated that approval was not needed. The licensee has indicated the reason NRC did not assert regulatory authority is that HMC did not specifically state that low-levels of uranium and selenium contamination in the alluvial aquifer was directly attributed to byproduct material. However, in 2009, the State of New Mexico requirements for uranium in groundwater changed and NMED requested that changes be made to the program. Following these changes, HMC assumed that the program remained compliant with NRC requirements as long as NMED GWPS were achieved. Additionally, HMC did not consider that the water used in the program could contain byproduct material and did not recognize that the program would entail releasing byproduct material from the NRC licensed area.

Following asking the "Why" questions associated with Apparent Violation 5, HMC determined that the Specific Root Cause for Apparent Violation 5 was that HMC failed to understand the appropriate definition of byproduct material. HMC determined that the Detection Root Cause was that it focused on remaining in compliance with DP-200 rather than reconfirming whether NRC approval of the program was required. Additionally, HMC determined that the Systemic Root Cause was that it did not fully understand its compliance obligations in addition to compliance with the NMED requirements.

The NRC staff has reviewed the RCA and associated "Five Whys Method" evaluation performed by HMC for Apparent Violation 5 and agrees that a root cause for this apparent violation is lack of clarity and communication between the licensee and the NRC. The NRC staff also agrees with the licensee's Specific, Detection, and Systemic Root Causes. Understanding that further clarification could have been provided regarding the land application program, a better understanding of the regulatory requirements, including the definition of byproduct material, and a greater focus on compliance with the NRC license could have prevented this issue.

Further, a questioning attitude by licensee management could have led to discussions with the NRC regarding the program, rather than assuming that because the program was implemented under a previous manager that all approvals had been received. Additionally, a questioning

attitude could have led to discussions regarding whether compliance with NMED permit DP-200 assured compliance with HMC's NRC license, and whether water used in the land application program met the definition of byproduct material. Finally, the NRC staff again notes that compliance with an NRC license is the responsibility of the licensee, and it should not be assumed that approval is granted if comments or violations are not issued regarding a program that did not receive the proper approval.

2.5.2 Review of the Corrective Actions Proposed for Apparent Violation 5

Section 2.5 of the Corrective Action Plan provides corrective actions that have been completed for Apparent Violation 5. Specifically, in this section HMC states that the land application program was terminated in 2012, and that it has established a practice of prohibiting the land application of any site effluents. HMC also stated that an internal memo dated June 16, 2017,²³ verified that the former land application areas are not being used to grow crops or graze farm animals. Finally, HMC stated that by letter dated September 25, 2017,²⁴ it submitted the Land Application Impact Assessment to the NRC as required by Condition 14 of the CO. The NRC staff agrees that prohibiting the practice should assist in ensuring that byproduct material is not disposed of via a land application program in the future. The NRC staff review of the stated memo is documented in IR 040-08903/2018-001. The Land Application Impact Assessment is still under NRC review.

Section 3.5 of the Corrective Action Plan discusses additional corrective actions proposed for Apparent Violation 5. Specifically, in this section, HMC states that the proposed corrective actions for Apparent Violation 5 are similar to those for Apparent Violations 1 through 4, which include regular communications to the NRC, the preparation of additional site documents, the development and implementation of a regulatory training program, and the hiring of additional on-site staff. The licensee also noted that it is preparing a Final Status Survey Work Plan for the Land Application Areas. The Final Status Survey Work Plan was submitted by letter dated November 14, 2017,²⁵ and the Final Status Survey was submitted by letter dated July 2, 2018.²⁶ These documents are still under NRC review. Additional corrective actions for Apparent Violation 5 are listed in Table 3 of the Corrective Action Plan.

The NRC staff has reviewed the proposed corrective actions as outlined in Section 3.5 and Table 3 of the Corrective Action Plan and determined that they are reasonable and appropriate to ensure that the root causes behind Apparent Violation 5 do not reoccur. The NRC staff agrees that assigning licensee staff with experience in these areas to the applicable tasks and creation of additional site documents should assist with these actions.

2.5.3 NRC Staff Conclusions Regarding Root Cause and Corrective Actions Associated with Apparent Violation 5

²³ ADAMS Accession No. ML17328A507.

²⁴ ADAMS Accession No. ML17270A066.

²⁵ ADAMS Package Accession No. ML17321A075.

²⁶ ADAMS Package Accession No. ML18186A577.

The NRC staff agrees that the licensee's RCA and proposed corrective actions associated with Apparent Violation 5 generally appear to be reasonable and appropriate to prevent reoccurrence of the apparent violation.

The NRC staff agrees that there will be challenges in implementing these corrective actions. Particular attention should be given to HMC staff ownership and responsibilities to recognize license and permit obligation compliance actions and adherence to applicable regulations. As previously stated, the NRC staff believes that this is the underlying root cause associated with Apparent Violation 5.

2.6 NRC Staff Conclusions Regarding Root Cause and Corrective Actions Associated with the 5 Apparent Violations

Section 3.0 of the RCA outlines the summary of the root causes and notes the number of times each category appears on the 'fishbone' diagrams that were attached. In this section, the licensee concludes, in part, that:

The tip of the root cause structure is clearly HMC Management (Site and, to a lesser extent, corporate) because, as the Licensee, HMC was ultimately responsible for License compliance associated with discharge-related activities and proactively communicating with NRC and other regulatory agencies regarding Site activities and compliance with all applicable federal, state and local regulations.

The licensee then notes that regulatory oversight was also a contributing factor including its misunderstanding of the requirements of its NRC license and GCAP requirements. In this section the licensee also noted that there was an "absence of complete and timely feedback to HMC from NRC on potential License compliance issues." The NRC staff agrees with the overall RCA conclusions, appreciates this feedback and will work with the licensee on better communications and timely responses. However, the NRC again notes that the responsibility of ensuring compliance with an NRC license is with the licensee, and it should not be assumed that approval is granted if comments or violations are not issued regarding a program that did not receive the proper approval.

A summary of corrective actions was provided in Tables 2 and 3 of the RCA Corrective Action Plan dated November 14, 2017, and updated in Table 1 of the RCA Corrective Action Plan for 5 Apparent Violations Update dated July 17, 2018. As previously discussed, the NRC staff has reviewed the proposed corrective actions and determined that they are reasonable and appropriate to ensure that the root causes behind the apparent violations do not reoccur. The NRC staff will review the documents, procedure changes, and other corrective actions during future inspections. The NRC staff concludes that Materials License SUA-1471 should be amended, or the licensee should implement procedure changes, to include the corrective actions the licensee has identified.

3.0 NRC Staff Review of HMC Schedule and Monitoring of Corrective Actions

Section 4 of the licensee's November 14, 2017, Corrective Action Plan, "Schedule and Monitoring of Corrective Actions", provides the proposed schedule for implementation of the

corrective actions, a plan for implementing and evaluating the effectiveness of the actions, and the frequency and methods used to evaluate the effectiveness of the corrective actions. In Section 4, the licensee also states that it will develop and initiate an internal audit program that will be prescribed in the Quality Assurance Program. The licensee then stated that once the initial internal audit is completed it will send a "RCA Corrective Action Plan Completion Report" to the NRC. Following this report, the licensee intends to conduct 'periodic' review of the program and requirements. The licensee will use the previously submitted RCP to assess the root causes and any additional deficiencies noted during implementation of its corrective actions. This section also discusses the training associated with the corrective actions.

The NRC staff notes that the Corrective Action Plan does not provide specific timeframes associated with the review of the corrective actions and assurances that the root causes have been mitigated. The current timeline provided by the licensee of 'periodic' in Section 4 is not prescriptive and could lead to these actions not receiving the proper efficacy review. The NRC staff does note that the licensee states it will outline the frequency of the review in the Quality Assurance Plan, and specific time frames may be adjusted as needed and agreed to by the NRC staff.

Recommendation 6

Specific timeframes should be designated for the review of the corrective actions and assurances that the root causes have been mitigated.

Additionally, the NRC staff also notes that Figure 2 of the Corrective Action Plan provides an Organization Chart, which lists the NRC at the head of the organization. Please note that while the NRC staff agrees that frequent communication should continue between the NRC and the licensee, the NRC should not be listed in an organizational chart for HMC.

Recommendation 7

The NRC should not be listed in an HMC organizational chart.

The NRC staff has reviewed the Corrective Action Plan, including the additional training, as previously noted and determined that the actions appear to be sufficiently comprehensive to address each of the causal factors identified in the RCA, and include steps to prevent the re-occurrence of the specific violation as well as similar violations. Additionally, the method of reviewing these actions with the RCP should evaluate the effectiveness of the training. The licensee's letter dated July 17, 2018, provided the completion dates for these actions in "Table 1., Summary of Additional Corrective Actions by Root Cause", which will be reviewed during a subsequent NRC inspection to ensure compliance.

4.0 NRC Staff Conclusion

As required by Condition 2 of the CO, HMC used the RCA submitted as required by Condition 1 of the CO to analyze reasons for the apparent violations as documented in the NRC's October 4, 2016, letter. Further, HMC submitted its proposed corrective actions within 60 days of completing the RCA as required.

The NRC staff has completed its review of the RCA report and proposed Corrective Action Plan and determined that the root cause analysis and proposed corrective actions are adequate with

the exception of the items and recommendations, as identified in this review. A summary of these items and recommendations are:

1. While the NRC staff agrees that more communication and summary documentation of the monthly calls between HMC and the regulatory agencies could be useful, the NRC staff will not 'concur' on the conclusions or action items in these summaries authored by HMC. The NRC staff can, however, review the document for accuracy.
2. The NRC staff does not provide 'buy-in' related to new actions or procedure changes made by licensees outside of the NRC's formal approval processes.
3. In the NRC staff review of the July 26, 2017, submittal, regarding the collection for re-injection mass balance/removal analysis, completed on October 29, 2019,²⁷ the NRC staff provided three recommendations to the licensee. These recommendations from NRC's October 29, 2019, response are reproduced here for convenience and NRC expects they will be addressed as HMC addresses the additional recommendations in this current review:
 - a) Recommendation 1
Further clarity is needed concerning the effects of the clean water injection on contaminant concentrations measured for the control area and how HMC's mass balance analysis incorporates these potential dilution effects into the mass balance analysis.
 - b) Recommendation 2
The contribution of contaminants from both the contents of the LTP and the underlying partially saturated zone of alluvium to the control area is highly qualitative. Further clarity is needed on how this qualitative uncertainty is considered in the analysis of the mass balance in the control area.
 - c) Recommendation 3
The RMM model had been rerun with data from 2000 to 2015 and a hard copy of the RMM model input and output was provided in the attachment to HMC's July 26, 2017, report. However, the NRC staff was not provided the electronic version of the model with electronic input and output files. These electronic files are needed for the NRC staff's independent review and verification of the satisfactory use of the model and modeled estimates.
4. If HMC intends to use License Condition 16 as a performance-based license condition, HMC must submit an amendment, in accordance with CO Condition 5, to request the current License Condition 16 be amended and replaced with a performance-based license condition that specifically allows for the formation of a SERP and SERP procedures.
5. In IR 040-08903/2018-001, the NRC inspectors noted that the changes to SOP-10 did not adequately address the cultural resources inventory as required, and as such staff

²⁷ ADAMS Accession No. ML19221B533.

review of SOP-10 with respect to cultural resources inventory remains open. Changes to SOP-10 to adequately address the cultural resources inventory are required.

6. In the NRC staff review of the July 26, 2017, submittal regarding the exceedance and re-injection project reports, completed on October 29, 2019,²⁸ the NRC staff provided one recommendation to the licensee. The recommendation from NRC's October 29, 2019, response is reproduced here for convenience and NRC expects it will be addressed as HMC addresses the additional recommendations in this current review:
 - a) Recommendation 4
The additional monitoring with increased frequency to provide early indications on potential exceedances, including: (1) daily conductivity measurements, (2) weekly measurements using a kinetic phosphorescence analyzer to detect uranium, (3) monitoring of molybdenum concentrations with a Hach meter, and (4) the review of preliminary laboratory results to mitigate exceedances of the GWPS in injection water, as documented in NRC Inspection Report 040-08903/2018-002 dated November 26, 2018, should be reflected in HMC's onsite procedures.
7. For the Root Cause Analysis associated with Apparent Violation 3, the NRC staff provides the following recommendation:
 - a) Recommendation 5
An additional root cause that should be added as a supplement to the RCA is the lack of a questioning attitude by the licensee.
8. For the HMC Schedule and Monitoring of Corrective Actions, the NRC staff provides two recommendations to the licensee:
 - a) Recommendation 6
Specific timeframes should be designated for the review of the corrective actions and assurances that the root causes have been mitigated.
 - b) Recommendation 7
The NRC should not be listed in an HMC organizational chart.

The NRC staff expects that HMC will address the items and recommendations in this review. The NRC staff approves the proposed corrective actions on condition that all of the items and recommendations in this review are addressed.

The NRC staff's understanding is that, in accordance with CO Condition 5, HMC will submit a license amendment request(s) to License SUA-1471, and/or implement procedure changes, to incorporate the corrective actions listed in HMC's letters dated November 15, 2017, and July 17, 2018, with updates to address the items and recommendations identified by NRC in this review.

²⁸ ADAMS Accession No. ML19289B451.

The NRC staff will evaluate HMC implementation of the items and recommendations in future NRC inspections. In addition, the NRC staff will review the documents, procedure changes, and other corrective actions during future NRC inspections.

HMC completion of CO Condition 1 requirements is documented in NRC inspection reports. HMC completion of implementation of the Conditions 2 and 5 requirements will be confirmed through future submittals from HMC and through NRC inspections, including confirmation of implementation of the corrective actions HMC has identified, and confirmation of appropriate license amendment and procedure updates.