NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
1 AEO	xv	Executive Summary, 2nd paragraph below bullets, 2nd sentence	Source control currently involves flushing of the soluble contaminant mass in the tailings pore water with unimpacted to slightly impacted low contaminant concentration water to expedite the draindown of seepage from the LTP to the groundwater.	Isn't the specific intent of large tailings pile (LTP) flushing to reduce contaminant mass that may otherwise continue to seep into the ground water over time? Please clarify.
2 DLM	xv	Executive summary, 3rd paragraph below bullets, 3rd sentence	If these land treatment limitations continue, additional delays should be expected, as this strategy is a critical component of the CAP.	By letter dated April 17, 2012, NMED has granted Temporary Permission for a period not to exceed 120 days for HMC to land apply contaminated water that is blended with ground water from the San Andres aquifer that achieves Site Alluvial aquifer ground water standards. As a condition under this Temporary Permission, which also will be included in the draft renewal/modification of DP-200, HMC is required 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. In order to promote continued efficacy in ground water remediation, HMC is also required 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.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
3 DLM	xvi	Executive summary, 1st (partial) paragraph, last sentence	Evaporation and land application are essential to the operation of the CAP.	See comment No. 2 above.
4 DLM	xvi	Executive summary, 3rd paragraph	HMC conducted a mass removal analysis of dissolved uranium to demonstrate the effectiveness of the plume control program…the results of this analysis…conclusively [demonstrate] that the decrease in dissolved uranium concentrations observed in the plume is due to mass removal, not dilution from injected water.	NMED does not agree that the statistical analysis of decreased dissolved uranium concentrations over time as detailed in Appendix E provides conclusive demonstration that the decrease in dissolved uranium concentrations can be attributed to mass removal, rather than dilution, throughout the area addressed by this analysis. The analysis presented in Appendix E is a volumetric calculation that does not account for ground water flow dynamics. HMC also could have quantified the amount of uranium that has been removed in its extraction activities through consideration of monitor well ground water analytical data and the volume of ground water that has been extracted over the time period considered; such analysis should yield a similar quantitative result to that resulting from the analysis that is presented in Appendix E. However, this volumetric analysis does not indicate what the primary mechanism is that results in the contaminant concentration reduction. HMC states that Alluvial ground water flow upgradient of the Site is approximately 63 gpm, while Alluvial ground water flow downgradient of the Site is approximately 338 gpm (section 3.2.2, p. 3-7); from this NMED infers that the a major component of the difference might be attributable to injected water. Without consideration of a ground water balance that shows the proportion of ground water captured through extraction in comparison to the total of injected "clean" water plus ground water that passes uncaptured through the area, adjusted for upgradient background ground

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
				water influx, the conclusion that the mass removal, rather than dilution, is the primary cause of contaminant reductions rather than dilution is unproven.
5 AEO	xvii	Executive Summary, 1st paragraph, 3rd sentence	HMC is currently evaluating three different alternative treatment technologies: *in situ* phosphate treatment, *ex situ* zeolite treatment, and electro-coagulation (EC).	Please provide a work plan for evaluating these alternative treatment technologies in an appendix to the CAP.
6 DLM	xvii	Executive summary, 3rd paragraph, 5th sentence	Without land treatment, the performance of the source control, plume control, and RO treatment programs is limited, and groundwater restoration will not be achieved on schedule.	See comment No. 2 above.
7 AEO	1-3	Section 1.1.2.1, 1st paragraph below bullets	Under the AEA, the NRC has the responsibility of regulation of source material and byproduct material generated from conventional uranium milling operations like the site. NRC regulations for source material facility licensing are found in 10 CFR 40.	This paragraph is redundant with the one below. Suggest deletion.
8 DLM	1-9	Section 1.1.3.1, 1st paragraph, 1st sentence	Rather than continue to conduct groundwater cleanup activities under the requirements of three competing regulatory programs, it is anticipated that the requirements of this CAP and the updated (pending) DRP will be incorporated into a Remedial Action plan approved by EPA, with NMED and NRC concurrence, under EPA's CERCLA authority and that the state discharge permits could be terminated.	NMED does not concur with this statement.
9 AEO	1-9	Section 1.1.3.1, 1st paragraph, 3rd sentence	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.	Please include a discussion of HMC's ongoing radon monitoring program including radon flux monitoring of the interim cover on the LTP, and monitoring at the site boundary. Also, please append a work plan for the radon monitoring program.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
10 DLM	1-11	Section 1.1.3.5, 2nd paragraph, 6th sentence	These site standards must be met at POC wells D1, X, and S4 in the alluvial aquifer and at the proposed POC wells CE2 and CE8 in the Upper Chinle Non-Mixing Zone.	NMED regulation stipulates that ground water must meet applicable standards "...at any place of withdrawal for present or reasonably foreseeable future use..." (20.6.2.3103 NMAC). Additionally, please include a discussion of how compliance with Chinle Mixing zone standards will be determined. NMED notes that the standards for some Constituents of Concern in the Chinle Mixing Zone are higher than the respective Alluvial ground water standard but lower than some or all non-mixing zone Chinle aquifer standards (e.g., uranium, sulfate, total dissolved solids). While it might be assumed that achievement of Alluvial standards for these constituents would imply achievement in the Mixing Zone, this should be verified formally through sample collection and analysis.
11 AEO	2-3	Section 2.3, 2nd paragraph, 1st sentence	The LTP contains tailings from ore milled under both federal government and commercial contracts for a total of 21.05 million tons of tailings; 11.41 million tons was generated under U.S. Atomic Energy Commission (AEC) contracts and 10.89 million tons from commercial contracts.	The tailings amount generated for the LTP adds-up to a total of 22.3 million tons (not 21.05 million tons). Please revise/correct.
12 AEO	2-3	Section 2.3, 3rd paragraph, 4th sentence	Detailed information about the grain size and geotechnical characteristics of the tailings is included in Appendix B.	Appendix B contains an engineering/stability assessment of the LTP that was completed in 1980. Has a more recent stability assessment been performed to characterize the LTP since flushing began in 2000? If so, please also include this report in Appendix B.
13 DLM	2-8	Section 2.4.3, 3rd paragraph, bulleted list	HMC plans to evaluate the monitoring program to determine if it can be further focused and optimized.	Additionally HMC should confirm the validity and integrity of the well completions as further documentation of data quality.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
14 AEO	2-9	Section 2.4.4, 3rd paragraph, 4th sentence	It has been estimated that the source control program has removed approximately 75,000 kg of dissolved uranium from the LTP itself from 2002 to 2009.	What is the basis for this estimate of dissolved uranium removed from the LTP? Is it based on a comparison of influent and effluent concentrations and volumes in the water treatment process (i.e. reverse osmosis)? Please explain.
15 DLM	3-2	Section 3.1, 3rd paragraph, last sentence	As a result, the alluvium contains significant concentrations of naturally occurring uranium, as well as selenium and molybdenum, which are typically present in uranium deposits.	HMC should cite references with analytical data to support this statement.
16 AEO	3-5	Section 3.2.2, 1st paragraph, 7th sentence	HMC has drilled more than 900 wells at the site and nearby downgradient locations (Figure 3.2.2-1).	Due to the complexity of the alluvial well network and associated operational flows, NMED recommends that HMC develop a comprehensive table that cross-references Figure 3.2.2-1, and identifies the various well types/uses (i.e. collection, injection, reversal, monitoring, etc.) and details their operational function and purpose. Also, please include information on water flow and disposition (i.e. RO treatment, LTP injection, transfer to EP, etc.). Furthermore, several wells are identified as "unknown/unassigned". Please explain and provide details on the purpose and use of these wells.
17 AEO	3-7	Section 3.2.3	Chinle Formation Aquifers	Please refer to comment No. 16 above, concerning Alluvial aquifer wells. NMED recommends that HMC develop a comprehensive table to differentiate the Chinle aquifer wells (upper, middle, & lower) and provide operational details similar to the approach for the alluvial aquifer wells.
18 AEO	3-7	Section 3.2.4	San Andres-Glorietta Regional Aquifer	Please see comment Nos. 16 and 17 above.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
19 DLM	4-4	Section 4.2.3, 4th paragraph, 3rd sentence	The results of this analysis [of dissolved uranium mass removal] confirm that the restoration program has removed a significant amount of uranium mass and that reductions in uranium concentrations are not primarily due to dilution.	See comment No. 4 above.
20 AEO	4-4	Section 4.2.3, 2nd paragraph, 3rd sentence	On the southeast side of the LTP, contaminant mass had migrated from the LTP to the vicinity of the evaporation ponds as a result of the flushing program. However, the southward extent of the plume along Highway 605 has steadily decreased in size and concentration between 1998 and 2010 and is currently limited to a narrow zone between wells L and L6.	Per Recommendation No.1 in Table A-4 , OU2-Former Mill Facility, please revise this description to indicate that uranium contamination southeast of the LTP (around the former mill facility) may be a remnant of contaminant mass that migrated from the LTP as a result of the flushing program.
21 DLM	4-5	Section 4.2.4	Total Dissolved Plume Mass	See comment No. 4 above.
22 DLM	5-3	Section 5.1, 3rd paragraph, 4th sentence	The actual schedule may be shorter than this predicted timeframe if alternative treatment technologies are implemented (pending favorable feasibility test results and required agency approval); alternatively, restoration may take longer if land treatment capacity is limited or there are other constraints that do not allow the simulated restoration activities and schedules to be achieved.	See comment No. 2 above.
23 AEO	5-3	Section 5.2, 1st paragraph, 3rd sentence	Flow values were obtained from both direct measurements and flow-balance calculation.	How have the flow rates at various extraction and injection wells been measured? Are the wells equipped with flow meters that are recorded periodically? Please clarify.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
24 DLM	5-9	Section 5.3.5, 2nd paragraph, 3rd sentence	HMC is proposing updated concentration limits for land treatment water, which will be more stringent than the above referenced standards to address concerns associated with ensuring that re-contamination of the alluvial aquifer is avoided in the four land treatment units.	As indicated in comment No. 2 above, HMC is required to collect both hydrochemical and soil moisture flux data to demonstrate that recontamination of the Alluvial aquifer will not occur.
25 DLM	5-9	Section 5.3.5, 4th paragraph, 1st sentence	Land treatment is typically limited to 7 to 8 months each year during the summer growing season, when the water is used for crop production.	HMC should consider whether an alternative water treatment method that would not be subject to such temporal limitation would promote greater efficiency and efficacy to the ground water restoration program.
26 AEO	5-12	Section 5.4, 1st paragraph, last sentence	HMC is currently evaluating three technologies…	Please provide a work plan for these alternative treatment technologies in an appendix to the CAP.
27 AEO	5-13	Section 5.4.1, 2nd paragraph, last sentence	Based on these results, HMC is currently implementing a pilot test of polyphosphate injections in a small area of the LTP to evaluate uranium removal under *in situ* test conditions.	Please call out and show the phosphate injection pilot test area on a related figure.
28 AEO	5-13	Section 5.4.2, 1st paragraph, 1st sentence	HMC is currently operating a pilot-scale zeolite pad on top of the LTP.	Please call out and show the zeolite pilot test area on a related figure.
29 AEO	5-14	Section 5.5.1.1, 2nd paragraph, 2nd sentence	To accomplish this objective, HMC identified a 1.3-acre area in the west-central part of the LTP where the source control program has significantly reduced COC concentrations.	Please call out and show the rebound evaluation area on a related figure and append a work plan that describes the details of the pilot test objectives, methods, and data quality.
30 AEO	5-15	Section 5.5.1.2, 2nd paragraph, 3rd sentence	Three potential areas in the east-central portion of the LTP have been identified as options for this tracer study.	Please call out and show the tracer study area on a related figure and append a work plan that describes the details of the tracer study objectives, methods, and data quality.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
31 DLM	5-16	Section 5.5.2.1	Mass Removal Analysis	As indicated in comment No. 4 above, HMC only presents a mass balance analysis without consideration for net ground water flux through the area. Without such consideration, the conclusion that extraction is the primary mode of the observed contaminant reduction is unproven.
32 AEO	6-3	Section 6.3.2, 3rd paragraph, 2nd sentence	HMC is evaluating whether the San Andres wells are adequately sealed. If HMC determines that these wells need to be abandoned, other San Andres wells will be used.	Per RSE Recommendation No. 9 (Table A-3), please provide more details and discussion of any plans to decommission/abandon and/or replace any potentially compromised San Andres aquifer wells. Please also provide a schedule for these activities, if possible.
33 AEO	6-4	Section 6.3.4, 1st paragraph, 1st sentence	The three lined evaporation ponds (EP-1, EP-2, and EP-3) will continue to be used in the same capacity as they are presently.	Per RSE Recommendation No. 8 (Table A-3), please include a discussion of qualitative measurements that could be made to assess leakage under the evaporation ponds, and more specifically to assure the integrity of the pond liner for EP-1.
34 AEO	7-11	Section 7.4.2, 1st paragraph, 2nd sentence	HMC is considering formalizing the CAP performance monitoring into an established program with specified analyte lists and monitoring frequencies, but this is not required by any involved agency and will be implemented only if determined to be beneficial for further optimizing current CAP operation monitoring activities.	Per RSE Recommendation No. 15 (Table A-3) and given the many monitoring wells and complexity of the monitoring activities, development of a more comprehensive objectives-based ground water monitoring program to assess the performance of the CAP is highly recommended.
35 AEO	A-14	Appendix A, Table A-3, Recommendation No. 1	The flushing of the tailings pile should be ended. If this is not adopted, a pilot test of the potential for rebound in concentrations should be conducted in a portion of the tailings pile. Monitoring should be conducted in depth-specific wells with short screen lengths.	Details of this nature are not included in Section 5.5.1.1. Please append a work plan that describes the details of the pilot test objectives, methods, and data quality.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
36 AEO	A-14	Appendix A, Table A-3, Recommendation No. 2	Simplification of the extraction and injection system is necessary to better focus on capture of the flux from under the piles and to significantly reduce dilution as a component of the remedy.	The referenced sections describe the effectiveness of the plume control program in removing dissolved uranium from the alluvial aquifer; however, they do not focus on capture of contaminant flux from the tailings piles. Section 5.5.2.1, Capture Zone Evaluation, indicates that HMC is considering using EPA capture analysis guidance to determine whether the performance of the hydraulic barrier can be improved or optimized. Please provide information that addresses this concern.
37 AEO	A-14	Appendix A, Table A-3, Recommendation No. 3	Further evaluate capture of contaminants west of the northwestern corner of the large tailings pile.	Section 5.3.2 does not discuss further evaluation for capture of contaminants west of the northwestern corner of the large tailings pile. Please provide information that addresses this concern.
38 AEO	A-14	Appendix A, Table A-3, Recommendation No. 5	Additional collection of geochemical parameters, including dissolved oxygen and oxidation reduction potential, of the groundwater beneath and downgradient of the LTP to characterize the geochemical environment and the role that reducing conditions induced by the flushing have had in immobilization of selenium (and the potential that cessation of the flushing may lead to less reducing conditions and release of the selenium).	Details of geochemical data collection and analysis are not included in Section 5.5.1.1. Please append a work plan that describes the details of rebound pilot testing.
39 AEO	A-14	Appendix A, Table A-3, Recommendation No. 6	If the field pilots to reduce uranium concentrations in the groundwater through adsorption or *in situ* precipitation are approved and the results from the pilots are promising, apply in larger scale to applicable portions of the LTP and the groundwater.	Please provide a work plan for evaluating these alternative treatment technologies in an appendix to the CAP and please show the locations of the pilot test areas on associated site maps/figures.

NMED Comments on Draft-Final CAP				
	Page	**Section**	**Sentence/Text (as stated)**	**Comment**
40 AEO		Appendix J	Land Treatment	Please refer to comment No. 2 above.
41 AEO		Appendix J, Attachment J-1	Evaluation of Years 2000 through 2010 Irrigation with Alluvial Ground Water	NMED has already reviewed and submitted comments on this document in a transmittal letter to HMC dated July 29, 2011.
42 AEO	K-1	Appendix K, Steps 1 and 2	Identify site wells that are currently being used or may be used as monitoring wells to evaluate the performance of the CAP in a comprehensive table	As part of this comprehensive table, please list the specific component of the ground water remedy that is characterized by the selected wells (i.e. background, LTP seepage, point-of-compliance, etc.), and include the rationale and objective for adding or deleting specific wells in the monitoring program per the optimization process outlined in Figure 2.4.3-1.
43 AEO	K-1	Appendix K, Step 3, 1st bullet	Compare data from the most recent round of sampling to historic results	NMED recommends that HMC develop contaminant distribution maps with integrated time-series plots to spatially show the historic water quality trends for specific wells across the site.