Appendix 2.2-A

Identification of Constituents

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1 Introduction

This document presents the assessment of constituents in groundwater at the Homestake Mining Company of California (HMC) Grants Reclamation Project (GRP) near Grants, New Mexico. Groundwater protection standards for United States Nuclear Regulatory Commission (NRC) licensed 11e.(2) Byproduct Material are identified in NRC License SUA-1471 (License), Condition 35B and Appendix A to 10 Code of Federal Regulations (CFR) Part 40.

Criterion 5B(1) states:

> "*Uranium and thorium byproduct materials must be managed to conform to the following secondary groundwater protection standard: 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.*"

Hazardous constituents are defined in Criterion 5B(2), which states:

> *"A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:*
> *(a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;*
> *(b) The constituent has been detected in the groundwater in the uppermost aquifer;* ***and*** [emphasis added]
> *(c) The constituent is listed in Criterion 13 of this appendix."*

HMC has systematically reviewed available information, including process knowledge of reagents and general understanding of the regional uranium ores together with data from groundwater sampling in the area to identify substances present in groundwater at the facility. Some of the identified constituents constitute "hazardous constituents" within the definition in Criterion 5(B)(2), and other identified constituents do not constitute "hazardous constituents" within that meaning because they are not identified in Criterion 13 of Appendix A to 10 CFR Part 40.

This Appendix discusses both hazardous constituents and other constituents (non-hazardous-constituents) for purposes of information, because they have the potential to be regulated by other agencies and mechanisms. One sub-set of these other substances comprises those substances for which NRC has established a groundwater protection standard under License SUA 1471, License Condition 35(B).

License Condition 35B currently identifies groundwater protection standards for the ten following constituents. The specified standards vary depending on the aquifers and aquifer mixing zones considered.

- chloride (Cl)
- molybdenum (Mo)
- nitrate (NO_3-N)
- selenium (Se)
- sulfate (SO_4)
- total dissolved solids (TDS)
- uranium (Unat)
- vanadium (V)
- thorium-230 (Th-230)

- combined radium-226+228 (Ra-226+228)

Chloride, sulfate, nitrate, vanadium, and TDS, however, are not listed in Appendix A, Criterion 13. Vanadium pentoxide is the only form of vanadium listed in Criterion 13. Thus, chloride, sulfate, TDS and vanadium do not constitute "hazardous constituents" under the definition in Appendix A even if those substances are present in groundwater at concentrations greater than the License 35B standards. If determined to be present in groundwater at concentrations greater than the License 35B standards, these constituents will be referred to "License Constituents".

Through sampling and analysis of tailings waters and groundwater at the GRP, HMC has identified three additional constituents not listed in the License that meet the definition of hazardous constituents in Criterion 5B(2) for which NRC has promulgated groundwater protection standards in Criterion 5C; arsenic (As), cadmium (Cd), and adjusted gross alpha. In addition, through sampling and analysis of tailings waters and groundwater at the GRP, HMC has identified two additional constituents not listed in the License that meet the definition of hazardous constituents in Criterion 5B(2) for which NRC does not have promulgated groundwater protection standards in Criterion 5C; boron (B) and fluoride/fluorine (F). The Hazardous Constituents identified in the License (Mo, Se, U, Ra-226+228, Th-230), the "License Constituents" identified above (Cl, SO_4, NO_3-N, V, TDS), and the four constituents not in the License but identified by HMC through sampling and analysis (As, B, Cd, F) are collectively referred to as the constituents to be addressed under the ACL application.

The systematic review process for tailings water and groundwater data used to identify constituents to be addressed in the ACL application included the following steps:

- **Step 1: Identify Potential Hazardous Constituents, License Constituents to be addressed**
  - Identify constituents listed in Criterion 13 of Appendix A to 10 CFR Part 40 associated with ores and process reagents (see Table App2.2A-1).
  - Identify additional constituents known or potentially associated with ores and process reagents not listed in Criterion 13 of Appendix A to 10 CFR Part 40 (see Table App2.2A-2).
- **Step 2: Identify Applicable Groundwater Protection Standards**
  - Identify License Condition 35B groundwater protection standards for hazardous constituents and License constituents to be addressed, as available (see Table App2.2A-3).
  - Identify groundwater protection standards in Criterion 5C of Appendix A to 10 CFR Part 40 for potential constituents to be addressed in the ACL Application, as available (see Table App2.2A-3).
  - Identify other relevant and potentially appropriate standards or protective criteria where NRC Condition 35B or Criterion 5 of Appendix A to 10 CFR Part 40 does not specify numerical standards (see Table App2.2A-3).
  - Background groundwater concentrations for individual aquifers and aquifer mixing zones were established for the License and agreed upon by NRC, New Mexico Environment Department (NMED) and the EPA in 2006. However, because background groundwater concentrations are being re-evaluated by EPA at this time, this analysis only relies on promulgated standards. If background groundwater concentrations are later to be determined to be higher than the lowest promulgated standard, constituents may be re-assessed at a future date and potentially excluded as a constituent to be addressed if that constituent is not present in the groundwater above the higher of background or the lowest promulgated standard. However, this approach for identifying constituents to be addressed is considered conservative as it is more inclusive and uses the lowest standards where appropriate and available. *It should be noted that consideration of standards not promulgated by NRC are only used herein as a*

screening tool and their use does not constitute approval or acceptance of those standards for other purposes.

- **Step 3: Assess Source Term Concentrations for Potential Constituents.**
  - The data sets used for this assessment are as follows.
    - 1987 NRC sampling of two Large Tailings Pile ponds for a broad range of constituents (see Tables App2.2A-4 and App2.2A-5, Attachment App2.2A-A includes the original 1987 data from NRC)
    - Large Tailings Pile sampling by HMC from September 1997 through October 2020. (See Table App2.2A-6, Attachment App2.2A-B includes an electronic file of the HMC Large Tailings Pile data)
  - Compare Large Tailings Pile water concentrations to License standards in Condition 35B and other relevant and appropriate standards where the License or Criterion 5 do not specify numerical standards (See Tables App2.2A-4 through -6).
  - Retain constituents for evaluation of groundwater concentrations:
    - that are listed in the License,
    - that are a) listed in Criterion 13 and known and/or b) potentially associated with ores and process reagents not listed in Criterion 13 above the lowest applicable standard, or relevant and appropriate standards where the License or Criterion 5 does not specify numerical standards, and
    - whose concentrations with respect to the standards in License Condition 35B and other applicable standards, or relevant and appropriate standards cannot be determined due to high reporting limits.

- **Step 4: Assess Groundwater Concentrations of Potential Constituents**
  - Assess the recent groundwater concentrations from analytical data of samples collected between February 2015 and April 2021 of the retained constituents in the uppermost aquifer with respect to the lowest applicable standard, or relevant and appropriate standards where the License or Criterion 5 does not specify numerical standards. Attachment App2.2.A-B includes an electronic file of the groundwater analytical data.
  - Assess the recent (February 2015 to April 2021) groundwater concentrations of constituents not retained by screening of the Large Tailings Pile fluid concentrations for which groundwater data are available to verify that groundwater conditions for these constituents are consistent with screening of Large Tailings Pile source.
  - Those constituents listed in the License and/or Criterion 5C and/or Criterion 13 confirmed to be present in the Large Tailings Pile and in groundwater of the uppermost aquifer at or beyond the point of compliance (POC) above the lowest applicable standard, or relevant and appropriate standards where the License or Criterion 5 do not specify numerical standards, are considered constituents to be addressed. In a few instances, where the historical groundwater concentrations of a constituent are very low and more than one recent groundwater concentration measurement at that sampling location are below the lowest applicable standard, or relevant and appropriate standards or criteria, a constituent may be deemed not to pose a reasonable potential for present or future hazard and is not retained as a constituent to be addressed.

The systematic review and decision process is discussed in this document. Section 2 discusses the calculated background groundwater concentrations. Section 3 discusses the constituent concentrations reported from samples collected both by the NRC sampling of two ponds on the Large Tailings Pile in 1987 and samples collected from Large Tailings Pile wells and sumps by HMC. Section 4 discusses the constituent concentrations of GRP groundwater samples collected between 2015 and 2021 and compares these

concentrations to the lowest promulgated or License groundwater protection standard. Section 5 outlines the constituents retained from the review of Large Tailings Pile fluid and GRP groundwater analytical data. The decision process by which constituent data were reviewed and retained as constituents to be addressed is illustrated in Figure App2.2.A-1. The data sets for tailings and the lowest applicable standard, or relevant and appropriate standards or criteria, are presented in Tables App2.2A-1, -2, and -3. The groundwater data set for the constituents retained from the Large Tailings Pile data assessment are presented in Table App2.2A-4. Figure App2.2A-2 illustrates the Large Tailings Pile fluid sampling locations while Figure App2.2A-3 illustrates the groundwater well locations for the data in Table App2.2A-3.

2 Step 1 Identify Potential Constituents

Table App2.2.A-1 identifies those constituents listed in Criterion 13 known or possibly associated with ores and/or the milling process. Table App2.2A-2 identifies those constituents not listed in Criterion 13 known or possibly associated with ores and/or the milling process. Based on the information presented in these two tables, the following constituents are identified as reasonably known to have been or are possibly associated with ores and/or the milling process, that will be subject to further evaluation.

- Radionuclides:
  - uranium, combined radium-226+228, and thorium, adjusted gross alpha
- Non-Radionuclides
  - Aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, vanadium, zinc
  - ammonia, chloride, fluorine (fluoride). nitrate, nitrite, sulfate, total dissolved solids,
  - ammonium sulfate, polyacrylamide, sodium carbonate, sodium bicarbonate, sodium hydroxide, sulfuric acid

Specific analyses for the non-radionuclides in the ores processed at the mill have not been located are retained as there are not sufficient data or evidence to exclude them from further consideration.

3 Step 2 Identify Applicable Groundwater Protection Standards

The following sections discuss the systematic review process steps for establishing the lowest appropriate protective standards or criteria.

3.1 License Standards, NRC Promulgated Standards, and Other Potentially Appropriate Standards or Protective Criteria

Table App2.2A-3 identifies License Condition 35B groundwater protection standards as well as groundwater protection standards promulgated in Criterion 5 of Appendix A to 10 CFR Part 40 for potential constituents to be addressed. Table App2.2A-3 identifies also identifies groundwater protection standards promulgated by the State of New Mexico (Chapter 20.6.2.3103) and EPA (40 CFR 192.32(a)(2) and 40 CFR 141.23.

3.2 Background Groundwater Concentrations

Background groundwater concentrations were developed over the period 1999 through 2006 (HMC 2003a; 2003b; HMC and Hydro-Engineering 2003; HMC 2005a; HMC 2005b; HMC 2006; NRC, 2006). The NRC, EPA, and NMED agreed upon groundwater cleanup levels that included background in 2006 with NRC

approval of License Condition 35.B (Amendment 39); EPA approved the levels in letter to NRC dated September 27, 2005; and the NMED approved these levels for inclusion in DP-200 via a letter dated August 18, 2005. The current background groundwater concentrations identified in the License and DP-200 are identified herein. However, EPA has recently initiated re-assessment of groundwater background in the Alluvial Aquifer, in the Chinle sandstone unit mixing zones where those units subcrop in the saturated alluvium, and in the upper, middle and lower Chinle sandstone units.

To eliminate the uncertainty associated with background levels, constituents are assessed solely based on the lowest applicable standard, or relevant and other potentially appropriate standards or protective criteria where the License or Criterion 5 do not specify numerical standards. This will ensure all potential constituents to be addressed are included. The list of identified constituents to be addressed will be revised if, in the future, groundwater background is identified as being higher than a maximum measured groundwater constituent concentration warranting removal of an analyte previously considered a constituent to be addressed.

4 Step 3 Assess Source Term Concentrations for Potential Constituents.

Source term concentrations from the Large Tailings Pile are assessed using data from NRC 1987 Large Tailings Pile pond sampling results and from HMC Large Tailings Pile fluid sampling data for the period 1997 through June 2021.

4.1 Large Tailings Pile Fluid Constituent Concentrations

Large Tailings Pile fluid constituent concentrations are reviewed in two steps. First, the NRC 1987 Large Tailings Pile pond sampling results were viewed and determinations made regarding the concentrations of constituents above groundwater protection standards, or in the absence of groundwater protection standards, EPA tap water screening levels. Constituents above the protective standards are retained for further consideration as potential constituents to be addressed. Constituents below groundwater protection standards or EPA tap water screening levels are not retained. Second, constituents whose concentrations with respect to groundwater protection standards or screening levels cannot be clearly determined from the NRC 1987 Large Tailings Pile pond sample results are then assessed by reviewing Large Tailings Pile fluid samples.

The NRC sampled the Large Tailings Pile liquid from each of two ponds located at that time on the top of the Large Tailings Pile. These ponds are identified by NRC as the East Pond (sample location H-1) and the West Pond (sample location H-2). Sampling took place on April 6, 1987 to support identification of the constituents to be addressed for uranium mill tailings in general, and for the License. The NRC analyzed the samples for dissolved and total concentrations of 31 metals, 18 other non-metal compounds, major ions, three radionuclides, as well as 99 organic compounds (e.g., volatile organic compounds, pesticides, herbicides). Samples were named as follows:

- Location H-1 (East Pond)
    - Total Analyses
        - Sample-039
        - Sample-056
    - Dissolved Analyses
        - Sample-032

        - Sample-056
- Location H-2 (West Pond)
    - Total Analyses
        - Sample-040
        - Sample-057
    - Dissolved Analyses
        - Sample-033
        - Sample-057

These data, along with the lowest applicable standard, or relevant and other potentially appropriate standards or protective criteria where the License or Criterion 5 do not specify numerical standards are presented in Tables App2.2A-4 and App2.2A-5. The original NRC data are included in Attachment App2.2A-A to this Appendix.

In addition, the available Large Tailings Pile fluid sampling data for the period 1997 through June 2021 were also evaluated. Constituents in the Large Tailings Pile fluid reported in both the 1987 NRC data set and the HMC data set that were below the lowest current applicable standard, or other potentially relevant and appropriate standards or criteria where the License or Criterion 5 do not specify numerical standards, were deemed to not be present at sufficient concentrations in the tailings to pose a current or potential future hazard in groundwater at or beyond the point of compliance and not retained for further assessment. Constituents reported above the lowest current applicable standard, or other potentially relevant and appropriate standards were retained for further assessment in groundwater. Constituents that were reported as below the laboratory reporting limits where the laboratory reporting limits were above the lowest current applicable standard, or other potentially relevant and appropriate standards or criteria were retained for further assessment in groundwater.

The following sections discuss the Large Tailings Pile fluid quality assessment results.

4.2 Inorganic Constituents

Analytical results for testing of Large Tailings Pile fluid for inorganic constituents, including radionuclides, are presented in Tables App2.2A-4 through App2.2A-6.

4.2.1 Silver

The lowest promulgated groundwater protection standard for silver is 0.05 mg/L and is consistent between Criterion 5C of Appendix A to 10 CFR Part 40 and New Mexico Administrative Code (NMAC) Section 20.6.2.3103.A (Human Health). Silver is listed in Criterion 13. All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of between 0.55 mg/L and 0.3 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for silver. Of the four Large Tailings Pile fluid samples (3 total, 1 dissolved), all silver concentrations were below the 0.05 mg/L lowest promulgated standard. Therefore, silver was not retained as a constituent to be addressed.

4.2.2 Aluminum

A promulgated groundwater protection standard for aluminum is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard for aluminum is 5 mg/L based on NMAC Chapter 20.6.2.3103.C (Irrigation). The total concentration of aluminum from one of the two NRC 1987 samples was above the standard (7 mg/L) while the dissolved concentration of that sample and both the total and dissolved concentration of the second NRC sample were below the lowest promulgated standard. All Large Tailings Pile fluid analytical results for total (3 samples) and dissolved aluminum (110 samples) were below the 5 mg/L lowest promulgated standard. Because the single NRC total analysis was close to the standard and all the NRC 1987 Large Tailings Pile pond sample dissolved results and all the numerous HMC Large Tailings Pile fluid sample results were below the standard, there is a reasonable assurance that aluminum in the Large Tailings Pile fluid does not pose a current or potential future hazard to groundwater. Therefore, aluminum was not retained as a constituent to be addressed.

4.2.3 Arsenic

The License does not specify a groundwater protection standard for arsenic, it is listed in Criterion 13. The lowest promulgated standard for arsenic is 0.01 mg/L in NMAC Chapter 20.6.2.3103.A (Human Health), which is lower than the NRC standard of 0.05 mg/L in Criterion 5C of Appendix A to 10 CFR Part 40. All NRC 1987 Large Tailings Pile pond sample total and dissolved analyses and many of the 36 HMC Large Tailings Pile fluid samples (3 total; 33 dissolved) were above the lowest promulgated standard. Therefore, arsenic is retained as a potential constituent for assessment in groundwater.

4.2.4 Boron

A promulgated groundwater protection standard for boron is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard for boron is 0.75 mg/ in NMAC Chapter 20.6.2.3103.C (Irrigation). All NRC 1987 Large Tailings Pile pond samples were above this standard (highest was 3.7 mg/L total, 2.2 mg/L dissolved). The HMC Large Tailings Pile fluid sampling data record does not include boron. Therefore, boron is retained as a potential constituent for assessment in groundwater.

4.2.5 Barium

A promulgated groundwater protection standard for barium is not specified in the License, it is not listed in Criterion 13. The lowest promulgated standard for barium is 1 mg/L in Criterion 5C in Appendix A to 10 CFR 40, which is lower than the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 2 mg/L. All NRC sample total and dissolved analytical results and all the 71 HMC Large Tailings Pile fluid samples (3 total; 68 dissolved) were below the lowest promulgated standard. Therefore, barium is not retained as a constituent to be addressed.

4.2.6 Beryllium

A promulgated groundwater protection standard for beryllium is not specified in NRC regulation or in the License, it is listed in Criterion 13. The lowest promulgated standard for beryllium is 0.004 mg/L in the NMAC Chapter 20.6.2.3103.A (Human Health), which is consistent with the EPA maximum contaminant level (MCL) specified in 40 CFR Part 141.23 (Drinking Water). All the NRC 1987 Large Tailings Pile pond samples were

analyzed at a reporting limit of between 0.012 mg/L and 0.022 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for beryllium. The Large Tailings Pile fluid sampling data do not include beryllium. Because the concentrations of beryllium in the Large Tailings Pile fluid could not be definitively ascertained, beryllium is retained as a potential constituent for assessment in groundwater.

4.2.7 Cadmium

The License does not specify a groundwater protection standard for cadmium, it is listed in Criterion 13. The lowest promulgated standard for cadmium is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.005 mg/L, which is the same as the EPA maximum contaminant level (40 CFR Part 141.23 [Drinking Water]) and lower than the NRC Criterion 5C in Appendix A to 10 CFR 40 standard of 0.01 mg/L. All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of between 0.03 mg/L and 0.055 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for cadmium. Only one of the four HMC Large Tailings Pile fluid samples (3 total; 1 dissolved) were analyzed with a reporting limit sufficient to determine the constituent concentrations, that result was less than 0.005 mg/L. Although the NRC 1987 Large Tailings Pile pond sample results indicated relatively low concentrations and the single result HMC sample result had a reported concentration less than lowest standard, the data record was not sufficiently robust to definitively exclude cadmium as a potential constituent. Therefore, cadmium is retained as a potential constituent for assessment in groundwater.

4.2.8 Chloride

The License specifies a groundwater protection standard of 250 mg/L for the Alluvial Aquifer, the Chinle Mixing Zone and the Middle Chinle Aquifer, although it also specifies higher concentrations for the Upper Chinle and Lower Chinle Aquifers. Chloride is not listed in Criterion 13. The License groundwater protection standards are consistent with DP-200 and NMAC Chapter 20.6.2.1303.B (Other Domestic). All NRC 1987 Large Tailings Pile pond samples and the majority of the 645 Large Tailings Pile fluid samples exceed the License groundwater protection standard. Therefore, chloride was retained as a potential constituent for assessment in groundwater.

4.2.9 Cobalt

A promulgated groundwater protection standard for cobalt is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard is the NMAC Chapter 20.6.2.3103.C (Irrigation) standard of 0.05 mg/L. All the NRC 1987 Large Tailings Pile pond samples were analyzed with a reporting limit of between 0.06 mg/L and 0.11 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for cobalt. All 11 of the HMC Large Tailings Pile fluid samples (3 total; 8 dissolved) were below the lowest standard. Therefore, cobalt is not retained as a constituent to be addressed.

4.2.10 Chromium

The License does not specify a groundwater protection standard for chromium, it is listed in Criterion 13. The lowest promulgated standard for cadmium is the Criterion 5C in Appendix A to 10 CFR 40 standard of 0.05 mg/L, which is the same as the NMAC Chapter 20.6.2.3103.A (Human Health) standard but which is lower than the EPA 40 CFR Part 141.23 (Drinking Water) maximum contaminant level of 0.1 mg/L. All the NRC 1987 Large Tailings Pile pond samples were analyzed with a reporting limit of between 0.24 mg/L and 0.44 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for chromium. All 47 of the HMC Large Tailings Pile fluid samples (3 total; 44 dissolved) were below the lowest standard. Therefore, chromium is not retained as a constituent to be addressed.

4.2.11 Copper

A promulgated groundwater protection standard for copper is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard for copper is the NMAC 20.6.2.3103.B (Other Domestic) standard of 1.0 mg/L. All the NRC 1987 Large Tailings Pile pond samples were reported to have concentrations below this standard. Four of the five of the HMC Large Tailings Pile fluid samples (3 total; 2 dissolved) were below the lowest standard, the highest value was a dissolved sample reported at 0.06 mg/L. Therefore, copper is not retained as a constituent to be addressed.

4.2.12 Fluoride

A promulgated groundwater protection standard for fluoride is not specified in NRC regulation or in the License. Fluoride is not listed Criterion 13 of Appendix A to 10 CFR 40, although fluorine is listed.
Fluorides and fluorine are chemically related but are not the same. Fluorine is a naturally-occurring, pale yellow-green gas with a sharp odor and combines with metals to make fluorides such as sodium fluoride and calcium fluoride. Analytical methods for fluoride use ion-specific electrodes to measure the dissolved anionic form of fluorine (F^-).

The lowest promulgated standard for fluoride is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 1.6 mg/L. EPA does not have a promulgated fluoride standard for groundwater. All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of 10 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for fluoride. The HMC Large Tailings Pile fluid data set has a single reported value for fluoride of 4.45 m/L. Because this data is limited, fluoride is retained as a Tailings Pile Pond potential constituent for assessment in groundwater.

4.2.13 Iron

A promulgated groundwater protection standard for iron is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard for copper is the NMAC 20.6.2.3103.B (Other Domestic) standard of 1.0 mg/L. One of the four NRC 1987 Large Tailings Pile pond samples (9.4 mg/L) was reported as above this standard. All 150 HMC Large Tailings Pile fluid samples (3 total; 147 dissolved) were below the lowest standard, except two samples. An October 2018 sample and a June 2019 sample from investigation location WME-4 were reported as 2 mg/L and 1.1 mg/L, respectively. Five other samples from

this single location, collected in August 2018, February, April 2019 and December 2019 and February 2020 were all below the standard.

These data do not indicate that iron is present in the tailing at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Therefore, iron is not retained as a constituent to be addressed.

4.2.14 Manganese

A promulgated groundwater protection standard for manganese is not specified in NRC regulation or in the License, it is not listed in Criterion 13. The lowest promulgated standard for manganese is the NMAC 20.6.2.3103.B (Other Domestic) standard of 0.2 mg/L. Two of the four NRC 1987 Large Tailings Pile pond samples (1 mg/L and 0.32 mg/L) was reported as above this standard, the other two were below the standard. All the 121 HMC Large Tailings Pile fluid samples (3 total; 118 dissolved) were below this standard except two samples. A November 2010 sample from location ES2 was reported as 0.61 mg/L, the only result from this location. A July 2018 sample from location South 1 Sump was reported as 0.392 mg/L, although all other samples from this location (4 other samples, 2018 through 2021) were below this standard. These data do not indicate that manganese is present in the tailings at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Therefore, manganese is not retained as a constituent to be addressed.

4.2.15 Mercury

The License does not specify a groundwater protection standard for mercury, it is listed in Criterion 13. The lowest promulgated standard for mercury is 0.002 mg/L per Criterion 5C in Appendix A to 10 CFR 40, which is the same as the NMAC Chapter 20.6.2.3103.A (Human Health) standard and the EPA maximum contaminant level in 40 CFR Part 141.23 (Drinking Water). All NRC 1987 Large Tailings Pile pond samples reported mercury below the lowest promulgated standard. All the 11 HMC Large Tailings Pile fluid samples (3 total; 8 dissolved) were below this standard except one sample, which reported a value of 0.002 mg/L. These data do not indicate that mercury is present in the tailings at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Therefore, mercury is not retained as a constituent to be addressed.

4.2.16 Molybdenum

The License specifies a groundwater protection standard of 0.1 mg/L for molybdenum in all aquifers and mixing zones. This groundwater protection limit is consistent with the standard in the DP-200 but substantially lower than the NMAC Chapter 20.6.2.3103.C (Irrigation) standard of 1.0 mg/L. All NRC 1987 Large Tailings Pile pond sample and the majority of the 1,313 HMC Large Tailings Pile fluid sample (3 total; 1,310 dissolved) results exceed that limit. Therefore, molybdenum was retained as a potential constituent for assessment in groundwater.

4.2.17 Nickel

A promulgated groundwater protection standard for nickel is not specified in NRC regulation or in the License, it is listed in Criterion 13. The lowest promulgated standard for nickel is the NMAC Chapter 20.6.2.3103.C (Irrigation) standard of 0.2 mg/L. All the NRC 1987 Large Tailings Pile pond samples were analyzed with a

reporting limit of between 0.36 mg/L and 0.66 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for nickel. All 36 of the HMC Large Tailings Pile fluid samples (3 total; 33 dissolved) were below the lowest standard. Therefore, nickel is not retained as a constituent to be addressed.

4.2.18 Lead

The License does not specify a groundwater protection standard for lead, it is listed in Criterion 13. The lowest promulgated standard for lead is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.015 mg/L, which is lower than the 0.05 mg/L limit Criterion 5C in Appendix A to 10 CFR 40, which is consistent with the EPA maximum contaminant level (MCL) per 40 CFR Part 141.23 (Drinking Water). All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of between 1.2 mg/L and 2.2 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for lead. All 43 of the HMC Large Tailings Pile fluid samples (3 total; 40 dissolved) were below the reporting limit of 0.05 mg/L except 3 dissolved values. A march 1998 sample from location ES-6 as reported at a concentration 0.05 mg/L although a subsequent November sample from this location was below the reporting limit (less than 0.05 mg/L). Two June 2021 samples, one from North 1 Sump and one from South 1 Sump were reported at concentrations of 0.001 and 0.003 mg/L, respectively. Although the HMC Large Tailings Pile fluid sample results indicate lead concentrations are very low (less than or equal to 0.05 mg/L) and a few recent data from sump locations that may be considered aggregate samples of bulk Large Tailings Pile fluid conditions are less than lowest standard, the data record was not considered sufficiently robust to definitively exclude lead as a potential constituent. Therefore, lead is retained as a potential constituent for assessment in groundwater.

4.2.19 Antimony

A promulgated groundwater protection standard for antimony is not specified in either regulation or in the License. The lowest promulgated standard for antimony is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.006 mg/L. All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of between 1.2 mg/L and 2.2 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for antimony. Three of the seven HMC Large Tailings Pile fluid samples (7 total; 0 dissolved) were below the lowest standard, one sample was reported at the standard and three samples were reported above the standard. Therefore, antimony is retained as a potential constituent for assessment in groundwater.

4.2.20 Selenium

The License specifies groundwater protection standards for selenium that vary from 0.07 mg/L (Middle Chinle mixing zone) to 0.32 mg/L (Alluvium and Lower Chinle). The lowest promulgated groundwater protection standard for selenium is 0.01 mg/L per Criterion 5C of Appendix A to 10 CFR Part 40, which is lower than the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.05 mg/L and the EPA maximum contaminant level (MCL) in 40 CFR Part 141.23 (Drinking Water). All the NRC 1987 Large Tailings Pile pond samples were reported above the lowest standard and above the current license condition standards. Many the 1,311 HMC Large Tailings Pile fluid samples (3 total; 1,308 dissolved) were above the lowest standard and license condition limits. Therefore, selenium is retained as a potential constituent for assessment in groundwater.

4.2.21 Tin

A promulgated groundwater protection standard for tin is not specified in either regulation or in the License. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for tin. EPA has a tap water screening level of 1.2 mg/L. All the NRC 1987 Large Tailings Pile pond samples were reported as below this screening level. All the seven HMC Large Tailings Pile fluid samples (0 total; 7 dissolved) were below this screening level. Therefore, tin is not retained as a constituent to be addressed.

4.2.22 Thallium

A promulgated groundwater protection standard for thallium is not specified in either NRC regulation or in the License. The lowest promulgated standard for antimony is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.002 mg/L, which is the same as the EPA 40 CFR Part 141.23 (Drinking Water) maximum contaminant level (MCL). All the NRC 1987 Large Tailings Pile pond samples were analyzed at a reporting limit of 0.05 mg/L and, therefore, the status of the constituent could not be determined from those data. One of the seven HMC Large Tailings Pile fluid samples (7 total; 0 dissolved) were reported as above the lowest promulgated standard (0.003 mg/L) and one result was reported at the lowest promulgated standard while the five other samples were reported as below the lowest standard. These data do not indicate that thallium is present in the tailings at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Therefore, thallium is not retained as a constituent to be addressed.

4.2.23 Uranium

The License specifies groundwater protection standards for uranium that vary from 0.03 mg/L (Lower Chinle) to 0.18 mg/L (Chinle mixing zone). The lowest promulgated standard for uranium is 0.03 mg/L per Criterion 5C of Appendix A to 10 CFR Part 40, which is the same as the NMAC Chapter 20.6.2.3103.A (Human Health) standard and the EPA 40 CFR Part 141.23 (Drinking Water) maximum contaminant level (MCL). All the NRC 1987 Large Tailings Pile pond samples were reported above the lowest standard and above the current license condition standards. A large number of the 1,436 HMC Large Tailings Pile fluid samples (27 total; 1,409 dissolved) were above the lowest standard and the majority were above License groundwater protection standards. Therefore, uranium is retained as a potential constituent for assessment in groundwater.

4.2.24 Vanadium

The License specifies groundwater protection standards for vanadium that vary from 0.01 mg/L (Upper Chinle and Chinle mixing-zone) to 0.02 mg/L (Alluvium). Neither New Mexico nor the EPA have a promulgated groundwater protection standard for vanadium. EPA has a tap water screening level of 0.0086 mg/L. All the NRC 1987 Large Tailings Pile pond samples were reported above the lowest standard and above the current License groundwater protection standards. A large number of the 147 HMC Large Tailings Pile fluid samples (3 total; 144 dissolved) were above the lowest standard and the License groundwater protection standards. Therefore, vanadium is retained as a potential constituent for assessment in groundwater.

4.2.25 Zinc

A promulgated groundwater protection standard for zinc is not specified in either NRC regulation or in the License. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for zinc. EPA has a tap water screening level of 0.6 mg/L. All the NRC 1987 Large Tailings Pile pond samples were reported

below this screening level. All the 36 HMC Large Tailings Pile fluid samples (3 total; 33 dissolved) were reported as below this screening level. Therefore, zinc is not as a constituent to be addressed.

4.2.26 Ammonia

A promulgated groundwater protection standard for ammonia (NH_3-N) is not specified in either NRC regulation or in the License. Neither New Mexico nor the EPA has a promulgated groundwater protection standard for ammonia and EPA does not have a tap water screening level for this constituent. The two NRC 1987 Large Tailings Pile pond samples for ammonia were reported at 0.2 mg/L. The 70 HMC Large Tailings Pile fluid samples for ammonium (NH_4-N) were reported at concentrations ranging from 0.04m mg/L to 8.6 mg/L. It is noted that ammonium (NH_4-N) is the reported analyte due to sample preservation (pH less than 2 s.u.) shifting all ammonia (NH_3-N) to ammonium. These ammonium results do not accurately represent the concentrations of ammonia. Ammonia concentrations can be calculated from the ammonium data using the field pH.

However, ammonia is known to be associated with mill process reagents and it is well documented that ammonia breaks down to nitrate under nitrification. Nitrification is common and natural microbial process by which reduced nitrogen compounds (primarily ammonia) are sequentially oxidized to nitrite and nitrate (EPA, 2002). Nitrifying bacteria are aerobic organisms commonly found in terrestrial and aquatic environments (Holt et al. 1995, Watson et al. 1981). Therefore, ammonia is retained as a constituent for assessment in groundwater.

4.2.27 Nitrite

A promulgated groundwater protection standard for nitrite (NO_2-N) is not specified in either NRC regulation or in the License. The lowest promulgated standard for nitrite is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 1 mg/L, which is the same as the EPA 40 CFR Part 141.23 (Drinking Water) maximum contaminant level (MCL). Nitrite in all the NRC 1987 Large Tailings Pile pond samples was reported as below the reporting limit of 50 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for nitrite. The HMC Large Tailings Pile fluid dataset does not contain any nitrite concentration data. However, the HMC Large Tailings Pile fluid does contain nitrate concentrations and measured nitrate+nitrite concentrations. A review of these concentrations in the sump samples indicate that nitrate+nitrite concentrations are similar to and not substantially higher than nitrate concentrations at the same locations. This indicates that nitrite is not likely to be present at elevated concentrations in the Large Tailings Pond fluid. Additionally, nitrification converts nitrite to nitrate. Nitrite is not retained as a constituent to be addressed.

4.2.28 Nitrate

The License specifies groundwater protection standards for nitrate that vary from 12 mg/L (Alluvium) to 15 mg/L (Chinle mining-zone), the license does not specify groundwater protection limits for the Middle or Lower Chinle. The lowest promulgated standard for nitrate is the NMAC Chapter 20.6.2.3103.A (Human Health) standard of 10 mg/L, which is the same as the EPA 40 CFR Part 141.23 (Drinking Water maximum contaminant level (MCL). All the NRC 1987 Large Tailings Pile pond samples were reported as below the reporting limit of 50 mg/L and, therefore, the concentrations of the constituent could not be determined based on those samples because the reporting limits are above the lowest promulgated standard for nitrate. All the 201 HMC Large Tailings Pile fluid samples were below the lowest standard. However, because nitrate is

known to be generated by the nitrification of ammonia, which has been retained as a constituent, nitrate is retained as a potential constituent for assessment in groundwater.

4.2.29 Sulfate

The License specifies groundwater protection standards for sulfate that vary from 857 mg/L (Middle Chinle) to 1,750 mg/L (Chinle mixing-zone). The lowest promulgated standard for sulfate is the NMAC 20.6.2.3103.B (Other Domestic) standard of is 600 mg/L. EPA does not have a promulgated primary groundwater protection standard for sulfate. All the NRC 1987 Large Tailings Pile pond samples were reported as above the lowest standard. The majority of the 1,285 HMC Large Tailings Pile fluid samples were above the lowest standard. Therefore, sulfate is retained as a constituent for assessment in groundwater.

4.2.30 Total Dissolved Solids

The License specifies groundwater protection standards for total dissolved solids (TDS) that vary from 1,560 mg/L (Middle Chinle) to 4,140 mg/L (Lower Chinle), and 2,734 mg/L for the Alluvial Aquifer. These values are consistent with the limits established int the DP-200. The lowest promulgated standard for TDS is the NMAC 20.6.2.3103.B (Other Domestic) standard of 1,000 mg/L. All the NRC 1987 Large Tailings Pile pond samples were reported above this limit. Almost all the 1,274 HMC Large Tailings Pile fluid samples were above this limit.

However, TDS is not a constituent but rather a water quality indicator parameter that represents a bulk level of dissolved ions and its concentration does not necessarily represent a specific health hazard at a threshold concentration. Rather, the potentially hazardous health effects depend on the specific dissolved ions present. The bulk of the ions present in Large Tailings Pile fluid and groundwater samples that comprise this parameter that could pose a current or potential hazard are assessed individually. It is not feasible to perform an assessment of human or ecological risk on this bulk water quality indicator parameter at a specified TDS level as the toxic or carcinogenic effects would depend on the individual ions present rather than the bulk parameter concentration. Therefore, TDS is not retained as a constituent to be addressed. However, it is retained as a water quality monitoring constituent.

4.3 Radionuclides

4.3.1 Adjusted Gross Alpha

The License does not specify groundwater protection standard for adjusted gross alpha (total gross alpha minus uranium and radon). The lowest promulgated standard for adjusted gross alpha is 15 pCi/L per Criterion 5C of Appendix A to 10 CFR Part 40. Neither New Mexico nor the EPA have a promulgated groundwater protection standards for adjusted gross alpha and EPA does not have a tap water screening level for this constituent. The NRC 1987 Large Tailings Pile pond samples were not analyzed for gross alpha.

The seven available HMC Large Tailings Pile fluid sample data (2021 samples from Large Tailings Pile sumps) analyzed for total gross alpha had activity concentrations ranging from to 2,220 pCi/L to 8,630 pCi/L. For this assessment, adjusted gross alpha activity concentrations were calculated by subtracting uranium concentrations for those same samples. The uranium concentrations, reported in mg/L, were converted to pCi/L using a specific activity for natural uranium of 675.7 pCi/mg and subtracted from the total gross alpha

activity concentrations. It was further assumed that radon in the groundwater was essentially zero due to the low solubility of radon in water. Though slightly imprecise, this assumption is conservative in that it will tend to overestimate adjusted gross alpha activity concentrations for those samples. All seven HMC Large Tailings Pile fluid samples had calculated adjusted gross alpha activity concentrations below 2 pCi/L. Therefore, adjusted gross alpha was not retained as a constituent to be addressed.

4.3.2 Combined Radium-226 and -228

The License specifies a groundwater protection standard for combined radium-226 and -228 (Ra-226+228) in the Alluvial Aquifer of 5 pCi/L, the License does not specify a combined radium-226 and -228 groundwater protection standard for any other aquifer. This standard for combined radium-226 and -228 is the same as with the NMAC Chapter 20.6.2.3103.A (Human Health) standard. EPA does not have promulgated standard for combined radium-226 and -228. One the NRC 1987 Large Tailings Pile pond samples were reported as above the lowest standard. All the 10 HMC Large Tailings Pile fluid samples (3 total; 7 dissolved) were above the lowest standard. Therefore, combined radium-226 and -228 is retained as a constituent for assessment in groundwater.

4.3.3 Thorium-230

The License specifies a groundwater protection standard for combined thorium 230 (Th-230) in the Alluvial Aquifer of 0.3 pCi/L, the license does not specify Th-230 groundwater protection standards for any other aquifer. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for Th-230 and EPA does not have a tap water screening level for this constituent. All the NRC 1987 Large Tailings Pile pond samples were reported as above the lowest standard. Eight of the 10 HMC Large Tailings Pile fluid samples (3 total; 7 dissolved) were above the lowest standard. Therefore, Th-230 is retained as a constituent for assessment in groundwater.

4.4 Organic Constituents

Organic constituents were used in a closed process of solvent extraction to strip dissolved uranium from the leach solution, which was then itself stripped of the uranium and the solvent reused. The solvent extraction process did not discharge organics constituents to the Large Tailings Pile, and organic constituents, therefore not expected to be a constituent to be addressed. However, organic constituents are identified in Criterion 13 of Appendix A and in New Mexico groundwater protection standards (NMAC 20.6.2.3103) and, therefore, are assessed herein. Further, certain herbicides, pesticides, and polychlorinated biphenols (PCBs) are also identified in Criterion 13 of Appendix A as well as in New Mexico groundwater protection standards (NMAC 20.6.2.3103). However, no documentation regarding use or disposal of PCBs, herbicides and pesticides has been identified for the GRP and these compounds were not used in GRP operations or ore processing.

None of 99 organic compounds tested by NRC in 1987 from the active tailings facility were reported as detected above the laboratory reporting limits, which range from 5 µg/L to 10 µg/L. Twelve of the 99 organic constituents assessed by NRC have no identified promulgated groundwater protection standard or other groundwater protective criteria (e.g., EPA tap water screening level). These compounds were not used as part of the mill process and are not components of the ore feed to the mill. These compounds are:

- 1,3-Dichlorobenzene
- 2-Nitrophenol
- Dimethyl phthalate
- Acenaphthylene
- 3-Nitroaniline
- 4-Nitrophenol
- 4-Chlorophenyl phenyl ether
- 4-Bromophenyl phenyl ether
- Phenanthrene
- Benzo[g,h,i]perylene
- 1,1-Dichloroethene (total)
- cis-1,3-dichlorpropane

Sixty seven of the 99 compounds analyzed by the NRC have no promulgated protective standards, although 55 of those 67 compounds (82%) have an EPA tap water screening level, as indicated in Table App2.2A-5. Eighteen of the 22 organic compounds identified in in NMAC 20.6.2.3103 were included in the analyses of the NRC 1987 Large Tailings Pile pond samples. Two herbicides (2,4,5-TP Silvex and 2,4-D (2,4-Dichlorophenoxyacetic acid) and four pesticides (Toxaphene; Methoxychlor; Lindane; Endrin) identified in Criterion 5 of Appendix A to 10 CFR Part 40 via reference to 40 CFR 192 subparts D and E, which in turn references standards in 40 CFR 264.94, were not included in the NRC 1987 Large Tailings Pile pond sample analyses.

The four remaining compounds (Methyl tertiary-butyl ether; trans-1,2-dichloroethene; ethylene dibromide; and cis-1,2-dichloroethene), one pesticide (atrazine), and PCBs were not included in the NRC 1987 Large Tailings Pile pond sample analyses. No documentation regarding use or disposal of PCBs, herbicides and pesticides has been identified for the GRP and these compounds were not used in GRP operations or ore processing and are not associated with the ores processed at the GRP.

No documentation regarding use or disposal of PCBs, herbicides and pesticides has been identified for the GRP and these compounds were not used in GRP operations or ore processing.

Twenty eight of the 99 tested organic constituents for which analyses were performed had laboratory reporting limits above the current applicable promulgated standards, or relevant and appropriate standards or criteria where the License or Criterion 5 do not specify numerical standards. The remaining 71 constituents were all below the lowest applicable standards or screening levels. None of these compounds were used at the GRP and, therefore, are not reasonably expected to be associated with the 11e.(2) Byproduct Material. The absence of any detected concentrations at reasonably low detection limits and the fact that these compounds are not known to have been used in ore processing supports the decision to not retain any organic compounds for further assessment. As a result, no further analysis or review for organic constituents in Large Tailings Pile fluid was warranted or performed and organic compounds are not retained as potential constituents for assessment in groundwater.

4.5 Constituents Analyzed by NRC but not Included

The NRC 1987 Large Tailings Pile pond sampling resulted in analyses of constituents that are not hazardous and that are not listed in Criterion 13. Nine of the 54 inorganic constituents assessed by NRC have no identified promulgated groundwater protection standard or other groundwater protective criteria (e.g., EPA tap water screening level). These constituents include gallium (Ga), silicon (Si), titanium (Ti), and phosphorous (P), ammonia (NH3-N), orthophosphate (PO4), sulfides (S-), total organic halides (TOX), and the lead-210 (Pb-210). These constituents are not known or reasonably expected to be derived from the milling process and have not been included in this assessment. These nine constituents are discussed further below.

4.5.1 Gallium

Gallium is an element in group 13 of the periodic table, and thus has similarities to the other metals of the group such as aluminum and thallium. It is not known to be a common constituent associated with uranium ores, is not identified in Criterion 13 of Appendix A to 10 CFR Part 40, and has not been assessed on other Title II uranium mill sites. Limited data indicates that soluble gallium is tolerated well with human consumption and does not accumulate as a poison, instead being excreted mostly through urine (Norberg and Gunnar, 2014). Gallium was not identified in the tailings above laboratory detection limits during NRC 1987 Large Tailings Pile pond sampling (Table App2.2A-1) and is not considered to likely pose a potential hazard in groundwater at or beyond the points of compliance based on the observed Large Tailings Pile concentrations and known toxicity of its soluble forms. Therefore, gallium is not considered further as a constituent to be addressed.

4.5.2 Lithium

Lithium is an element in group 1 of the periodic table, and thus has similarities to the other metals of the group such as beryllium and magnesium. It is not identified in Criterion 13 of Appendix A to 10 CFR Part 40, and has not typically been assessed on other Title II uranium mill sites. A promulgated groundwater protection standard for lithium is not specified in NRC regulation or in the License. Neither New Mexico nor the EPA has a promulgated groundwater protection standards for lithium. Lithium is a monovalent cation similar to sodium that is used to treat bipolar disorder in humans. Ingesting too many tablets may cause lithium toxicity, but such concentrations are not likely to be encountered in environmental media (Heyda, Avula and Swoboda 2020). ATSDR has not published a toxicological profile for lithium. Two of the four NRC 1987 Large Tailings Pile pond samples (1 mg/L and 0.32 mg/L) were reported as above the EPA tap water screening level of 0.004 mg/L. All the seven HMC Large Tailings Pile fluid samples (0 samples total concentrations; 7 dissolved samples) ranged from 0.018 mg/L to 0.041 mg/L. Upgradient groundwater concentrations in the Alluvial Aquifer from 2020 are in the range of 0.1 mg/L to 0.3 mg/L and 196 site groundwater concentrations from 2015 through May 2021 range from 0.8 mg/L to 0.1 mg/L with an average concentration of 0.31 mg/L, which is near the measured upgradient concentration of 0.3 mg/L. Therefore, lithium is not retained as a constituent for assessment in groundwater as measured groundwater conditions do not support lithium posing substantial current or potential future hazard.

4.5.3 Phosphorous and Orthophosphate

A promulgated groundwater protection standard for phosphorous (P) or orthophosphates (PO_4) is not specified in either NRC regulation or in the License. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for phosphorous or orthophosphates and EPA does not have a tap water screening level for these constituents. Phosphorous is a member of Group 15 in the periodic table and is between silicon and sulfur. Total phosphorus in water is an essential nutrient in ecological water systems at low concentrations (less than 0.05 mg/L), although elevated water concentrations may cause algae blooms, accelerated plant growth, and low dissolved oxygen from the decomposition of additional vegetation (EPA, 2015). EPA and the Occupational Safety and Health Administration (OSHA) have not set drinking water standards for phosphorus. This constituent was detected in the NRC 1987 Large Tailings Pile pond sampling analyses (Table App2.2A-1) and in the HMC Large Tailings Pile fluid analyses (Table App2.2A-6) between 0.2 and 9.1 mg/L. This constituent is not identified in Criterion 13 of Appendix A to 10 CFR Part 40 and was not associated with process reagents or ores milled. Due these factors, as well as the relatively low concentrations in the Large Tailings Pile fluid and the absence of regulatory standards, it is concluded that concentrations in the Large Tailings Pile fluid do not reasonably pose a present or potential future hazard in groundwater at or beyond the points of compliance. Therefore, phosphorous is not retained for further assessment.

Orthophosphates, also known as Reactive Phosphates, are common oxides containing phosphorus and are a main constituent in fertilizers used for agriculture and residential purposes, although they can also derive from other sources. Orthophosphates were not components of process reagents used in the milling of ore and are not typically associated with the ore of the area, and, therefore, are not reasonably expected to be associated with the 11e.(2) Byproduct Material. This constituent is not identified in Criterion 13 of Appendix A to 10 CFR Part 40. EPA has not set drinking water standards for orthophosphates. However, HMC contracted Arcadis to perform a limited test in 2011 through 2012 within the Large Tailings Pile to study precipitation of phosphate minerals as a potential means of removing contaminants from Large Tailings Pile fluid. Samples of Large Tailings Pile fluid associated with an Arcadis study, in which small amounts of phosphate-bearing solutions were injected into the tailings, measured relatively low initial orthophosphate concentrations, that increased after test initiation and decreased with time as precipitates formed. Pre-study (August 2011) orthophosphate concentrations ranged from 0.01 mg/L total phosphate to 0.5 mg/L with an average of 0.14 mg/L. Initial orthophosphate concentrations in the limited Large Tailings Pile test area averaged around 12 mg/L at the start of the localized test in October 2011 and decreased to an average of 2.7 mg/L by the end of November 2011 (see electronic data in Attachment App2.2.A-B). Based on the fact that the Arcadis study identified that orthophosphate concentrations in the tailings fluid reduce with time and concentrations were below 0.5 mg/L before the study, it is concluded that orthophosphates are not present in the Large Tailings Pile overall at concentrations that could reasonably pose a present or potential future hazard in groundwater at or beyond the points of compliance. Therefore, orthophosphate is not retained as a constituent for assessment in groundwater.

4.5.4 Silicon

Silicon is a member of group 14 in the periodic table and is located between carbon (C) and germanium (Ge). More than 90 percent of the Earth's crust is composed of silicate minerals, making silicon the second most abundant element in the Earth's crust (about 28 percent by mass), after oxygen. EPA and the Occupational Safety and Health Administration (OSHA) have not set drinking water standards for silicon and is generally

considered non-toxic when ingested except through inhalation. Therefore, silicon is not considered further as a constituent to be addressed.

4.5.5 Strontium

A promulgated groundwater protection standard for strontium is not specified in either regulation or in the License. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for strontium. EPA has a tap water screening level of 1.2 mg/L. One of the four NRC 1987 Large Tailings Pile pond samples (1.7 mg/L) was reported as above this screening level. All the seven HMC Large Tailings Pile fluid samples (0 total concentration samples; 7 dissolved concentration samples) were below this screening level. Upgradient groundwater concentrations in the Alluvial Aquifer from 2020 are in the range of 4 mg/L to 6 mg/L and 250 site groundwater concentrations from 2015 through May 2021 range from 13.2 mg/L to 0.07 mg/L with an average concentration of 3.49 mg/L, which is below the measured upgradient concentrations. No deaths in healthy humans have been reported after oral exposure to stable strontium. Stable strontium caused death in laboratory animals only at doses that are very high compared to normal human exposure. In acute exposure studies in mice, the oral LD50 for strontium nitrate was reported to be 2,350 mg strontium/kg in males (ATSDR, 2004). For strontium chloride administered by gavage, the acute oral LD50 in albino mice was reported to be 2,900 mg strontium/kg for males and 2,700 mg strontium/kg for females.

These water quality data do not indicate that strontium is present in the tailing or groundwater at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Therefore, strontium is not retained as a constituent for assessment in groundwater.

4.5.6 Sulfides

Sulfides are chemical compounds that contain sulfur and another element or group of elements. Inorganic sulfides form from aqueous metal cations reacting with sulfide sources, such as hydrogen sulfide. These sulfides are typically not soluble or have low solubility in water and are likely not toxic. Some sulfides when exposed to a strong acid will release hydrogen sulfide gas. Sulfide does not have an EPA tap water standard likely because common forms are either insoluble in water or in the case of hydrogen sulfide, water becomes aesthetically undrinkable from the odor before harmful concentrations are reached.

Sulfide was not detected in the NRC 1987 Large Tailings Pile pond sampling analyses (Table App2.2A-4 above the reporting limit of 0.1 mg/L. Sulfides have been reported above 1 mg/L in four samples collected in 2018 from three wells located in the Large Tailings Pile. The pH of these samples was greater than 10 s.u. Samples from the Large Tailings Pile sumps collected in the same months as the well samples had reported sulfide concentrations of less than 0.1 mg/L and measured pH values of less than 10 s.u. Sulfides are not considered further as constituents to be addressed because at the pH values of the groundwater at the points of compliance the potential sulfide concentrations would be low and no promulgated groundwater protection standard exists. Therefore, sulfide is not considered further as an individual constituent to be addressed.

4.5.7 Titanium

Titanium is an element in group 4 of the periodic table and is located between scandium (Sc) and vanadium (V). EPA and the Occupational Safety and Health Administration (OSHA) have not set drinking water standards for Titanium. is generally considered non-toxic (Emsley, 2001), and was not detected in the NRC

1987 samples of the Large Tailings Pile ponds at reasonably low reporting limits. Therefore, titanium is not considered further as a constituent to be addressed.

4.5.8 Total Organic Halides

Total organic halogens (TOX), often referred to as total organic halides, are the sum parameter of total organic fluorine (F), chlorine (Cl), iodine (I) and bromine (Br), and are commonly measured to assess the amount of dissolved halogenated organics in disinfected waters. This parameter is not identified in Criterion 13 of Appendix A and most of the individual ions that comprise the total organic halogen suite are addressed individually with separate analyses in the fluid of the Large Tailings Pile. Therefore, total organic halogens are not considered further as a constituent to be addressed.

4.5.9 Lead-210

The radioisotope, lead-210 (Pb-210) is a radiogenic isotopic, part of the uranium decay chain and is principally a decay product of radium-226. A promulgated groundwater protection standard for lead-210 is not specified in either NRC regulation or in the License. Neither New Mexico nor the EPA have a promulgated groundwater protection standard for lead-210 and EPA does not have a tap water screening level for this constituent. Therefore, lead-210 is not retained further for assessment as a constituent to be addressed.

4.5.10 Zirconium

Zirconium is a member of group 4 in the periodic table and is located between yttrium (Y) and niobium (Nb). EPA and the Occupational Safety and Health Administration (OSHA) have not set drinking water standards for zirconium, although EPA has a tap water screening level of 0.16 µg/L. Zirconium is not found in nature as a native metal and generally results from the mining and processing of the titanium minerals, ilmenite and rutile, as well as tin. Zirconium has no known biological role and is not known to be associated with the uranium ores processed at the GRP. Therefore, zirconium is not considered further as a constituent to be addressed.

4.5.11 Major Ions and Other Parameters

The major ions for bromide (Br), calcium (Ca), magnesium (Mg), and sodium (Na) and the characteristic water quality parameters pH, carbonate (CO_3), bicarbonate (HCO_3), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), total suspended solids (TSS), do not have promulgated standards, are not identified in Criterion 13 of Appendix A, and are generally not individually hazardous. License Condition 35B has standards for total dissolved solids (TDS) which are consistent with the DP-200 groundwater protection limit and which are higher than the standard in NMAC Chapter 20.6.2.33103.B. Although TDS is not uniquely characteristic of 11e.(2) Byproduct Material in the Large Tailings Pile, it is retained for further assessment in groundwater at and beyond the points of compliance.

5 Step 4 Assess Groundwater Concentrations of Potential Constituents

Assessment of groundwater data from 74 wells in the Alluvial Aquifer and the Upper Chinle Aquifer at and beyond the points of compliance for the retained constituents was performed, based on decades of groundwater sampling which show that these aquifers have the highest concentrations of constituents as they are closest and most directly connected to the sources of groundwater impacts. Measured groundwater concentrations from samples collected between 2015 and May 2021 were assessed against the lowest promulgated standard. The locations and aquifers screened by the wells from which these samples were collected are illustrated in Figure App2.2.A-3 and the testing results are summarized in Table App2.2.A-7. A Microsoft Excel spreadsheet file with the groundwater analytical data is presented in Attachment App2.2A-B.

As a due diligence measure, groundwater sampling data for analytes not retained from the Large Tailings Pile screening assessment but for which groundwater data are available were also assessed to confirm the consistency of constituent retention with existing groundwater data.

The available groundwater sample analytical results were compared to the lowest applicable standard, or relevant and appropriate standards or criteria where the License or Criterion 5 do not specify numerical standards. These constituents are identified in Table App2.2A-8 and are deemed the constituents to be addressed in the ACL Application.

The following sections discuss the results for groundwater water quality screening for each analyte.

5.1 Inorganic Constituents

Based on the screening of the Large Tailings Pile fluid samples presented in Section 3.2, the constituents identified as being retained and those constituent with available groundwater sample data from 2015 to 2021 were reviewed to determine if they should be retained as constituents to be addressed.

5.1.1 Silver

Although silver was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for silver. Therefore, the available groundwater silver concentrations were assessed. The lowest promulgated standard for silver is 0.05 mg/L and is consistent between Criterion 5C of Appendix A to 10 CFR Part 40 and NMAC Chapter 20.6.2.3103.A (Human Health). Of the 266 groundwater analytical results for silver in groundwater, all were below the lowest promulgated standard. Therefore, the decision to not retain silver as a constituent to be addressed is confirmed.

5.1.2 Aluminum

Although aluminum was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for aluminum. Therefore, the available groundwater aluminum concentrations were assessed. NRC does not specify a promulgated standard for aluminum in either regulation or in the License. The lowest promulgated standard for silver is 5 mg/L based on NMAC Chapter 20.6.2.3103.C (Irrigation). Aluminum does not have an EPA tap water screening level. Of the 17 groundwater

analytical results for aluminum in groundwater, all were below the lowest promulgated standard. Therefore, the decision to not retain aluminum as a constituent to be addressed is confirmed.

5.1.3 Arsenic

Over 300 groundwater analytical results were assessed and identified that arsenic is present in groundwater above the lowest promulgated standard for arsenic (NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.01 mg/L). Arsenic is also present in the Large Tailings Pile at concentrations above the lowest promulgated standard. Therefore, arsenic is confirmed as a constituent to be addressed.

5.1.4 Barium

Although barium was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for barium. Therefore, the available groundwater barium concentrations were assessed. Of the 23 groundwater analytical results for barium in groundwater, all were below the groundwater protection standard (10 CFR Part 40, Appendix A, Criterion 5C standard of 1 mg/L). All NRC 1987 Large Tailings Pile pond samples and all 34 HMC Large Tailings Pile fluid sample results for barium were below the NRC standard. The Large Tailings Pile sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that barium is not present in groundwater at concentrations and extents that pose current or potential future hazards. Therefore, the decision to not retain barium as a constituent to be addressed is confirmed.

5.1.5 Boron

Over 200 groundwater analytical results were assessed and identified boron is present in groundwater above the lowest promulgated standard for boron (NMAC Chapter 20.6.2.3103.C (Irrigation) standard of 0.75 mg/L). Boron is also present in the Large Tailings Pile at concentrations above the lowest promulgated standard. Therefore, boron is confirmed as a constituent to be addressed.

5.1.6 Beryllium

Over 250 groundwater analytical results were assessed and identified beryllium in all groundwater samples were below the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A [Human Health] standard of 0.004 mg/L) except one sample from location T54. Location T54 is screened below the Large Tailings Pile footprint. This single value of 0.006 mg/L from January 2020 is bounded by three samples in 2018 and 2019 and two subsequent samples from February and July 2020 that are all less than 0.001 mg/L. These data indicate that the groundwater beryllium concentrations at this location are currently and generally below the lowest promulgated standard. The single value from January 2020 is not representative of the overall groundwater quality. Although the beryllium concentrations in the Large Tailings Pile are all low but not definitively below the lowest standard, the extensive groundwater sampling data provide the requisite reasonable assurance that beryllium is not present in groundwater at concentrations and extents that pose current or potential future hazards. Therefore, beryllium is not retained as a constituent to be addressed.

5.1.7 Cadmium

Over 280 groundwater analytical results were assessed and identified cadmium is present in groundwater above the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.001 mg/L). Cadmium is also present in the Large Tailings Pile at concentrations above the lowest promulgated standard. Therefore, cadmium is confirmed as a constituent to be addressed.

5.1.8 Chloride

Over 530 groundwater analytical results were assessed and identified chloride is present in groundwater above the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A (Human Health) standard of 250 mg/L). Chloride is also present in the Large Tailings Pile at concentrations above the lowest promulgated standard. Therefore, chloride is confirmed as a constituent to be addressed.

5.1.9 Cobalt

Although cobalt was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for cobalt. Therefore, the available groundwater cobalt concentrations were assessed. NRC does not specify a promulgated standard for cobalt in either regulation or in the License. The lowest promulgated standard for cobalt is the NMAC Chapter 20.6.2.3103.C (Irrigation) standard of 0.05 mg/L.

Over 270 groundwater analytical results were assessed and cobalt was identified in all groundwater samples to be below the lowest promulgated standard (NMAC Chapter 20.6.2.3103.C [Irrigation] standard of 0.05 mg/L) except two samples, one from location CW29 and one from location V6, both of which are located more than one mile from the Large Tailings Pile. Location CW29 is a Chinle mixing zone well while location V6 is a lower Chinle well. Of the two samples available from location CW29, the August 2018 value is 0.005 mg/L and the August 2020 value is 0.33 mg/L. Of the three samples available from location V9, the July 2017 value is 0.005 mg/L, the July 2019 sample is 0.005 mg/L and the August 2020 value is 0.37 mg/L.

These isolated values are inconsistent with the other sampling results for this location, the results of sampling of the Large Tailings Pile, and the absence of cobalt concentrations in any portion of the aquifers closer to the Large Tailings Pile. These spatially and temporally isolated results are not consistent with the majority of other groundwater cobalt results or the Large Tailings Pile fluid sample results for cobalt. The Large Tailings Pile fluid sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that cobalt is not present in groundwater at concentrations and extents that pose current or potential future hazards at or beyond the point of compliance. Therefore, the decision not to retain cobalt as a constituent to be addressed is confirmed.

5.1.10 Chromium

Over 280 groundwater analytical results were assessed and chromium was identified as not present in groundwater above the lowest promulgated standard (0.05 mg/L per Criterion 5C in Appendix A to 10 CFR 40 and NMAC Chapter 20.6.2.1303.A), except for four isolated samples from locations B11, CF4, CW29, and V6.

Location B11 is located at the down gradient margin of the central portion of the Large Tailings Pile. A value of 0.3 mg/L was reported for the alluvial aquifer location B11 in April 2019. This single result is bounded by samples from B11 on March and April 2018 and March 2020 of less than 0.005 mg/L.

A value of 0.091 mg/L was reported for Upper Chinle Aquifer Mixing Zone well CF4 (below Large Tailings Pile footprint) in August 2020. This single result is one of only two results for this location, the previous result of less than 0.005 mg/L was collected on June of 2018.

A value of 1.32 mg/L was reported for Lower Chinle Aquifer well CW29 in August 2020 (southwest of Broadview Acres subdivision). This single result is one of only two results for this location, the previous result of less than 0.005 mg/L was collected on August of 2018.

A value of 1.82 mg/L was reported for Lower Chinle Aquifer V6 in August 2020 (southwest of Broadview Acres subdivision). This single result is one of only three results for this location, the previous results of less than 0.005 mg/L were collected on July of 2018 and August of 2019.

These spatially and temporally isolated results are not consistent with the vast majority of other groundwater chromium results or the 41 HMC Large Tailings Pile fluid sample results for chromium, which were all below the lowest promulgated standard. The Large Tailings Pile fluid sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that chromium is not present in groundwater at concentrations and extents that pose current or potential future hazards at or beyond the point of compliance. Therefore, the decision to not retain chromium as a constituent to be addressed is confirmed.

5.1.11 Copper

Although copper was excluded as a potential to be addressed constituent based on LTP screening, groundwater samples have been analyzed for copper. Therefore, the available groundwater copper concentrations were assessed. Of the 11 groundwater analytical results assessed for copper, copper concentrations in all groundwater samples were below the lowest promulgated standard in NMAC Chapter 20.6.2.3103.B (Other Domestic) of 1.0 mg/L per. All the NRC 1987 Large Tailings Pile pond samples and the HMC Large Tailings Pile fluid samples were reported as below this standard. Therefore, the decision to not retain copper as a constituent to be addressed is confirmed.

5.1.12 Fluoride

Over 280 groundwater analytical results were assessed and identified fluoride is present in groundwater above the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A [Human Health] standard of 1.6 mg/L), although all samples with concentrations greater than the promulgated standard are directly below the Large Tailings Pile except for one sample in well R3. Fluoride is also present in the Large Tailings Pile fluid at concentrations (0.2 mg/L to 10.5 mg/L) above the lowest promulgated standard. Therefore, fluoride is confirmed as a constituent to be addressed.

5.1.13 Iron

Although iron was excluded as a potential constituent to be addressed based on Large Tailings Pile fluid sample screening, groundwater samples have been analyzed for iron. Therefore, the available groundwater iron concentrations were assessed. Over 240 groundwater analytical results were assessed and identified iron in groundwater below the lowest promulgated standard (HMAC Chapter 20.6.2.3103.B [Other Domestic Uses] standard of 1 mg/L) except for four downgradient samples at locations SUB2, SUB3, and T19. Sample T19 is located beneath the center of the Large Tailings Pile footprint while locations SUB2 (Alluvial Aquifer well), and SUB3 (Lower Chinle well) are located in the Broadview Acres subdivision.

Of the two available iron concentrations from samples collected from T19, the June 2018 sample was 1.10 mg/L while the June 2019 samples was 0.71 mg/L.

Of the two available iron concentrations from samples collected from location SUB2, the April 2018 sample was 1.39 mg/L while the June 2019 sample was 0.09 mg/L.

Of the two available iron concentrations from samples collected from location SUB3, the April 2018 sample was 18.6 mg/L while the June 2019 sample was 5.54 mg/L.

Screening of Large Tailings Pile fluid quality does not indicate that iron is present in the tailings at concentrations and quantities capable of posing a present or potential future hazard to groundwater. Iron is ubiquitous in the groundwater environment and these isolated values do not appear to be temporally persistent nor spatially related to the Large Tailings Pile (except T19 sample). Therefore, the decision to not retain iron as a constituent to be addressed is confirmed.

5.1.14 Manganese

Although manganese was excluded as a potential constituent to be addressed based on Large Tailings Pile fluid screening, groundwater samples have been analyzed for manganese. Therefore, the available groundwater manganese concentrations were assessed. Eighty two groundwater analytical results from 53 locations were assessed. Manganese was identified in groundwater beneath the Large Tailings Pile above the lowest promulgated standard (NMAC Chapter 20.6.2.3103.B [Other Domestic Uses] standard of 0.2 mg/L) in 4 locations above 0.2 mg/L, three of which are directly under the Large Tailings Pile with the highest at 0.4 mg/L). One isolated sample from location MX (Figure App2.2A-3) reported a manganese value of 1.15 mg/L, however, because this location is distant from the tailings and all other samples in the area are not consistent with that value, it cannot be determined that this concentration is a result of the tailings seepage. It is noted that 24 samples from upgradient locations (DD, DD2, P, Q) that represent influent baseline alluvial groundwater conditions to the GRP had manganese concentrations that ranged from 0.002 mg/L to 2.86 mg/L and averaged 0.7 mg/L. This indicates that upgradient baseline manganese concentrations are higher than those in the tailings, are above the lowest promulgated standard, and may be influencing groundwater concentrations near the tailings in the alluvial aquifer. Because manganese dissolve concentrations in the tailings are only slightly above the standard (maximum dissolved concentration of 0.61 mg/L, average value of of 0.04 mg/L), and because groundwater concentrations are well within the range of upgradient aquifer concentrations (up to 2.86 mg/L), manganese is not confirmed to have impacted groundwater quality, and

manganese in tailings seepage is not likely to pose a substantial future hazard to groundwater. Therefore, the decision to not retain manganese as a constituent to be addressed is confirmed.

5.1.15 Mercury

Mercury was excluded as a potential constituent to be addressed based on Large Tailings Pile fluid screening. No mercury groundwater data are available for the GRP. Therefore, mercury was not retained as a constituent to be addressed.

5.1.16 Molybdenum

Over 580 groundwater analytical results were assessed and molybdenum was identified as present in groundwater above the lowest promulgated standard (License Condition 35B groundwater protection standard of 0.1 mg/L). Molybdenum is also present in the Large Tailings Pile fluid at concentrations above the lowest promulgated standard. Therefore, molybdenum is confirmed as a constituent to be addressed.

5.1.17 Nickel

Although nickel was excluded as a potential constituent to be addressed based on Large Tailings Pile fluid screening, groundwater samples have been analyzed for nickel. Therefore, the available groundwater nickel concentrations were assessed. Over 275 groundwater analytical results were assessed and concentrations of nickel were not identified in groundwater above the lowest promulgated standard (NMAC Chapter 20.6.2.1303.C standard of 0.2 mg/L). Therefore, the decision to not retain nickel as a constituent to be addressed is confirmed.

5.1.18 Lead

Over 280 groundwater analytical results identified lead below the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A [Human Health] standard of 0.015 mg/L) except for two samples from one location.

Lead values of 0.042 mg/L and 0.024 mg/L were reported for Alluvial Aquifer location T19 in June 2018 and June 2019, respectively. These two results are bounded by a sample from T19 on July 2020 of 0.003 mg/L and all other T wells (wells screened directly under the Large Tailings Pile footprint) that report concentrations less than the lowest promulgated standard. Lead concentrations in the Large Tailings Pile are low (less than 0.05 mg/L) but not definitively below the lowest promulgated standard. These data indicate that the groundwater lead concentrations at this location are currently and generally below the lowest promulgated standard and the values from 2018 and 2019 are not representative of the current or overall groundwater quality in this area. The Large Tailings Pile sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that lead is not present in groundwater at concentrations and extents that pose current or potential future hazards at or beyond the point of compliance. Therefore, lead is not retained as a constituent to be addressed.

5.1.19 Antimony

Over 230 antimony groundwater analytical results in groundwater were all below the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A [Human Health] standard of 0.006 mg/L) except two isolated samples. A value of 0.009 mg/L was reported for a sample collected from Alluvial Aquifer well CE8 in June 2019 (south of Small Tailings Pile). This single result is one of only two results for this location, the previous result of less than 0.001 mg/L was collected in June 2018. A value of 0.007 mg/L was reported for Alluvial Aquifer well T54 in January 2020 (directly under Large Tailings Pile footprint). This single result is one of five results for this location and is temporally bounded by three earlier sample results that range from less than 0.004 mg/L to less than 0.001 mg/L collected between April 2018 and June 2019 and a subsequent sample result collected in February 2020, which was less than 0.001 mg/L. These two isolated results are very low in concentration and are spatially and temporally bounded by other groundwater samples that are all below the lowest promulgated standard. Although the antimony concentrations in the Large Tailings Pile fluid are generally low but not definitively below the lowest standard, extensive groundwater sampling provides the requisite reasonable assurance that antimony is not present in groundwater at concentrations and extents that pose current or potential future hazards. Therefore, antimony is not retained as a constituent to be addressed.

5.1.20 Selenium

Over 580 groundwater analytical results were assessed and selenium was identified present in groundwater above the lowest promulgated standard (NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.01 mg/L). These groundwater results also identify that selenium is present in groundwater above License Condition 35B groundwater protection standards that range up to 2.9 mg/L and average 0.1 mg/L. Selenium is also present in the Large Tailings Pile fluid at concentrations above the License groundwater protection standard and the lowest promulgated standard. Therefore, selenium is confirmed as a constituent to be addressed.

5.1.21 Tin

Although tin was excluded as a potential constituent to be addressed based on LTP screening, groundwater samples have been analyzed for tin. Therefore, the available groundwater tin concentrations were assessed. Over 230 groundwater analytical results for tin in groundwater were all below the EPA Tap water Screening Level (1.2 mg/L), there are no NRC, New Mexico, or EPA promulgated groundwater standards for this constituent. All NRC 1987 Large Tailings Pile pond sample results for tin were below the screening level, the HMC Large Tailings Pile fluid data set does not include tin. The Large Tailings Pile pond sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that tin is not present in groundwater at concentrations and extents that pose current or potential future hazards. Therefore, the decision to not retain tin as a constituent to be addressed is confirmed.

5.1.22 Thallium

Although thallium was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for thallium. Therefore, the available groundwater thallium concentrations were assessed. Over 230 groundwater analytical results for thallium in groundwater were all below the laboratory reporting limit of 0.005 mg/L, which is above the lowest promulgated standard

(NMAC Chapter 20.6.2.3103.A (Human Health) standard of 0.002 mg/L) except one sample result. A value of 0.0054 mg/L was reported for Alluvial Aquifer well T54 in a sample collected in January 2020 (directly under Large Tailings Pile footprint). This single result is one of five results for this location and is temporally bounded by three earlier sample results of less than 0.0005 mg/L to less than 0.0007 mg/L collected between April 2018 and June 2019 and a subsequent sample result collected in February 2020, which was less than 0.005 mg/L. All NRC 1987 Large Tailings Pile pond sample results for thallium were reported below the reporting limit of 0.05 mg/L, which is above the lowest promulgated standard. The Large Tailings Pile fluid sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that thallium is not present in groundwater at concentrations and extents that pose current or potential future hazards. Therefore, the decision to not retain thallium as a constituent to be addressed is confirmed.

5.1.23 Uranium

Over 580 groundwater analytical results were assessed and uranium was identified as present in groundwater above the lowest promulgated standard (0.03 mg/L per Criterion 5C of Appendix A to 10 CFR Party 40, which is the same as NMAC Chapter 20.6.2.3103.A (Human Health) standard and the EPA 40 CFR Part 141.23 maximum contaminant level (MCL). These groundwater results also identify that uranium is present in groundwater above License Condition 35B groundwater protection standards that range from 0.03 mg/L to 0.18 mg/L. Uranium is also present in the Large Tailings Pile fluid at concentrations above the License groundwater protection standard and the lowest promulgated standard. Therefore, uranium is confirmed as a constituent to be addressed.

5.1.24 Vanadium

Over 340 groundwater analytical results were assessed and zinc was identified as present in groundwater above the lowest promulgated standard (0.01 mg/L to 0.02 mg/L per License Condition 35B). New Mexico and EPA do not have promulgated standards for this constituent. Vanadium is also present in the Large Tailings Pile at concentrations above the License groundwater protection standard. Therefore, vanadium is confirmed as a constituent to be addressed.

5.1.25 Zinc

Although zinc was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for zinc. Therefore, the available groundwater zinc concentrations were assessed. Over 280 groundwater analytical results for zinc in groundwater were all below the EPA Tap water Screening Level (0.6 mg/L) with two exceptions. A single sample from location V6 in August 2020 was reported as 3.2 mg/L although the preceding 2018 and 2019 samples were both less than the reporting limit of 0.01 mg/L. A single sample from location CW29 in August 2020 was reported as 3.0 mg/L although the preceding 2018 sample was reported as at the reporting limit of 0.01 mg/L. These isolated results do not appear to be consistent with all other groundwater data and with tailings water quality data.

There are no NRC, New Mexico, or EPA promulgated groundwater standards for this constituent. All NRC 1987 Large Tailings Pile pond samples results and all 36 HMC Large Tailings Pile fluid sample results for zinc were below the screening level. The Large Tailings Pile sample results and the extensive groundwater sampling results provide the requisite reasonable assurance that zinc is not present in groundwater at

concentrations and extents that pose current or potential future hazards. Therefore, the decision to not retain zinc as a constituent to be addressed is confirmed.

5.1.26 Ammonia

Although ammonia was excluded as a potential constituent to be addressed based on Large Tailings Pile screening, groundwater samples have been analyzed for ammonia. Therefore, available groundwater ammonia concentrations were assessed. There are no NRC, New Mexico, or EPA promulgated groundwater standards for this constituent and there is no EPA tap water screening level for ammonia (NH_3-N). The 21 groundwater analytical results were assessed and ammonia was identified as present in groundwater at concentrations ranging from 0.02 mg/L to 0.07 mg/L. Assessment of 58 HMC Large Tailings Pile fluid samples indicates ammonia, a known mill process reagent, is present in the Large Tailings Pile at concentrations ranging from of 0.04 mg/L to 8.5 mg/L. However, it is well documented that ammonia breaks down to nitrate and nitrite through nitrification, as previously discussed in Section 3.1 above. Ammonia is known to naturally break down to nitrate and nitrite, is documented to be present in the groundwater only at low concentrations, and lacks promulgated standards for groundwater protection or tap water screening levels. Additionally, ammonia's nitrification product, nitrate, is identified as a constituent to be addressed at the GRP. Ammonia, is not considered to pose a reasonable current or potential future potential hazard not addressed by regulation of nitrate. Therefore, ammonia is not retained as a constituent to be addressed.

5.1.27 Nitrite

There are no current groundwater data for nitrite at the GRP. New Mexico has a promulgated groundwater standard for nitrite of 1.0 mg/L in NMAC Chapter 20.6.2.3103.A (Human Health), which is the same as the EPA 40 CFR Part 141.23 Maximum Contaminant Level (MCL). Nitrite is reasonably expected to be derived from mill reagents containing ammonia through the process of nitrification, discussed in Sections 3.1.27 and 4.1.26, above. Therefore, Nitrite is not retained as a constituent to be addressed.

5.1.28 Nitrate

Over 400 groundwater analytical results were assessed and nitrate was identified as present in groundwater above the lowest promulgated standard in NMAC Chapter 20.6.2.3103.A (Human Health) of 10 mg/L , which is the same as EPA 40 CFR Part 141.23 Maximum Contaminant Level (MCL). Nitrate is also a known product of the mill reagents through nitrification containing ammonia, discussed in the Sections 3.1.27 and 4.1.26. Further, nitrate is present in the Large Tailings Pile fluid at concentrations at or above the lowest promulgated standard. Therefore, nitrate is confirmed as a constituent to be addressed.

5.1.29 Sulfate

Over 640 groundwater analytical results were assessed and sulfate was identified present in groundwater above the License groundwater protection standards for sulfate that vary from 857 mg/L (Middle Chinle) to 1,750 mg/L (Chinle mixing-zone) and above the lowest promulgated standard in NMAC Chapter 20.6.2.3103.B (Other Domestic) of 600 mg/L. Sulfate is present in the Large Tailings Pile fluid at concentrations above the License groundwater protection standards and the lowest promulgated standard. Therefore, sulfate is confirmed as a constituent to be addressed.

5.1.30 Total Dissolved Solids

Total dissolved solids wase not retained as a constituent to be addressed for the reasons discussed in Section 3.1. However, because it is identified as a compliance parameter in the License, it should be considered for retention as a water quality monitoring constituent and the proposed action will address the groundwater protection standards in the License.

5.2 Radionuclides

5.2.1 Adjusted Gross Alpha

Although adjusted gross alpha was excluded as a potential constituent to be addressed based on Large Tailings Pile fluid screening, groundwater samples were analyzed for adjusted gross alpha. Therefore, the available groundwater adjusted gross alpha concentrations were assessed. The License does not specify a groundwater protection standard for adjusted gross alpha (total gross alpha minus uranium and radon). The lowest promulgated standard for adjusted gross alpha is 15 pCi/L per Criterion 5C of Appendix A to 10 CFR Part 40. Neither New Mexico nor the EPA have promulgated groundwater protection standards for adjusted gross alpha and EPA does not have a tap water screening level for this constituent.

The four available groundwater samples from downgradient locations were analyzed for total gross alpha and had activity concentrations ranging from to 36.6 pCi/L to 298 pCi/L. For this assessment, adjusted gross alpha activity concentrations were calculated by subtracting uranium concentrations for those same samples using the same method as described in Section 3.2. The four groundwater samples had calculated adjusted gross alpha activity concentrations ranging from 4.8 pCi/L to 82.5 pCi/L with an average of 32 pCi/L.

It is noted that upgradient locations (DD, DD2, Q) that represent influent baseline groundwater conditions to the GRP had calculated adjusted gross alpha activity concentrations ranging from 1.66 pCi/L to 77.7 pCi/L with an average of approximately 21 pCi/L. This indicates that baseline and baseline upgradient adjusted gross alpha activity concentrations are likely above the standard. Therefore, adjusted gross alpha is not retained as a constituent to be addressed.

5.2.2 Combined Radium-226 and Radium-228

Groundwater quality data for radium in the HMC groundwater database have been reported with radium-226 and radium-228 as separate activity concentrations, not combined. Data from the same location for the same date have been added to calculate the combined radium 226+228 activity concentrations. Over 310 groundwater analytical results were assessed and combined radium 226+228 was identified to be present in groundwater above the lowest promulgated standard (5 pCi/L) in 10 CFR Part 40, Appendix A, Criterion 5C, which is consistent with NMAC Chapter 20.6.2.3103.A (Human Health). Combined radium 226+228 is also known to be associated with the ores processed at the former mill. Further, combined radium 226+228 is present in the Large Tailings Pile fluids at concentrations at or above the lowest promulgated standard. Therefore, combined radium 226+228 is confirmed as a constituent to be addressed.

5.2.3 Thorium-230

Over 310 groundwater analytical results were assessed and identified thorium-230 is present in groundwater above the lowest promulgated standard (30 pCi/L mg/L per 10 CFR Part 40, Appendix A, Criterion 5C). Thorium-230 is also known to be associated with the ores processed at the former mill. Further, thorium-230 is present in the Large Tailings Pile at concentrations at or above the lowest promulgated standard. Therefore, thorium-230 is confirmed as a constituent to be addressed.

5.3 Organic Constituents

There are no current groundwater data for organic constituents at the GRP. Organic constituents were assessed in the Large Tailings Pile data review and were not retained as constituent to be addressed.

6 Retained Constituents

The constituents known or reasonably likely derived from the ores, milling process and historical operations were assessed in tailings and groundwater against the lowest promulgated standard, or other protective criteria where no standard was promulgated. Constituents that are confirmed to be present in the samples collected from tailings and groundwater above the lowest promulgated standard, or other protective criteria were retained as constituents to be addressed.

This assessment identified four constituents not currently listed in License Condition 35B that are known or reasonably derived from the milling process and historical operations and have been identified in groundwater of the uppermost aquifer above the lowest promulgated standard (arsenic, boron, cadmium, fluorine [fluoride]). The parameter TDS is not retained as a constituent for assessment in groundwater. However, because it is identified as a compliance parameter in the License, it will be retained as a water quality monitoring constituent. Table App2.2A-8 summarizes the Large Tailings Pile and groundwater screening results and identifies the retained constituents to be addressed.

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TABLES

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
1	75-05-8	Acetonitrile (Ethanenitrile)	No	No
2	98-86-2	Acetophenone (Ethanone, 1-phenyl)	No	No
3	53-96-3	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts (Warfarin)	No	No
4	60-35-5	2-Acetylaminofluorene (Acetamide, N-(9H-fluoren-2-yl)-)	No	No
5	75-36-5	Acetyl chloride (Ethanoyl chloride)	No	No
6	591-08-2	1-Acetyl-2-thiourea (Acetamide, N-(aminothioxomethyl)-)	No	No
7	107-02-8	Acrolein (2-Propenal)	No	No
8	79-06-1	Acrylamide (2-Propenamide)	No	No
9	107-13-1	Acrylonitrile (2-Propenenitrile)	No	No
10	1402-68-2	Aflatoxins	No	No
11	309-00-2	Aldrin (1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,8b-hexahydro-endo, exo-1,4:5,8-Dimethanonaphthalene)	No	No
12	107-18-6	Allyl alcohol (2-Propen-1-ol)	No	No
13	20859-73-8	Aluminum phosphide	No	No
14	92-67-1	4-Aminobiphenyl ([1,1'-Biphenyl]-4-amine)	No	No
15	50-07-7	6-Amino-1,1a,2,8,8a,8b-hexahydro-8-(hydroxymethyl)-8a-methoxy-5-methyl-carbamate azirino[2',3'3,4]pyrrolo[1,2-a]indole-4,7-dione, (ester) (Mitomycin C) (Azirino[2'3'3,4]pyrrolo(1,2-a)indole-4,7-dione, 6-amino-8-[((amino-cabonyl)oxy)methyl]-1,1a,2,8,8a,8b-hexa-hydro-8a methoxy-5-methy-)	No	No
16	2763-96-4	5-(Aminomethyl)-3-isoxazolol (3(2H)-Isoxazolone, 5-(aminomethyl)-) 4-Aminopyridine (4-Pyridinamine)	No	No
17	61-82-5	Amitrole (1H-1,2,4-Triazol-3-amine)	No	No
18	62-53-3	Aniline (Benzenamine)	No	No
19	7440-36-0	Antimony and compounds, N.O.S.3	No	**Possibly**
20	140-57-8	Aramite (Sulfurous acid, 2-chloroethyl-, 2-[4-(1,1-dimethylethyl) phenoxy]-1-methylethyl ester)	No	No
21	7440-38-2	Arsenic and compounds, N.O.S.3	No	**Possibly**
22	7778-39-4	Arsenic acid (Orthoarsenic acid)	No	No
23	1303-28-2	Arsenic pentoxide (Arsenic (V) oxide)	No	No
24	1327-53-3	Arsenic trioxide (Arsenic (III) oxide)	No	No
25	492-80-8	Auramine (Benzenamine, 4,4'-carbonimidoylbis[N,N-Dimethyl-, monohydrochloride)	No	No
26	115-02-6	Azaserine (L-Serine, diazoacetate (ester))	No	No
27	7440-39-3	Barium and compounds, N.O.S.3	No	Yes
28	542-62-1	Barium cyanide	No	No
29	225-51-4	Benz[c]acridine (3,4-Benzacridine)	No	No
30	56-55-3	Benz[a]anthracene (1,2-Benzanthracene)	No	No
31	71-43-2	Benzene (Cyclohexatriene)	No	No
32	98-05-5	Benzenearsonic acid (Arsonic acid, phenyl-)	No	No
33	98-87-3	Benzene, dichloromethyl- (Benzal chloride)	No	No
34	108-98-5	Benzenethiol (Thiophenol)	No	No
35	92-87-5	Benzidine ([1,1'-Biphenyl]-4,4'diamine)	No	No
36	205-99-2	Benzo[b]fluoranthene (2,3-Benzofluoranthene)	No	No
37	205-82-3	Benzo[j]fluoranthene (7,8-Benzofluoranthene)	No	No
38	50-32-8	Benzo[a]pyrene (3,4-Benzopyrene)	No	No
39	106-51-4	p-Benzoquinone (1,4-Cyclohexadienedione)	No	No
40	98-07-7	Benzotrichloride (Benzene, trichloromethyl)	No	No
41	100-44-7	Benzyl chloride (Benzene, (chloromethyl)-)	No	No
42	7440-41-7	Beryllium and compounds, N.O.S.3	No	**Possibly**

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
43	111-91-1	Bis(2-chloroethoxy)methane (Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-])	No	No
44	74-84-0	Bis(2-chloroethyl) ether (Ethane, 1,1'-oxybis[2-chloro-])	No	No
45	494-03-1	N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)	No	No
46	74-98-6	Bis(2-chloroisopropyl) ether (Propane, 2,2'-oxybis[2-chloro-])	No	No
47	74-82-8	Bis(chloromethyl) ether (Methane, oxybis[chloro-])	No	No
48	117-81-7	Bis(2-ethylhexyl) phthalate (1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester)	No	No
49	598-31-2	Bromoacetone (2-Propanone, 1-bromo-)	No	No
50	75-25-2	Bromomethane (Methyl bromide)	No	No
51	101-55-3	4-Bromophenyl phenyl ether (Benzene, 1-bromo-4-phenoxy-)	No	No
52	357-57-3	Brucine (Strychnidin-10-one, 2,3-dimethoxy-)	No	No
53	1338-23-4	2-Butanone peroxide (Methyl ethyl ketone, peroxide)	No	No
54	85-68-7	Butyl benzyl phthalate (1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester)	No	No
55	75-60-5	2-sec-Butyl-4,6-dinitrophenol (DNBP) (Phenol, 2,4-dinitro-6-(1-methylpropyl)-)	No	No
56	7440-43-9	Cadmium and compounds, N.O.S.3	No	**Possibly**
57	13765-19-0	Calcium chromate (Chromic acid, calcium salt)	No	No
58	592-01-8	Calcium cyanide	No	No
59	75-15-0	Carbon disulfide (Carbon bisulfide)	No	No
60	353-50-4	Carbon oxyfluoride (Carbonyl fluoride)	No	No
61	75-07-0	Chloral (Acetaldehyde, trichloro-)	No	No
62	55285-14-8	Chlorambucil (Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-)	No	No
63	57-74-9	Chlordane (alpha and gamma isomers) (4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-tetrahydro-) (alpha and gamma isomers)	No	No
64	N.A.	Chlorinated benzenes, N.O.S.3	No	No
65	N.A.	Chlorinated ethane, N.O.S.3	No	No
66	N.A.	Chlorinated fluorocarbons, N.O.S.3	No	No
67	N.A.	Chlorinated naphthalene, N.O.S.3	No	No
68	N084	Chlorinated phenol, N.O.S.3	No	No
69	107-20-0	Chloroacetaldehyde (Acetaldehyde, chloro-)	No	No
70	N.A.	Chloroalkyl ethers, N.O.S.3	No	No
71	106-47-8	p-Chloroaniline (Benzenamine, 4-chloro-)	No	No
72	108-90-7	Chlorobenzene (Benzene, chloro-)	No	No
73	510-15-6	Chlorobenzilate (Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-,ethyl ester)	No	No
74	59-50-7	p-Chloro-m-cresol (Phenol, 4-chloro-3-methyl)	No	No
75	75-21-8	1-Chloro-2,3-epoxypropane (Oxirane, 2-(chloromethyl)-)	No	No
76	110-75-8	2-Chloroethyl vinyl ether (Ethene, (2-chloroethoxy)-)	No	No
77	67-66-3	Chloroform (Methane, trichloro-)	No	No
78	74-87-3	Chloromethane (Methyl chloride)	No	No
79	107-30-2	Chloromethyl methyl ether (Methane, chloromethoxy-)	No	No
80	91-58-7	2-Chloronaphthalene (Naphthalene, betachloro-)	No	No
81	95-57-8	2-Chlorophenol (Phenol, o-chloro-)	No	No
82	5344-82-1	1-(o-Chlorophenyl)thiourea (Thiourea, (2-chlorophenyl)-)	No	No
83	542-76-7	3-Chloropropionitrile (Propanenitrile, 3-chloro-)	No	No
84	7440-47-3	Chromium and compounds, N.O.S.3	No	**Possibly**
85	218-01-9	Chrysene (1,2-Benzphenanthrene)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
86	6358-53-8	Citrus red No. 2 (2-Naphthol, 1-[(2,5-dimethoxyphenyl)azo]-)	No	No
87	8007-45-2	Coal tars	No	No
88	544-92-3	Copper cyanide	No	No
89	137-29-1	Creosote (Creosote, wood)	No	No
90	1319-77-3	Cresols (Cresylic acid) (Phenol, methyl-)	No	No
91	4170-30-3	Crotonaldehyde (2-Butenal)	No	No
92	N.A.	Cyanides (soluble salts and complexes), N.O.S.[3]	No	No
93	460-19-5	Cyanogen (Ethanedinitrile)	No	No
94	506-68-3	Cyanogen bromide (Bromine cyanide)	No	No
95	506-77-4	Cyanogen chloride (Chlorine cyanide)	No	No
96	14901-08-7	Cycasin (beta-D-Glucopyranoside, (methyl-ONN-azoxy)methyl-)	No	No
97	131-89-5	2-Cyclohexyl-4,6-dinitrophenol (Phenol, 2-cyclohexyl-4,6-dinitro-)	No	No
98	50-18-0	Cyclophosphamide (2H-1,3,2,-Oxazaphosphorine, [bis(2-chloroethyl) amino]-tetrahydro-,2-oxide)	No	No
99	20830-81-3	Daunomycin (5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-)	No	No
100	72-54-8	DDD (Dichlorodiphenyldichloroethane) (Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-)	No	No
101	72-55-9	DDE (Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-)	No	No
102	50-29-3	DDT (Dichlorodiphenyltrichloroethane) (Ethane, 1,1,1-trichloro-2,2-bis (p-chlorophenyl)-)	No	No
103	2303-16-4	Diallate (S-(2,3-dichloroallyl) diisopropylthiocarbamate)	No	No
104	226-36-8	Dibenz[a,h]acridine (1,2,5,6-Dibenzacridine)	No	No
105	224-42-0	Dibenz[a,j]acridine (1,2,7,8-Dibenzacridine)	No	No
106	53-70-3	Dibenz[a,h]anthracene (1,2,5,6-Dibenzanthracene)	No	No
107	194-59-2	7H-Dibenzo[c,g]carbazole (3,4,5,6-Dibenzcarbazole)	No	No
108	192-65-4	Dibenzo[a,e]pyrene (1,2,4,5-Dibenzpyrene)	No	No
109	189-64-0	Dibenzo[a,h]pyrene (1,2,5,6-Dibenzpyrene)	No	No
110	189-55-9	Dibenzo[a,i]pyrene (1,2,7,8-Dibenzpyrene)	No	No
111	96-12-8	1,2-Dibromo-3-chloropropane (Propane, 1,2-dibromo-3-chloro-)	No	No
112	106-93-4	1,2-Dibromoethane (Ethylene dibromide)	No	No
113	74-95-3	Dibromomethane (Methylene bromide)	No	No
114	84-74-2	Di-n-butyl phthalate (1,2-Benzenedicarboxylic acid, dibutyl ester)	No	No
115	95-50-1	o-Dichlorobenzene (Benzene, 1,2-dichloro-)	No	No
116	541-73-1	m-Dichlorobenzene (Benzene, 1,3-dichloro-)	No	No
117	106-46-7	p-Dichlorobenzene (Benzene, 1,4-dichlor-)	No	No
118	25321-22-6	Dichlorobenzene, N.O.S.[3] (Benzene, dichloro-, N.O.S.[3])	No	No
119	91-94-1	3,3'-Dichlorobenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-)	No	No
120	764-41-0	1,4-Dichloro-2-butene (2-Butene, 1,4-dichloro-)	No	No
121	75-71-8	Dichlorodifluoromethane (Methane, dichlorodifluoro-)	No	No
122	75-35-4	1,1-Dichloroethane (Ethylidene dichloride)	No	No
123	156-60-5	1,2-Dichloroethane (Ethylene dichloride)	No	No
124	111-44-4	trans-1,2-Dichloroethene (1,2-Dichloroethylene)	No	No
125	108-60-1	Dichloroethylene, N.O.S.[3] (Ethene, dichloro-, N.O.S.[3])	No	No
126	111-91-1	1,1-Dichloroethylene (Ethene, 1,1-dichloro-)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
127	542-88-1	Dichloromethane (Methylene chloride)	No	No
128	120-83-2	2,4-Dichlorophenol (Phenol, 2,4-dichloro-)	No	No
129	87-65-0	2,6-Dichlorophenol (Phenol, 2,6-dichloro-)	No	No
130	94-75-7	2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters (Acetic acid, 2,4-dichlorophenoxy-, salts and esters)	No	No
131	696-28-6	Dichlorophenylarsine (Phenyl dichloroarsine)	No	No
132	26638-19-7	Dichloropropane, N.O.S.[3] (Propane, dichloro-, N.O.S.[3])	No	No
133	26545-73-3	1,2-Dichloropropane (Propylene dichloride)	No	No
134	26952-23-8	Dichloropropene, N.O.S.[3] (Propene, dichloro-, N.O.S.[3])	No	No
135	542-75-6	1,3-Dichloropropene (1-Propene, 1,3-dichloro-)	No	No
136	60-57-1	Dieldin (1,2,3,4,10.10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octa-hydro-endo, exo- 1,4:5,8-Dimethanonaphthalene)	No	No
137	1464-53-5	1,2:3,4-Diepoxybutane (2,2'-Bioxirane)	No	No
138	692-42-2	Diethylarsine (Arsine, diethyl-)	No	No
139	1615-80-1	N,N-Diethylhydrazine (Hydrazine, 1,2-diethyl)	No	No
140	3288-58-2	O,O-Diethyl S-methyl ester of phosphorodithioic acid (Phosphorodithioic acid, O,O-diethyl S-methyl ester)	No	No
141	311-45-5	O,O-Diethylphosphoric acid, O-p-nitrophenyl ester (Phosphoric acid, diethyl p-nitrophenyl ester)	No	No
142	84-66-2	Diethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)	No	No
143	297-97-2	O,O-Diethyl O-2-pyrazinyl phosphorothioate (Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester)	No	No
144	56-53-1	Diethylstilbesterol (4,4'-Stilbenediol,alpha,alpha-diethyl, bis(dihydrogen phosphate, (E)-)	No	No
145	94-58-6	Dihydrosafrole (Benzene, 1,2-methylenedioxy-4-propyl-)	No	No
146	120-80-9	3,4-Dihydroxy-alpha-(methylamino)methyl benzyl alcohol (1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-)	No	No
147	55-91-4	Dilsopropylfluorophosphate (DFP) (Phosphorofluoridic acid, bis(1-methylethyl) ester)	No	No
148	60-51-5	Dimethoate (Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester)	No	No
149	119-90-4	3,3'-Dimethoxybenzidine ([1,1'-Biphenyl]- 4,4'-diamine, 3-3'-dimethoxy-)	No	No
150	60-11-7	p-Dimethylaminoazobenzene (Benzenamine, N,N-dimethyl-4-(phenylazo)-)	No	No
151	57-97-6	7,12-Dimethylbenz[a]anthracene (1,2-Benzanthracene, 7,12-dimethyl-)	No	No
152	119-93-7	3,3'-Dimethylbenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-)	No	No
153	79-44-7	Dimethylcarbamoyl chloride (Carbamoyl chloride, dimethyl-)	No	No
154	57-14-7	1,1-Dimethylhydrazine (Hydrazine, 1,1-dimethyl-)	No	No
155	540-73-8	1,2-Dimethylhydrazine (Hydrazine, 1,2-dimethyl-)	No	No
156	39196-18-4	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino) carbonyl] oxime (Thiofanox)	No	No
157	122-09-8	alpha,alpha-Dimethylphenethylamine (Ethanamine, 1,1-dimethyl-2-phenyl-)	No	No
158	105-67-9	2,4-Dimethylphenol (Phenol, 2,4-dimethyl-)	No	No
159	131-11-3	Dimethyl phthalate (1,2-Benzenedicarboxylic acid, dimethyl ester)	No	No
160	77-78-1	Dimethyl sulfate (Sulfuric acid, dimethyl ester)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
161	25154-54-5	Dinitrobenzene, N.O.S.[3] (Benzene, dinitro-, N.O.S.[3])	No	No
162	534-52-1	4,6-Dinitro-o-cresol and salts (Phenol, 2,4-dinitro-6-methyl-, and salts)	No	No
163	51-28-5	2,4-Dinitrophenol (Phenol, 2,4-dinitro-)	No	No
164	121-14-2	2,4-Dinitrotoluene (Benzene, 1-methyl-2,4-dinitro-)	No	No
165	606-20-2	2,6-Dinitrotoluene (Benzene, 1-methyl-2,6-dinitro-)	No	No
166	117-81-7	Di-n-octyl phthalate (1,2-Benzenedicarboxylic acid, dioctyl ester)	No	No
167	123-91-1	1,4-Dioxane (1,4-Diethylene oxide)	No	No
168	122-39-4	Diphenylamine (Benzenamine, N-phenyl-)	No	No
169	122-66-7	1,2-Diphenylhydrazine (Hydrazine, 1,2-diphenyl-)	No	No
170	621-64-7	Di-n-propylnitrosamine (N-Nitroso-di-n-propylamine)	No	No
171	298-04-4	Disulfoton (O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate)	No	No
172	541-53-7	2,4-Dithiobiuret (Thioimidodicarbonic diamide)	No	No
173	115-29-7	Endosulfan (5-Norbornene, 2,3-dimethanol, 1,4,5,6,7,7-hexachloro-, cyclic sulfite)	No	No
174	72-20-8	Endrin and metabolites (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene, and metabolites)	No	No
175	51-79-6	Ethyl carbamate (Urethan) (Carbamic acid, ethyl ester)	No	No
176	107-12-0	Ethyl cyanide (propanenitrile)	No	No
177	111-54-6	Ethylenebisdithiocarbamic acid, salts and esters (1,2-Ethanediyl-biscarbamodithioic acid, salts and esters)	No	No
178	151-56-4	Ethyleneimine (Aziridine)	No	No
179	75-21-8	Ethylene oxide (Oxirane)	No	No
180	96-45-7	Ethylenethiourea (2-Imidazolidinethione)	No	No
181	97-63-2	Ethyl methacrylate (2-Propenoic acid, 2-methyl-, ethyl ester)	No	No
182	62-50-0	Ethyl methanesulfonate (Methanesulfonic acid, ethyl ester)	No	No
183	206-44-0	Fluoranthene (Benzo[j,k]fluorene)	No	No
184	7782-41-4	Fluorine	**Yes**	No
185	640-19-7	2-Fluoroacetamide (Acetamide, 2-fluoro-)	No	No
186	62-74-8	Fluoroacetic acid, sodium salt (Acetic acid, fluoro-, sodium salt)	No	No
187	50-00-0	Formaldehyde (Methylene oxide)	No	No
188	64-18-6	Formic acid (Methanoic acid)	No	No
189	765-34-4	Glycidylaldehyde (1-Propanol-2,3-epoxy)	No	No
190	56-23-5	Halomethane, N.O.S.3	No	No
191	76-44-8	Heptachlor (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-)	No	No
192	1024-57-3	Heptachlor epoxide (alpha, beta, and gamma isomers) (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-2,3-epoxy-3a,4,7,7-tetrahydro-, alpha, beta, and gamma isomers)	No	No
193	118-74-1	Hexachlorobenzene (Benzene, hexachloro-)	No	No
194	87-68-3	Hexachlorobutadiene (1,3-Butadiene, 1,1,2,3,4,4-hexachloro-)	No	No
195	58-89-9	Hexachlorocyclohexane (all isomers) (Lindane and isomers)	No	No
196	77-47-4	Hexachlorocyclopentadiene (1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
197	67-72-1	Hexachloroethane (Ethane, 1,1,1,2,2,2-hexachloro-)	No	No
198	309-00-2	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,endo-dimethanonaphthalene (Hexachlorohexa-hydro-endo,endo-dimethanonaphthalene)	No	No
199	70-30-4	Hexachlorophene (2,2'-Methylenebis(3,4,6-trichlorophenol)	No	No
200	1888-71-7	Hexachloropropene (1-Propene, 1,1,2,3,3,3-hexachloro-)	No	No
201	757-58-4	Hexaethyl tetraphosphate (Tetraphosphoric acid, hexaethyl ester)	No	No
202	302-01-2	Hydrazine (Diamine)	No	No
203	74-90-8	Hydrocyanic acid (Hydrogen cyanide)	No	No
204	7664-39-3	Hydrofluoric acid (Hydrogen fluoride)	No	No
205	6/4/7783	Hydrogen sulfide (Sulfur hydride)	No	No
206	75-60-5	Hydroxydimethylarsine oxide (Cacodylic acid)	No	No
207	193-39-5	Indeno (1,2,3-cd)pyrene (1,10-(1,2-phenylene)pyrene)	No	No
208	74-88-4	Iodomethane (Methyl iodide)	No	No
209	9004-66-4	Iron dextran (Ferric dextran)	No	No
210	75-13-8	Isocyanic acid, methyl ester (Methyl isocyanate)	No	No
211	78-83-1	Isobutyl alcohol (1-Propanol, 2-methyl-)	No	No
212	120-58-1	Isosafrole (Benzene, 1,2-methylenedioxy-4-allyl-)	No	No
213	143-50-0	Kepone (Decachlorooctahydro-1,3,4-Methano-2H-cyclobuta[cd]pentalen-2-one)	No	No
214	303-34-4	Lasiocarpine (2-Butenoic acid, 2-methyl-, 7-[(2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy)methyl]-2,3,5,7a- tetrahydro-1H- pyrrolizin-1-yl ester)	No	No
215	7439-92-1	Lead and compounds, N.O.S.3	No	**Possibly**
216	301-04-2	Lead acetate (Acetic acid, lead salt)	No	No
217	7446-27-7	Lead phosphate (Phosphoric acid, lead salt)	No	No
218	1335-32-6	Lead subacetate (Lead, bis(acetato-0)tetrahydroxytri-)	No	No
219	108-31-6	Maleic anhydride (2,5-Furandione)	No	No
220	123-33-1	Maleic hydrazide (1,2-Dihydro-3,6-pyridazinedione)	No	No
221	109-77-3	Malononitrile (Propanedinitrile)	No	No
222	148-82-3	Melphalan (Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-,L-)	No	No
223	628-86-4	Mercury fulminate (Fulminic acid, mercury salt)	No	No
224	7439-97-6	Mercury and compounds, N.O.S.3	No	**Possibly**
225	126-98-7	Methacrylonitrile (2-Propenenitrile, 2-methyl-)	No	No
226	74-93-1	Methanethiol (Thiomethanol)	No	No
227	91-80-5	Methapyrilene (Pyridine. 2-[(2-dimethylamino)ethyl]-2-thenylamino-)	No	No
228	16752-77-5	Metholmyl (Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester)	No	No
229	72-43-5	Methoxychlor (Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-)	No	No
230	75-55-8	2-Methylaziridine (1,2-Propylenimine)	No	No
231	56-49-5	3-Methylcholanthrene (Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-)	No	No
232	79-22-1	Methyl chlorocarbonate (Carbonochloridic acid, methyl ester)	No	No
233	101-14-4	4,4-Methylenebis(2-chloroaniline) (Benzenamine, 4,4-methylenebis- (2-chloro-)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
234	78-93-3	Methyl ethyl ketone (MEK) (2-Butanone)	No	No
235	60-34-4	Methyl hydrazine (Hydrazine, methyl-)	No	No
236	75-86-5	2-Methyllactonitrile (Propanenitrile, 2-hydroxy-2-methyl-)	No	No
237	80-62-6	Methyl methacrylate (2-Propenoic acid, 2-methyl-, methyl ester)	No	No
238	66-27-3	Methyl methanesulfonate (Methanesulfonic acid, methyl ester)	No	No
239	123-38-6	2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime (Propanal, 2-methyl-2-(methylthio)-, 0-[(methylamino)carbonyl]oxime)	No	No
240	113-00-8	N-Methyl-N-nitro-N-nitrosoguanidine (Guanidine, N-nitroso-N-methyl-N- nitro-)	No	No
241	298-00-0	Methyl parathion (0,0-dimethyl 0-(4-nitrophenyl) phosphorothioate)	No	No
242	56-04-2	Methylthiouracil (4-IH-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-)	No	No
243	7439-98-7	Molybdenum and compounds, N.O.S.3	No	**Possibly**
244	505-60-2	Mustard gas (Sulfide, bis(2-chloroethyl)-)	No	No
245	91-20-3	Naphthalene	No	No
246	130-15-4	1,4-Naphthoquinone (1,4-Naphthalenedione)	No	No
247	134-32-7	1-Naphthylamine (alpha-Naphthylamine)	No	No
248	91-59-8	2-Naphthylamine (beta-Naphthylamine)	No	No
249	86-88-4	1-Naphthyl-2-thiourea (Thiourea, 1-naphthalenyl-)	No	No
250	7440-02-0	Nickel and compounds, N.O.S.3	No	**Possibly**
251	13463-39-3	Nickel carbonyl (Nickel tetracarbonyl)	No	No
252	557-19-7	Nickel cyanide (Nickel (II) cyanide)	No	No
253	54-11-5	Nicotine and salts (Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts)	No	No
254	10102-43-9	Nitric oxide (Nitrogen (II) oxide)	No	No
255	100-01-6	p-Nitroaniline (Benzenamine, 4-nitro-)	No	No
256	98-95-3	Nitrobenzine (Benzene, nitro-)	No	No
257	10102-44-0	Nitrogen dioxide (Nitrogen (IV) oxide)	No	No
258	51-75-2	Nitrogen mustard and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)- N-methyl-, and hydrochloride salt)	No	No
259	75-04-7	Nitrogen mustard N-Oxide and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)-N-methyl-, and hydrochloride salt)	No	No
260	55-63-0	Nitroglycerine (1,2,3-Propanetriol, trinitrate)	No	No
261	100-02-7	4-Nitrophenol (Phenol, 4-nitro-)	No	No
262	79-46-9	4-Nitroquinoline-1-oxide (Quinoline, 4-nitro-1-oxide-)	No	No
263	35576-91-1	Nitrosamine, N.O.S.3	No	No
264	924-16-3	N-Nitrosodi-n-butylamine (1-Butanamine, N-butyl-N-nitroso-)	No	No
265	1116-54-7	N-Nitrosodiethanolamine (Ethanol, 2,2-(nitrosoimino)bis-)	No	No
266	55-18-5	N-Nitrosodiethylamine (Ethanamine, N-ethyl-N-nitroso-)	No	No
267	62-75-9	N-Nitrosodimethylamine (Dimethylnitrosamine)	No	No
268	759-73-9	N-Nitroso-N-ethylurea (Carbamide, N-ethyl-N-nitroso-)	No	No
269	10595-95-6	N-Nitrosomethylethylamine (Ethanamine, N-methyl-N-nitroso-)	No	No
270	684-93-5	N-Nitroso-N-methylurea (Carbamide, N-methyl-N-nitroso-)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
271	615-53-2	N-Nitroso-N-methylurethane (Carbamic acid, methylnitroso-, ethyl ester)	No	No
272	4549-40-0	N-Nitrosomethylvinylamine (Ethenamine, N-methyl-N-nitroso-)	No	No
273	59-89-2	N-Nitrosomorpholine (Morpholine, N-nitroso-)	No	No
274	16543-55-8	N-Nitrosonornicotine (Nornicotine, N-nitroso-)	No	No
275	100-75-4	N-Nitrosopiperidine (Pyridine, hexahydro-, N-nitroso-)	No	No
276	930-55-2	Nitrosopyrrolidine (Pyrrole, tetrahydro-, N-nitroso-)	No	No
277	13256-22-9	N-Nitrososarcosine (Sarcosine, N-nitroso-)	No	No
278	99-55-8	5-Nitro-o-toluidine (Benzenamine, 2-methyl-5-nitro-)	No	No
279	152-16-9	Octamethylpyrophosphoramide (Diphosphoramide, octamethyl-)	No	No
280	20816-12-0	Osmium tetroxide (Osmium (VIII) oxide)	No	No
281	145-73-3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid (Endothal)	No	No
282	123-63-7	Paraldehyde (1,3,5-Trioxane, 2,4,6-trimethyl-)	No	No
283	56-38-2	Parathion (Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester)	No	No
284	608-93-5	Pentachlorobenzene (Benzene, pentachloro-)	No	No
285	76-01-7	Pentachloroethane (Ethane, pentachloro-)	No	No
286	82-68-8	Pentachloronitrobenzene (PCNB) (Benzene, pentachloronitro-)	No	No
287	87-86-5	Pentachlorophenol (Phenol, pentachloro-)	No	No
288	62-44-2	Phenacetin (Acetamide, N-(4-ethoxyphenyl)-)	No	No
289	108-95-2	Phenol (Benzene, hydroxy-)	No	No
290	95-54-5	Phenylenediamine (Benzenediamine)	No	No
291	108-45-2	Phenylmercury acetate (Mercury, acetatophenyl-)	No	No
292	25265-76-3	N-Phenylthiourea (Thiourea, phenyl-)	No	No
293	75-44-5	Phosgene (Carbonyl chloride)	No	No
294	7803-51-2	Phosphine (Hydrogen phosphide)	No	No
295	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester (Phorate)	No	No
296	85-44-9	Phosphorothioic acid, O,O-dimethyl O-[p-((dimethylamino)sulfonyl)phenyl] ester (Famphur)	No	No
297	88-99-3	Phthalic acid esters, N.O.S.[3] (Benzene, 1,2-dicarboxylic acid, esters, N.O.S.[3])	No	No
298	85-44-9	Phthalic anhydride (1,2-Benzenedicarboxylic acid anhydride)	No	No
299	109-06-8	2-Picoline (Pyridine, 2-methyl-)	No	No
300	1336-36-3	Polychlorinated biphenyl, N.O.S.3	No	No
301	151-50-8	Potassium cyanide	No	No
302	506-61-6	Potassium silver cyanide (Argentate(1-), dicyano-, potassium)	No	No
303	23950-58-5	Pronamide (3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide)	No	No
304	1120-71-4	1,3-Propane sultone (1,2-Oxathiolane, 2,2-dioxide)	No	No
305	107-10-8	n-Propylamine (1-Propanamine)	No	No
306	51-52-5	Propylthiouracil (Undecamethylenediamine, N,N'-bis(2-chlorobenzyl-), dihydrochloride)	No	No
307	107-19-7	2-Propyn-1-ol (Propargyl alcohol)	No	No
308	110-86-1	Pyridine	No	No
309	7440-14-4	Radium -226 and -228	No	**Yes**

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
310	50-55-5	Reserpine (Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[3,4,5- trimethoxybenzoyl)oxy]-, methyl ester)	No	No
311	108-46-3	Resorcinol (1,3-Benzenediol)	No	No
312	128-44-9	Saccharin and salts (1,2-Benzoisothiazolin-3-one, 1,1-dioxide, and salts)	No	No
313	94-59-7	Safrole (Benzene, 1,2-methylenedioxy-4-allyl-)	No	No
314	7783-00-8	Selenious acid (Selenium dioxide)	No	No
315	7782-49-2	Selenium and compounds, N.O.S.3	No	**Possibly**
316	7488-56-4	Selenium sulfide (Sulfur selenide)	No	No
317	144-34-3	Selenourea (Carbamimidoselenoic acid)	No	No
318	7440-22-4	Silver and compounds, N.O.S.3	No	**Possibly**
319	506-64-9	Silver cyanide	No	No
320	143-33-9	Sodium cyanide	No	No
321	136-30-1	Streptozotocin (D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-)	No	No
322	148-18-5	Strontium sulfide	No	No
323	57-24-9	Strychnine and salts (Strychnidin-10-one, and salts)	No	No
324	95-94-3	1,2,4,5-Tetrachlorobenzene (Benzene, 1,2,4,5-tetrachloro-)	No	No
325	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (Dibenzo-p-dioxin, 2,3,7,8-tetrachloro-)	No	No
326	25322-20-7	Tetrachloroethane, N.O.S.[3] (Ethane, tetrachloro-, N.O.S. [3])	No	No
327	630-20-6	1,1,1,2-Tetrachlorethane (Ethane, 1,1,1,2-tetrachloro-)	No	No
328	79-34-5	1,1,2,2-Tetrachlorethane (Ethane, 1,1,2,2-tetrachloro-)	No	No
329	127-18-4	Tetrachloroethane (Ethene, 1,1,2,2-tetrachloro-)	No	No
330	56-23-5	Tetrachloromethane (Carbon tetrachloride)	No	No
331	58-90-2	2,3,4,6,-Tetrachlorophenol (Phenol, 2,3,4,6-tetrachloro-)	No	No
332	3689-24-5	Tetraethyldithiopyrophosphate (Dithiopyrophosphoric acid, tetraethyl-ester)	No	No
333	78-00-2	Tetraethyl lead (Plumbane, tetraethyl-)	No	No
334	107-49-3	Tetraethylpyrophosphate (Pyrophosphoric acide, tetraethyl ester)	No	No
335	509-14-8	Tetranitromethane (Methane, tetranitro-)	No	No
336	7440-28-0	Thallium and compounds, N.O.S.3	No	**Possibly**
337	1314-32-5	Thallic oxide (Thallium (III) oxide)	No	No
338	563-68-8	Thallium (I) acetate (Acetic acid, thallium (I) salt)	No	No
339	6533-73-9	Thallium (I) carbonate (Carbonic acid, dithallium (I) salt)	No	No
340	7791-12-0	Thallium (I) chloride	No	No
341	10102-45-1	Thallium (I) nitrate (Nitric acid, thallium (I) salt)	No	No
342	12039-52-0	Thallium selenite	No	No
343	7446-18-6	Thallium (I) sulfate (Sulfuric acid, thallium (I) salt)	No	No
344	62-55-5	Thioacetamide (Ethanethioamide)	No	No
345	79-19-6	Thiosemicarbazide (Hydrazinecarbothioamide)	No	No
346	62-56-6	Thiourea (Carbamide thio-)	No	No
347	137-26-8	Thiuram (Bis(dimethylthiocarbamoyl) disulfide)	No	No
348	7440-29-1	Thorium and compounds, N.O.S.,3 when producing thorium byproduct material	No	**Yes**
349	108-88-3	Toluene (Benzene, methyl-)	No	No
350	25376-45-8	Toluenediamine (Diaminotoluene)	No	No
351	636-21-5	o-Toluidine hydrochloride (Benzenamine, 2-methyl-, hydrochloride)	No	No

Table App2.2A-1 Constituents Known or Potentially Associated with Process or Ores

	CAS No.	Constituent	Used In Mill Process	Associated with Ores
352	584-84-9	Tolylene diisocyanate (Benzene, l,3-diisocyanatomethyl-)	No	No
353	8001-35-2	Toxaphene (Camphene, octachloro-)	No	No
354	75-25-2	Tribromomethane (Bromoform)	No	No
355	120-82-1	1,2,4-Trichlorobenzene (Benzene, 1,2,4-trichloro-)	No	No
356	71-55-6	1,1,1-Trichloroethane (Methyl chloroform)	No	No
357	79-00-5	1,1,2-Trichloroethane (Ethane, 1,1,2-trichloro-)	No	No
358	79-01-6	Trichloroethene (Trichloroethylene)	No	No
359	75-70-7	Trichloromethanethiol (Methanethiol, trichloro-)	No	No
360	75-69-4	Trichloromonofluoromethane (Methane, trichlorofluoro-)	No	No
361	95-95-4	2,4,5-Trichlorophenol (Phenol, 2,4,5-trichloro-)	No	No
362	88-06-2	2,4,6-Trichlorophenol (Phenol, 2,4,6-trichloro-)	No	No
363	93-76-5	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) (Acetic acid, 2,4,5-trichlorophenoxy-)	No	No
364	93-72-1	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex) (Propionoic acid, 2-(2,4,5-trichlorophenoxy)-)	No	No
365	25735-29-9	Trichloropropane, N.O.S.[3] (Propane, trichloro-, N.O.S.[3])	No	No
366	96-18-4	1,2,3-Trichloropropane (Propane, 1,2,3-trichloro-)	No	No
367	152-20-5	O,O,O-Triethyl phosphorothioate (Phosphorothioic acid, O,O,O-triethyl ester)	No	No
368	121-44-8	sym-Trinitrobenzene (Benzene, 1,3,5-trinitro-)	No	No
369	52-24-4	Tris(1-azridinyl) phosphine sulfide (Phosphine sulfide, tris(1-aziridinyl-)	No	No
370	126-72-7	Tris(2,3-dibromopropyl) phosphate (1-Propanol, 2,3-dibromo-, phosphate)	No	No
371	1655-35-2	Trypan blue (2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl (1,1'-biphenyl)- 4,4'-diyl)bis(azo)]bis(5-amino-4-hydroxy-, tetrasodium salt)	No	No
372	66-75-1	Uracil mustard (Uracil 5-[bis(2-chloroethyl)amino]-)	No	No
373	7440-61-1	Uranium and compounds, N.O.S.3	No	**Yes**
374	11115-67-6	Vanadic acid, ammonium salt (ammonium vanadate)	No	No
375	1314-62-1	Vanadium pentoxide (Vanadium (V) oxide)	No	No
376	75-01-4	Vinyl chloride (Ethene, chloro-)	No	No
377	557-21-1	Zinc cyanide	No	No
378	1314-84-7	Zinc phosphide	No	No

10 CFR Part 40, Appendix A, Criterion 13
List of constituents identifies the constituents for which standards must be set and complied with if the specific constituent is
reasonably expected to be in or derived from the byproduct material and has been detected in groundwater.

Table App2.2.A-2 Constituents Known or Potentially Associated with Process or Ores

Constituent	Source	Basis
SUMMARY **Not listed in Criterion 13 but reasonably known to have been or possibly associated with ores and/or the milling process:** **a**luminum, barium, boron, cobalt, copper, iron, lithium, manganese, strontium tin, vanadium, zinc, ammonia, chloride, nitrate, nitrite, sulfate, total dissolved solids, ammonium sulfate, polyacrylamide, sodium carbonate, sodium bicarbonate, sodium hydroxide, sulfuric acid, adjusted gross alpha		
Antimony (Sb)	Ore	Listed in Criterion 13
Aluminum (Al)	Ore	Not Listed
Arsenic (As)	Ore	Listed in Criterion 13
Barium (Ba)	Ore	Not Listed
Beryllium (Be)	Ore	Listed in Criterion 13
Boron (B)	Ore	Not Listed
Cadmium (Cd)	Ore	Listed in Criterion 13
Chromium (Cr)	Ore	Listed in Criterion 13
Cobalt (Co)	Ore	Not Listed
Copper (Cu)	Ore	Not Listed
Fluorine (F)	Ore	Listed in Criterion 13
Iron (Fe)	Ore	Not Listed
Lead (Pb)	Ore	Listed in Criterion 13
Lithium (Li)	Ore	Not Listed
Manganese (Mn)	Ore	Not Listed
Mercury (Hg)	Ore	Listed in Criterion 13
Molybdenum (Mo)	Ore	Listed in Criterion 13
Nickel (Ni)	Ore	Listed in Criterion 13
Silver (Ag)	Ore	Listed in Criterion 13
Selenium (Se)	Ore	Listed in Criterion 13
Strontium (Sr)	Ore	Not Listed
Thallium (Tl)	Ore	Listed in Criterion 13
Tin (Sn)	Ore	Not Listed
Uranium (U)	Ore	Listed in Criterion 13
Vanadium (V)	Ore	Not Listed
Zinc (Zn)	Ore	Not Listed
Ammonia (NH3-N)	Process Reagent	Not Listed
Chlorine (Cl)	Process Reagent	Not Listed
Nitrate (NO3-N)	Degradation product from NH3-N	Not Listed
Nitrite (NO2-N)	Degradation product from NO3-N	Not Listed
Sulfate (SO4)	From Process Reagent (H2SO4)	Not Listed
Total Dissovled Solids (TDS)	Process related	Not Listed
Ammonium Sulfate ((NH4)2SO4	Process Reagent	Not Listed
Polyacrylamide	Process Reagent (flocculant)	Not Listed
Sodium carbonate (Na2CO3)	Process Reagent (Na, HCO3, CO3)	Not Listed
Sodium bicarbonate (NaHCO3)	Process Reagent (Na, HCO3, CO3)	Not Listed
Sodium hydroxide (NaOH)	Process Reagent (Na)	Not Listed
Sulfuric acid (H2SO4)	Process Reagent (Sulfate)	Not Listed
Adjusted Gross Alpha (GA)	Ore	Not Listed
Radium-226+228 (Ra-226+228)	Ore	Listed in Criterion 13
Thorium-230 (Th-230)	Ore	Listed in Criterion 13

Table App2.2.A-3 Summary of Applicable Standards and Other Reasonable and Potentially Appropriate Criteria

	POTENITALLY APPLICABLE STANDARDS								
	NRC Standards		State of New Mexico Standards			EPA Standards and Protective Criteria			Lowest Promulgated Standard
	NRC License/	10 CFR 40 Appendix A,	NMAC 20.6.2.3103.A	NMAC 20.6.2.3103.B	NMAC	EPA 40 CFR 192 Subpart	EPA MCLs	EPA Tapwater	
Metals (mg/L)									
Ag		0.05	**0.05**	-	-	0.05	-	-	**0.05**
Al			-	-	5.0	-	-	2.00	**5**
As		0.05	0.01	-	-	0.05	0.010	-	**0.01**
B			-	-	0.75	-	-	0.4	**0.75**
Ba		1.0	2	-	-	1	2.0	-	**1**
Be			0.004	-	-	-	0.004	-	**0.004**
Cd		0.01	0.005	-	-	0.01	0.005	-	**0.005**
Co			-	-	0.05	-	-	0.0006	**0.05**
Cr		0.05	0.05	-	-	0.05	0.1	-	**0.05**
Cu			-	1.0	-	-	-	-	**1**
Fe			-	1.0	-	-	-	1.4	**1**
Ga			-	-	-	-	-	NA	**NA**
Hg		0.002	0.002	-	-	0.002	0.002	-	**0.002**
Li			-	-	-	-	-	0.004	**NA**
Mn			-	0.2	-	-	-	-	**0.2**
Mo	0.1		-	-	1.0	0.1	-	-	**0.1**
Ni			-	-	0.2	-	-	0.039	**0.2**
Pb		0.05	0.015	-	-	0.05	-	-	**0.015**
Sb			0.006	-	-	-	0.006	-	**0.006**
Se	0.32	0.01	0.05	-	-	0.01	0.05	-	**0.01**
Si			-	-	-	-	-	NA	**NA**
Sn			-	-	-	-	-	1.2	**NA**
Sr			-	-	-	-	-	1.2	**NA**
Ti			-	-	-	-	-	NA	**NA**
Tl			0.002	-	-	-	0.002	-	**0.002**
U	0.16	0.03	0.03	-	-	-	0.03	-	**0.03**
V	0.02		-	-	-	-	-	-	**0.02**
Zn			-	-	-	-	-	0.6	**NA**
Zr			-	-	-	-	-	0.00016	**NA**
Major Ions (mg/L)									
Br			-	-	-	-	-	NA	**NA**
Ca			-	-	-	-	-	NA	**NA**
Mg			-	-	-	-	-	NA	**NA**
Na			-	-	-	-	-	NA	**NA**
Other Compounds (mg/L)									
pH (s.u.)			-	6 to 9	-	-	-	-	6 to 9
Cl	250		-	250	-	-	-	-	**250**
F			1.6	-	-	-	4.0	-	**1.6**
CO3			-	-	-	-	-	NA	**NA**
HCO3			-	-	-	-	-	NA	**NA**
NH3-N			-	-	-	-	-	**NA**	**NA**
NO2-N			1	-	-	-	1	**-**	**1**
NO3-N	12		10	-	-	10	10	**-**	**10**
P			-	-	-	-	-	NA	**NA**
PO4			-	-	-	-	-	NA	**NA**
SO4	1,500		-	600	-	-	-	**-**	**600**
Sulfide			-	-	-	-	-	NA	**NA**
Total Dissolved Solids	2,734		-	1,000	-	-	-	-	**1,000**
Total Suspended Solids	-		-	-	-	-	-	NA	**NA**
Radionuclides (pCi/L)									
Adjusted Gross Alpha		15	-	-	-	15	-	**-**	**15**
Th-230 (diss)	0.3		-	-	-	-	-	**-**	**0.3**
Ra-Total (diss)	5	5	5	-	-	5	-	-	**5**

Table App2.2A-4 Summary of 1987 NRC Analysis of LTP Water Quality (Inorganics)

			Location H-1 East Pond				Location H-2 West Pond			
			Total		Dissolved		Total		Dissolved	
(mg/L)	EPA Tapwater Screening Level	Lowest Promulgated Standard	Sample-039	Sample-056	Sample-032	Sample-056	Sample-040	Sample-057	Sample-033	Sample-057
Metals										
Ag	-	**0.05**	< 0.55	-	< 0.3	-	< 0.55	-	< 0.3	-
Al		**5**	7	-	2.7	-	< 0.22	-	< 1.2	-
As	-	**0.01**	< 1.1	0.79	< 0.6	0.78	1.1	0.19	< 0.6	0.2
B		**0.75**	3.7	-	2.2	-	< 2.6	-	1.6	-
Ba	-	**1**	< 0.22	-	< 0.12	-	< 0.22	-	< 0.12	-
Be	-	**0.004**	< 0.022	-	< 0.012	-	< 0.022	-	< 0.012	-
Cd	-	**0.005**	< 0.055	-	< 0.030	-	< 0.055	-	< 0.03	-
Co		**0.05**	< 0.11	-	< 0.060	-	< 0.11	-	< 0.060	-
Cr	-	**0.05**	< 0.44	-	< 0.24	-	< 0.44	-	< 0.24	-
Cu	-	**1**	< 0.22	-	< 0.12	-	< 0.22	-	< 0.12	-
Fe		**1**	9.4	-	0.89	-	0.69	-	0.39	-
Ga	NA	**NA**	< 3.3	-	< 1.8	-	< 3.3	-	< 1.8	-
Hg	-	**0.002**	-	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001
Li	0.004	**NA**	2.3	-	< 1.8	-	< 2.2	-	< 1.2	-
Mn	-	**0.2**	1	-	0.32	-	0.13	-	0.075	-
Mo	-	**0.1**	100	-	58	-	73	-	39	-
Ni		**0.2**	< 0.66	-	< 0.36	-	< 0.66	-	< 0.36	-
Pb	-	**0.015**	< 2.2	-	< 1.2	-	< 2.2	-	< 1.2	-
Sb	-	**0.006**	< 2.2	-	< 1.2	-	< 2.2	-	< 1.2	-
Se	-	**0.01**	11	7.0	6.5	5.8	< 2.2	0.72	< 1.2	0.71
Si	NA	**NA**	6.3	-	4.0	-	3.7	-	5.2	-
Sn	1.2	**NA**	< 0.55	-	< 0.3	-	< 0.55	-	< 0.3	-
Sr	1.2	**NA**	1.7	-	0.88	-	1.1	-	0.59	-
Ti	NA	**NA**	< 0.22	-	< 0.12	-	< 0.22	-	< 0.12	-
Tl	-	**0.002**	-	< 0.05	-	< 0.05	-	-	-	< 0.05
U	-	**0.03**	10.2	-	9.5	-	24.2	-	22.1	-
V	-	**0.02**	2.9	-	1.4	-	< 0.1	-	0.13	-
Zn	0.6	**NA**	< 0.22	-	< 0.12	-	< 0.22	-	< 0.12	-
Zr	0.00016	**NA**	< 0.22	-	< 0.12	-	< 0.22	-	< 0.12	-
Major Ions										
Br	NA	**NA**	na		< 50		na		< 50	
Ca	NA	**NA**	35		17		65		33	
Mg	NA	**NA**	190		100		260		130	
Na	NA	**NA**	12,000		6,900		7,900		4,300	
Other Compounds										
pH	-	**6 to 9**			9.64				9.01	
Cyanide (CN)	-	**0.20**			< 0.002				0.003	
Cl	-	**250**	-	-	1,900	-	na	-	1,500	-
F	-	**1.6**	na	-	< 10	-		-	< 10	-
CO3	NA	**NA**			2,275				350	
HCO3	NA	**NA**			1,175				706	
NH3-N	**NA**	**NA**			0.2				0.2	
NO2-N	-	**1**			< 50				< 50	
NO3-N	-	**10**			< 50				< 50	
P	NA	**NA**	4.2		< 1.8		< 3.3		< 1.8	
PO4	NA	**NA**			< 50				< 50	
SO4	-	**600**			12,000				9,100	
Sulfide	NA	**NA**			< 0.1				< 0.1	
Total Organic Halides	NA	**NA**			50				42	
Total Kjeldahl Nitorigen (TKN)	NA	**NA**			na	8.2			na	2.1
Total Organic Carbon (TOC)	NA	**NA**			na	56			na	40
Total Dissolved Solids	-	**1,000**			18,160				12,735	
Total Suspended Solids	NA	**NA**			154				36	
Radionuclides (pCi/L)			**Sample-262**		**Sample-263**		**Sample-250**		**Sample-251**	
Adjusted Gross Alpha	-	**15**	na		na		na		na	
Pb-210 (diss)	NA	**NA**			0.37 ±0.07		0.407 ±0.07		0.333 ±0.07	
Th-230 (diss)	-	**0.3**	0.444 ±0.07		1.11 ±0.22		0.37 ±0.07		0.1332 ±0.04	
Ra-Total (diss)	-	**5**	0.3219 ±0.01		0.1258 ±0.07		0.074 ±0.01		0.0666 ±0.01	
			pCi/Bq 27.027							

Table App2.2A-5 Summary of 1987 NRC Analysis of LTP Water Quality (Organics)

		POTENITALLY APPLICABLE STANDARDS (µg/L)				Location H-1 East Pond		Location H-2 West Pond
CAS no.	(µg/L)	NRC License	10 CFR 40 Appdx A, Criterion 5C	EPA Tapwater Screening Level	Lowest Promulgated Standard	Sample-127		Sample-128
Organics								
108-95-2	Phenol	(none)	(none)	580	NA	< 10		< 10
111-44-4	Bis(2-chloroethyl)ether	(none)	(none)	0.014	NA	< 10		< 10
95-57-8	2-Chlorophenol	(none)	(none)	9.1	NA	< 10		< 10
95-50-1	1,2-Dichlorobenzene	(none)	(none)	-	600	< 10		< 10
541-73-1	1,3-Dichlorobenzene	(none)	(none)	NA	NA	< 10		< 10
106-46-7	1,4-Dichlorobenzene	(none)	(none)	-	75	< 10		< 10
100-51-6	benzly alcohol	(none)	(none)	200	NA	< 10		< 10
95-48-7	2-Methylphenol	(none)	(none)	93	NA	< 10		< 10
108-60-1	2,2'-oxybis[1-chloropropane]	(none)	(none)	71	NA	< 10		< 10
106-44-5	4-methylphenol	(none)	(none)	190	NA	< 10		< 10
621-64-7	N-Nitrosodi-n-propylamine	(none)	(none)	0.011	NA	< 10		< 10
67-72-1	Hexachloroethane	(none)	(none)	0.33	NA	< 10		< 10
98-95-3	Nitrobenzene	(none)	(none)	0.14	NA	< 10		< 10
78-59-1	Isophorone	(none)	(none)	78	NA	< 10		< 10
88-75-5	2-Nitrophenol	(none)	(none)	NA	NA	< 10		< 10
105-67-9	2,4-Dimethylphenol	(none)	(none)	36	NA	< 10		< 10
65-85-0	benzoic acid	(none)	(none)	7,500	NA	< 50		< 50
111-91-1	Bis(2-chloroethoxy)methane	(none)	(none)	5.9	NA	< 10		< 10
120-83-2	2,4-dichlorophenol	(none)	(none)	4.6	NA	< 10		< 10
120-82-1	1,2,4-Trichlorobenzene	(none)	(none)	-	70	< 10		< 10
91-20-3	Naphthalene	(none)	(none)	-	30	< 10		< 10
106-47-8	4-Chloroaniline	(none)	(none)	0.37	NA	< 10		< 10
87-68-3	Hexachlorobutadiene	(none)	(none)	0.14	NA	< 10		< 10
59-50-7	4-Chloro-3-methylphenol	(none)	(none)	140	NA	< 10		< 10
91-57-6	2-Methylnaphthalene	(none)	(none)	3.6	NA	< 10		< 10
77-47-4	Hexachlorocyclopentadiene	(none)	(none)	-	0	< 10		< 10
88-06-2	2,4,6-Trichlorophenol	(none)	(none)	1.2	NA	< 10		< 10
95-95-4	2,4,5-Trichlorophenol	(none)	(none)	120	NA	< 50		< 50
91-58-7	2-Chloronaphthalene	(none)	(none)	75	NA	< 10		< 10
88-74-4	2-Nitroaniline	(none)	(none)	19	NA	< 50		< 50
131-11-3	Dimethyl phthalate	(none)	(none)	NA	NA	< 10		< 10
208-96-8	Acenaphthylene	(none)	(none)	NA	NA	< 10		< 10
606-20-2	2,6-Dinitrotoluene	(none)	(none)	0.049	NA	< 10		< 10
99-09-2	3-Nitroaniline	(none)	(none)	NA	NA	< 50		< 50
83-32-9	Acenaphthene	(none)	(none)	53	NA	< 10		< 10
51-28-5	2,4-Dinitrophenol	(none)	(none)	3.9	NA	< 50		< 50
100-02-7	4-Nitrophenol	(none)	(none)	NA	NA	< 50		< 50
132-64-9	Dibenzofuran	(none)	(none)	0.79	NA	< 10		< 10
121-14-2	2,4-Dinitrotoluene	(none)	(none)	0.24	NA	< 10		< 10
84-66-2	Diethyl phthalate	(none)	(none)	1500	NA	< 10		< 10
7005-72-3	4-Chlorophenyl phenyl ether	(none)	(none)	NA	NA	< 10		< 10
86-73-7	Fluorene	(none)	(none)	29	NA	< 10		< 10
100-01-6	4-Nitroaniline	(none)	(none)	3.8	NA	< 50		< 50
534-52-1	4,6-Dinitro-2-methylphenol	(none)	(none)	0.15	NA	< 50		< 50
86-30-6	n-Nitrosodiphenylamine(as diphenylamine)	(none)	(none)	12	NA	< 10		< 10
101-55-3	4-Bromophenyl phenyl ether	(none)	(none)	NA	NA	< 10		< 10
118-74-1	Hexachlorobenzene	(none)	(none)	NA	0	< 10		< 10
87-86-5	Pentachlorophenol	(none)	(none)	NA	1	< 50		< 50
85-01-8	Phenanthrene	(none)	(none)	NA	NA	< 10		< 10
120-12-7	Anthracene	(none)	(none)	180	NA	< 10		< 10
84-74-2	Di-n-butyl phthalate	(none)	(none)	90	NA	< 10		< 10
206-44-0	Fluoranthene	(none)	(none)	80	NA	< 10		< 10
129-00-0	Pyrene	(none)	(none)	12	NA	< 10		< 10
85-68-7	Butyl benzyl phthalate	(none)	(none)	16	NA	< 10		< 10
91-94-1	3,3'-Dichlorobenzidine	(none)	(none)	0.13	NA	< 20		< 20
56-55-3	Benzo[a]anthracene	(none)	(none)	0.03	NA	< 10		< 10
218-01-9	Chrysene	(none)	(none)	25	NA	< 10		< 10
117-81-7	Bis(2-ethylhexyl) phthalate	(none)	(none)	NA	0	< 10		< 10
117-84-0	Di-n-octyl phthalate	(none)	(none)	20	NA	< 10		< 10
205-99-2	Benzo[b]fluoranthene	(none)	(none)	0.25	NA	< 10		< 10
207-08-9	Benzo[k]fluoranthene	(none)	(none)	2.5	NA	< 10		< 10
50-32-8	Benzo[a]pyrene	(none)	(none)	NA	0.2	< 10		< 10
193-39-5	Indeno[1,2,3-cd]pyrene	(none)	(none)	0.25	NA	< 10		< 10
53-70-3	Dibenz(a,h)anthracene	(none)	(none)	0.025	NA	< 10		< 10

Table App2.2A-5 Summary of 1987 NRC Analysis of LTP Water Quality (Organics) continued

		POTENITALLY APPLICABLE STANDARDS (µg/L)				Location H-1 East Pond		Location H-2 West Pond
CAS no.	(µg/L)	NRC License	10 CFR 40 Appdx A, Criterion 5C	EPA Tapwater Screening Level	Lowest Promulgated Standard	Sample-127		Sample-128
Organics								
53-70-3	Dibenz(a,h)anthracene	(none)	(none)	0.025	NA	< 10		< 10
191-24-2	Benzo[g,h,i]perylene	(none)	(none)	NA	NA	< 10		< 10
74-87-3	Chloromethane	(none)	(none)	19	NA	< 10		< 10
74-83-9	Bromomethane	(none)	(none)	0.75	NA	< 10		< 10
75-01-4	Vinyl chloride	(none)	(none)	NA	2	< 10		< 10
75-00-3	Chloroethane	(none)	(none)	2100	NA	< 10		< 10
75-09-2	Methylene Chloride	(none)	(none)	NA	5	< 5		< 5
67-64-1	Acetone	(none)	(none)	1400	NA	< 10		< 10
75-15-0	Carbon disulfide	(none)	(none)	81	NA	< 5		< 5
75-35-4	1,1-Dichloroethene	(none)	(none)	NA	7	< 5		< 5
75-34-3	1,1-Dichloroethane	(none)	(none)	NA	25	< 5		< 5
540-59-0	1,1-Dichloroethene (total)	(none)	(none)	NA	NA	< 5		< 5
67-66-3	Chloroform	(none)	(none)	NA	100	< 5		< 5
107-06-2	1,2-Dichloroethane	(none)	(none)	NA	5	< 5		< 5
78-93-3	2-Butanone (MEK)	(none)	(none)	560	NA	< 10		< 10
71-55-6	1,1,1-Trichloroethane	(none)	(none)		200	< 5		< 5
56-23-5	Carbon tetrachloride	(none)	(none)		5	< 5		< 5
108-05-4	vinyl acetate	(none)	(none)	41	NA	< 10		< 10
75-27-4	Dichlorobromomethane	(none)	(none)		0	< 5		< 5
78-87-5	1,2-Dichloropropane	(none)	(none)		5	< 5		< 5
10061-01-5	cis-1,3-dichlorpropane	(none)	(none)	NA	NA	< 5		< 5
79-01-6	Trichloroethene	(none)	(none)		5	< 5		< 5
124-48-1	Chlorodibromomethane	(none)	(none)		0	< 5		< 5
79-00-5	1,1,2-Trichloroethane	(none)	(none)		5	< 5		< 5
71-43-2	Benzene	(none)	(none)		5	< 5		< 5
10061-02-06	trans-1,3-dichloropropene	(none)	(none)	0.21	NA	< 5		< 5
75-25-2	Bromoform	(none)	(none)		0	< 5		< 5
108-10-1	4-Methyl-2-pentanone (MIBK)	(none)	(none)	630	NA	< 10		< 10
591-78-6	2-Hexanone	(none)	(none)	3.8	NA	< 10		< 10
127-18-4	Tetrachloroethene	(none)	(none)		5	< 5		< 5
79-34-5	1,1,2,2-Tetrachloroethane	(none)	(none)		10	< 5		< 5
108-88-3	Toluene	(none)	(none)		1000	< 5		< 5
108-90-7	Chlorobenzene	(none)	(none)		100	< 5		< 5
100-41-4	Ethylbenzene	(none)	(none)		700	< 5		< 5
100-42-5	Styrene	(none)	(none)		100	< 5		< 5
1330-20-7	xylene (total)	(none)	(none)		620	< 5		< 5
1634-04-4	Methyl tertiary-butyl ether	(none)	(none)		100	NA		NA
156-60-5	trans-1,2-dichloroethene	(none)	(none)		100	NA		NA
1912-24-9	atrazine	(none)	(none)		3	NA		NA
1336-36-3	PCBs	(none)	(none)		0.5	NA		NA
106-93-4	ethylene dibromide	(none)	(none)		0.05	NA		NA
156-59-2	cis-1,2-dichloroethene	(none)	(none)		70	NA		NA
93-72-1	2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	(none)	(none)		10	NA		NA
94-75-7	2,4-D (2,4-Dichlorophenoxyacetic acid)	(none)	(none)		100	NA		NA
8001-35-2	Toxaphene	(none)	(none)		5	NA		NA
72-43-5	Methoxychlor	(none)	(none)		100	NA		NA
58-89-9	Lindane	(none)	(none)		4	NA		NA
72-20-8	Endrin	(none)	(none)		4	NA		NA

Not In License or 10 CFR 40, Appendix A, Criterion 5C, 13

Table App2.2A-6 Summary of HMC Analytical Results for LTP Waters (January 1997 - June 2021)

Constituents	Lowest Promulgated Standard	Total							Dissolved						
		Maximum	Minimum	Average	Count w/o ND	Count with ND	Maximum ND	Minimum ND	Maximum	Minimum	Average	Count w/o ND	Count with ND	Maximum ND	Minimum ND
Metals (mg/L)															
Ag	**0.05**	NA	NA	NA	0	3	0.01	0.01	NA	NA	NA	0	1	0.01	0.01
Al	**5**	NA	NA	NA	0	3	0.1	0.1	2	0.002	0.160	63	110	0.10	0.03
As	**0.01**	0.316	0.0050	0.1097	3	3			0.961	0.001	0.180	33	33		
B	**0.75**	NA	NA	NA	0	0			NA	NA	NA	0	0		
Ba	**1**	NA	NA	NA	0	3	0.1	0.1	0.0900	0.0090	0.0224	44	68	0.10	0.05
Be	**0.004**	NA	NA	NA	0	0			NA	NA	NA	0	0		
Cd	**0.005**	NA	NA	NA	0	3	0.01	0.01	NA	NA	NA	0	1	0.01	0.01
Co	**0.05**	NA	NA	NA	0	3	0.01	0.01	NA	NA	NA	0	8	0.03	0.01
Cr	**0.05**	NA	NA	NA	0	3	0.05	0.05	NA	NA	NA	0	44	0.05	0.05
Cu	**1**	NA	NA	NA	0	3	0.01	0.01	0.06	0.04	0.05	2	2		
Fe	**1**	0.46	0.03	0.27	3	3			2	0.01	0.155	90	147	0.20	0.03
Hg	**0.002**	NA	NA	NA	0	3	0.001	0.001	0.002	0.002	0.002	1	8	0.001	0.001
Li	**NA**	NA	NA	NA	0	0			0.087	0.018	0.041	7	7		
Mn	**0.2**	NA	NA	NA	0	3	0.01	0.01	0.61	0.0006	0.0402	102	118	0.020	0.005
Mo	**0.1**	9.56	6.64	8.02	3	3			188.9	0.046	34.02	1309	1310		
Ni	**0.2**	NA	NA	NA	0	3	0.05	0.05	NA	NA	NA	0	33	0.05	0.05
Pb	**0.015**	NA	NA	NA	0	3	0.05	0.05	0.05	0.0010	0.0180	3	40	0.05	0.001
Sb	**0.006**	NA	NA	NA	0	0			0.0150	0.0040	0.0077	6	7	0.00	0.003
Se	**0.01**	0.117	0.027	0.0667	3	3			24.9000	0.0020	0.5435	1280	1308	0.05	0.002
Sn	**NA**	NA	NA	NA	0	0			NA	NA	NA	0	7	1	1
Sr	**NA**	NA	NA	NA	0	0			NA	NA	NA	0	7	1	1
Tl	**0.002**	NA	NA	NA	0	0			0.003	0.002	0.0025	2	7	0.001	0.001
U	**0.03**	13.9	0.014	4.9	27	27			131	0.049	13.89	1408	1409		
V	**0.02**	NA	NA	NA	0	3	0.1	0.1	2.6	0.002	0.1859	76	144	0.1	0.01
Zn	**NA**	0.03	0.01	0.02	3	3			0.2	0.01	0.0525	8	33	0.01	0.01
Other Compounds															
Cl	**250**	2250	80	411	653	653			NA	NA	NA	NA			
F	**1.6**	NA	NA	NA	0	0			4.45	4.45	4.45	1	1		
NH3-N	**NA**	8.6	0.04	1.55	67	70	0.1	0.1	NA	NA	NA	NA	NA		
NO2-N	**1**	NA	NA	NA	NA				NA	NA	NA	NA	NA		
NO3-N	**10**	1	0.20	0.63	4	22	0.1	0.1	NA	NA	NA	NA	NA		
NO2+NO3-N		7	0.01	0.94	148	201	0.1	0.01							
P	**NA**	NA	NA	NA	NA	0			9.100	0.100	2.523	57	74	2	0.4
PO4	**NA**	NA	NA	NA	NA				53.000	0.010	4.757	27	29	0.01	0.01
SO4	**600**	17800	207	4053	1285	1285			NA	NA	NA	NA	NA		
Sulfide	**NA**	5.2	0.02	0.76	31	43	0.2	0.04	NA	NA	NA	NA	NA		
Total Dissolved Solids	**1,000**	NA	NA	NA					41600	2	9910	1274	1274		
Radionuclides (pCi/L)															
Adjusted Gross Alpha	15	NA	NA	NA	0	7	2	2	NA	NA	NA	NA	NA	0	0
Pb-210 (diss)	NA														
Th-230 (diss)	0.3	36.7	36.7	36.7	1	3	0.1	0.02	52.7	0.3	11.7	7	7		
Ra-226+228 (diss)	5	44.4	11.0	22.8	3	3	0	0	76.1	7.3	28.8	0	7	7	7

ND = Non Detection

Table App2.2A-7 Summary of HMC Groundwater Analytical Results (January 2015 - May 2021)

Constituents	EPA Tapwater Screening Level	Lowest Promulgated Standard	Groundwater Samples				
			Maximum	Minimum	Average	Count w/o ND	Count with ND
Metals (mg/L)							
Ag	-	**0.05**	0.01	0.0000	0.01	5	266
Al	-	**5**	0.02	0.0009	0.01	9	17
As	-	**0.01**	3.36	0.0004	0.07	117	277
B	-	**0.75**	1.39	0.3000	0.61	201	202
Ba	-	**1**	0.02	0.0003	0.01	19	23
Be	-	**0.004**	0.006	0.0001	0.001	7	257
Cd	-	**0.005**	0.02	0.0000	0.003	36	283
Co	-	**0.05**	0.37	0.0001	0.02	39	280
Cr	-	**0.05**	1.82	0.0002	0.10	36	282
Cu	-	**1**	0.01	0.0006	0.002	9	11
Fe	-	**1**	18.60	0.0030	0.42	81	248
Ga	NA	**NA**	NA	NA	NA	NA	NA
Hg	-	**0.002**	NA	NA	NA	NA	NA
Li	0.004	**NA**	0.80	0.1000	0.33	141	178
Mn	-	**0.2**	1.15	0.0003	0.08	45	82
Mo	-	**0.1**	81.10	0.0010	3.23	354	584
Ni	-	**0.2**	0.03	0.0003	0.01	47	279
Pb	-	**0.015**	0.04	0.0001	0.004	27	282
Sb	-	**0.006**	0.009	0.0003	0.004	6	233
Se	-	**0.01**	2.90	0.0010	0.10	555	585
Si	NA	**NA**	NA	NA	NA	NA	NA
Sn	1.2	**NA**	<0.05	<0.05	<0.05	0	240
Sr	1.2	**NA**	13.20	0.0700	3.20	224	224
Ti	NA	**NA**	0.14	0.0320	0.07	4	6
Tl	-	**0.002**	0.005	0.0002	0.002	4	239
U	-	**0.03**	79.00	0.0018	1.71	590	590
V	-	**0.02**	0.44	0.0010	0.03	59	346
Zn	0.6	**NA**	3.20	0.0003	0.14	56	288
Other Compounds							
pH		**6 to 9**					
Cl	-	**250**	1710	18	200	534	534
F	-	**1.6**	10.50	0.20	0.88	205	290
NH3-N	**NA**	**NA**	0.07	0.020	0.03	9	21
NO2-N	**-**	**1**	NA	NA	NA	NA	NA
NO2+NO3-N	**-**	**10**	495	0.10	6.24	353	384
P	NA	**NA**	0.20	0.02	0.06	7	19
PO4	NA	**NA**	0.02	0.02	0.02	2	2
SO4	**-**	**600**	13300	183	1055	572	572
Sulfide	NA	**NA**	0.01	0.01	0.01	1	13
Total Dissolved Solids	-	**1,000**	24600	780	2391	359	359
Radionuclides (pCi/L)							
Adjusted Gross Alpha	**-**	**15.000**	82.5	4.8	32.1	4	4
Pb-210 (diss)	NA	**NA**	NA	NA	NA	NA	0
Th-230 (diss)	**-**	**0.300**	363	0	2	268	315
Ra-Total (diss)	-	**5**	203	0	4	215	315

Table App2.2A-8 Summary of Constituent Characterization in LTP Source & GW

			NRC & HMC LTP Sampling		GW Sampling	
(mg/L)	EPA Tapwater Screening Level	Lowest Promulgated Standard	Not Retained	Retained	Not Retained	Retained
Metals						
Ag		0.05	✔		✔	
Al		5	✔		✔	
As		0.01		✔		✔
B		0.75		✔		✔
Ba		1	✔		✔	
Be		0.004		✔	✔	
Cd		0.005		✔		✔
Co		0.05	✔		✔	
Cr		0.05	✔		✔	
Cu		1	✔		✔	
Fe		1	✔		✔	
Ga	NA	NA	✔		✔	
Hg		0.002	✔		✔	
Li	0.004	NA		✔	✔	
Mn		0.2	✔			
Mo		0.1		✔		✔
Ni		0.2	✔		✔	
Pb		0.015		✔	✔	
Sb		0.006		✔	✔	
Se		0.01		✔		✔
Si	NA	NA	✔		✔	
Sn	1.2	NA	✔		✔	
Sr	1.2	NA	✔		✔	
Ti	NA	NA	✔		✔	
Tl		0.002	✔		✔	
U		0.03		✔		✔
V		0.02		✔		✔
Zn	0.6	NA	✔		✔	
Zr	0.00016	NA				
Major Ions						
Br	NA	NA	✔		✔	
Ca	NA	NA	✔		✔	
Mg	NA	NA	✔		✔	
Na	NA	NA	✔		✔	
Other Compounds						
Cl		250		✔		✔
F		1.6		✔		✔
NH3-N	NA	NA		✔	✔	
NO2-N		1				
NO3-N		10		✔		✔
P	NA	NA	✔		✔	
PO4	NA	NA	✔		✔	
SO4	-	600		✔		✔
Total Suspended Solids	NA	NA	✔		✔	
Radionuclides (pCi/L)						
Adjusted Gross Alpha		15	✔			
Pb-210 (diss)	NA	NA	✔			
Th-230 (diss)		0.3		✔		✔
Ra-Total (diss)		5		✔		✔
Organics						
All organics		Varies	✔		✔	

FIGURES

Figure App2.2.A-1 Constituent Determination Decision Flow Chart

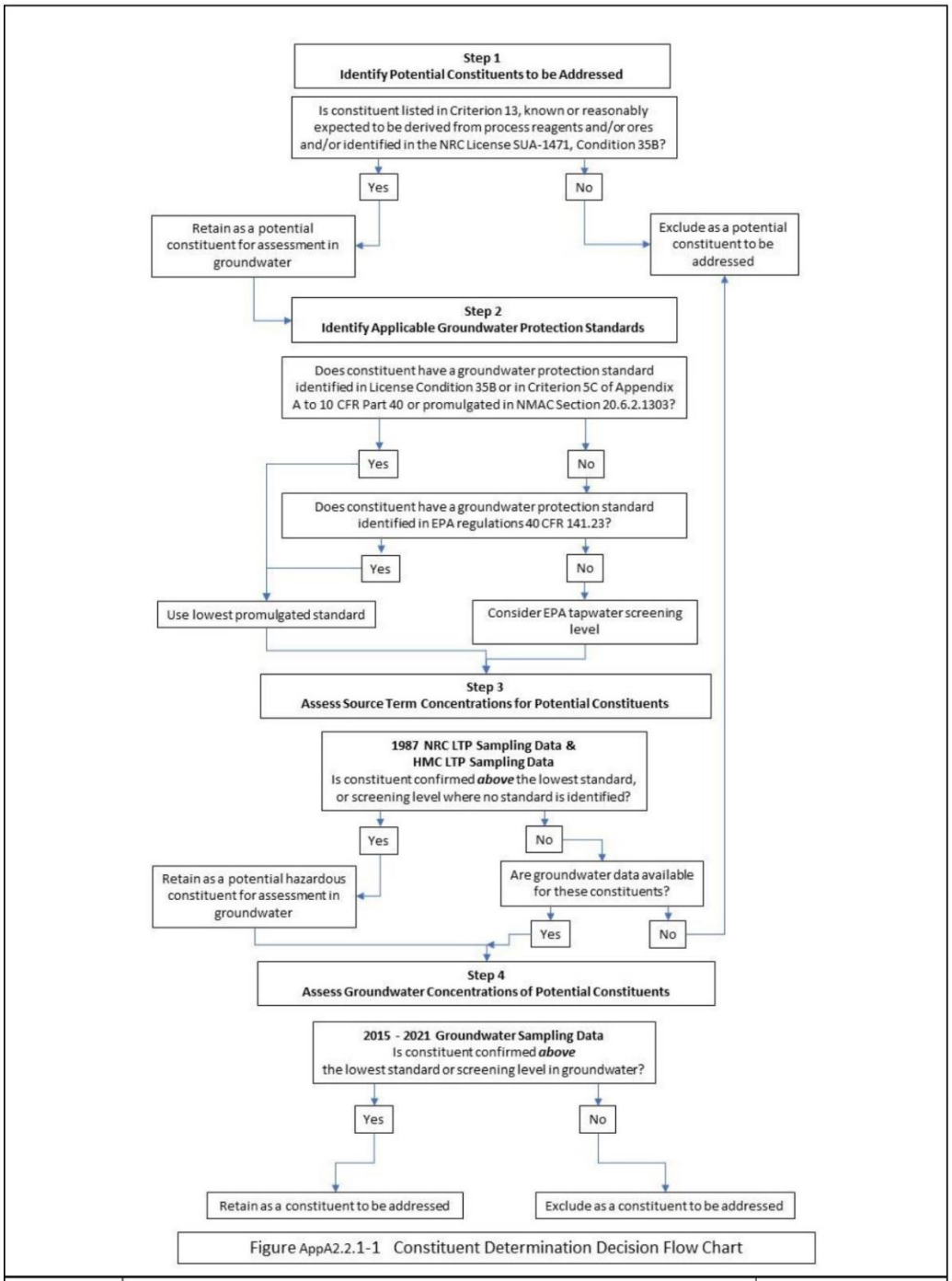
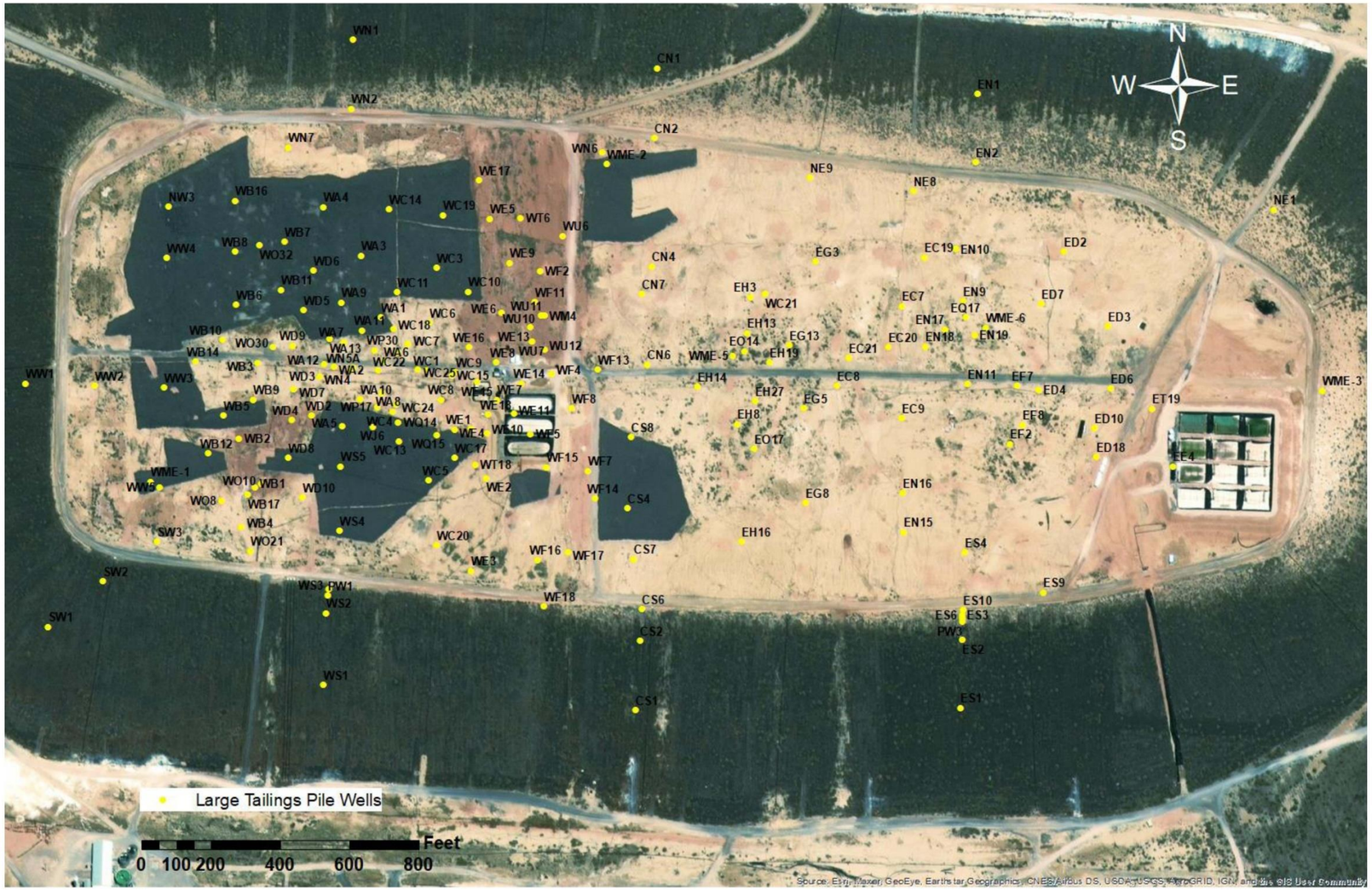


Figure App2.2.A-2 Large Tailings Pile Sampling Locations



HOMESTAKE

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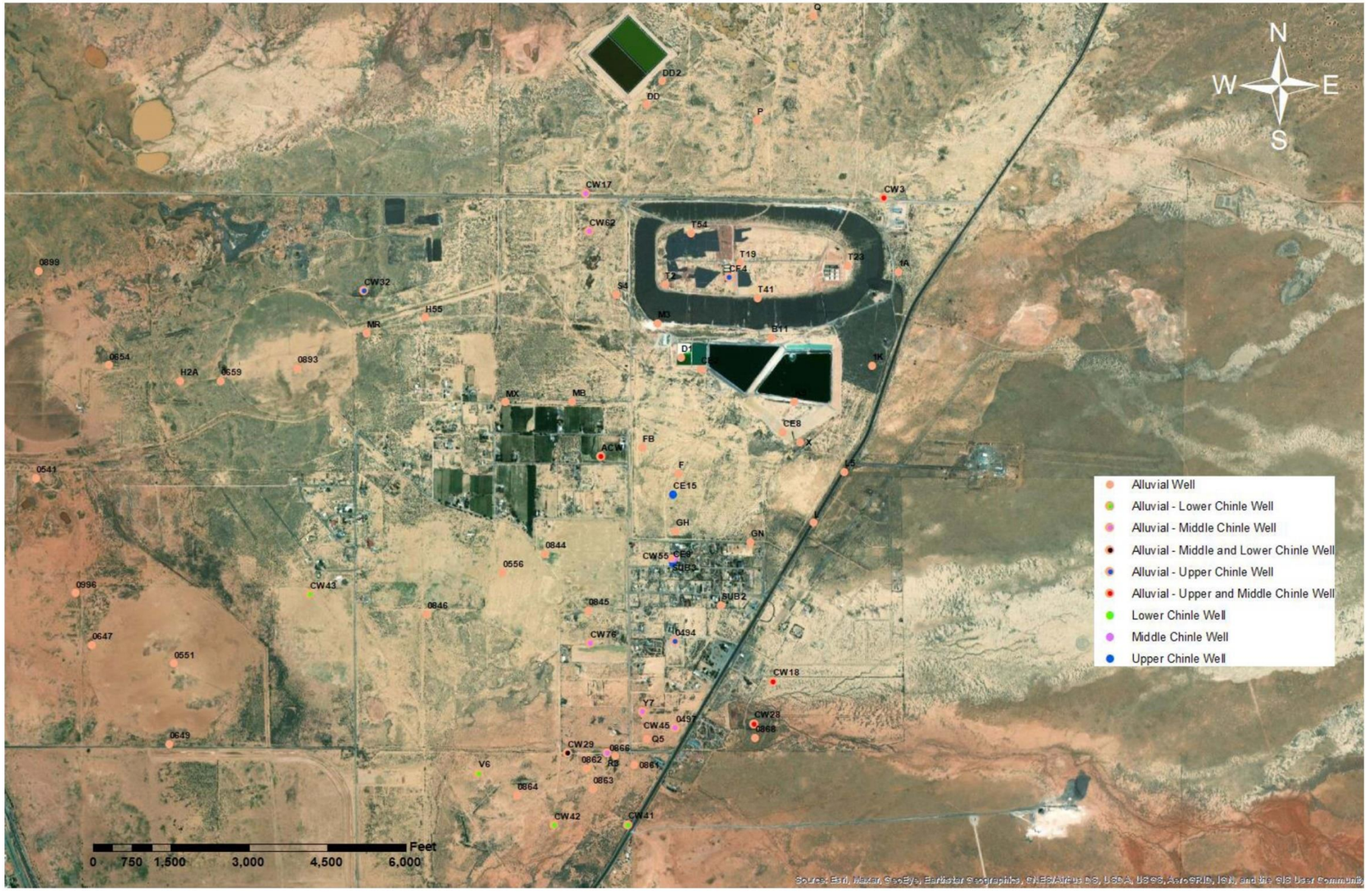
Figure App2.2A-2
Large Tailings Pile Sampling Locations

Figure App2.2.A-3 Groundwater Sample Locations



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Grants Reclamation Project
Corrective Action Program

Figure App2.2A-3
Groundwater Sample Locations

ATTACHMENTS

ATACHMENT App2.2A-A
April 6, 1987 NRC Analytical Results of GRP Large Tailings Pile (LTP)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
URANIUM RECOVERY FIELD OFFICE
BOX 25325
DENVER, COLORADO 80225

RECEIVED
AUG - 3 1987

JUL 28 1987

URFO:GRK
Docket No. 40-8903

Homestake Mining Company
P.O. Box 98
Grants, New Mexico 87020

Gentlemen:

Recently, members of the NRC staff visited your mill and took water samples from your tailings impoundment. The sampling represented the first step by the NRC staff to verify the potential existence in your tailings impoundment of families of hazardous constituents as defined in Appendix VIII to 40 CFR Part 261. This data may be used at a future time, in conjunction with similar data that you may be required to collect, to determine the existence of hazardous constituents in the ground water. All sampling, preservation and analysis, as well as chain of custody, are being conducted in conformance to the hierarchical analytical protocol for ground-water sampling as defined by EPA Methods 3510, 8010, 8240 and 8270.

Complete documents detailing these methods and associated analytical techniques are available from the Environmental Protection Agency or the National Technical Information Service. Additionally, for your information, a copy of "Required Containers and Preservation Techniques" is enclosed which outlines the collection techniques, containers and preservation methods utilized by the NRC field team. The NRC has contracted with Oak Ridge National Laboratory to perform the laboratory analyses. A copy of the analytical results is enclosed for your information.

Your cooperation during the field sampling and verification program is greatly appreciated. Should you have any questions concerning this program, please contact Gary Konwinski of my staff at (303) 236-2819.

Sincerely,

Edward F. Hawkins, Chief
Licensing Branch 1
Uranium Recovery Field Office
Region IV

Enclosures: As stated

Required Containers and Preservation Techniques

Parameter	Container	Preservation
Metals - Total	1 - L P[a]	Conc. HNO_3 - 5mL/L (pH <2)
Metals - Dissolved	1 - L P	Filter through 0.45 µm Millipore filter and then acidify as for total metals.
Radionuclides - Total	1 - L P	Conc. HNO_3 - 5mL/L (pH <2)
Radionuclides - Dissolved	1 - L P	Filter thorugh 0.45 µm Millipore filter and then acidify as for total radionuclides.
General Chemistry: Anions (F, Cl, Br, PO_4, SO_4, NO_2, NO_3), HCO_3/CO_3, pH, TDS and Total Suspended Solids	1 - L P	Cool 4°C
Volatile organics[b]	4-40mL vials with teflon septum	Cool 4°C, 0.008% $Na_2S_2O_3$[c] (1-2 crystals/vial)
Organics	2-1 L glass with teflon lined cap	Cool 4°C
TOX, TOC	1 - L glass with teflon lined cap	Cool HCl or H_2SO_4 -5mL/L (pH <2)
Cyanide	1 - L P	Cool 4°C, NaOH to pH >12 0.6g ascorbic acid
Sulfides	1 - L P	Cool 4°C, 2mL of 2 M zinc acetate/L and NaOH to pH >9
TKN, Nitrate-Nitrate, NH_3	1 - L P	Cool 4°C, 3 mL/L of H_2SO_4

[a] P = Polyethylene

[b] When collecting this sample, be sure that the side of the septum containing the thin layer of teflon is in contact with the water. The vial must be completely filled so that it contains no pockets of air. After filling the vial, the presence or absence of air bubbles can be checked by inverting and tapping on the vial.

[c] Only necessary in the presence of residual chlorine.

870406-039 HOMESTAKE H-1 EAST POND	AG	< 0.55	MG/L	EPA 200.7	5-May-1987

870406-039 HOMESTAKE H-1 EAST POND

AL	7.0	MG/L	EPA 200.7	5-May-1987
AS	< 1.1	MG/L	EPA 200.7	5-May-1987
B	3.7	MG/L	EPA 200.7	5-May-1987
BA	< 0.22	MG/L	EPA 200.7	5-May-1987
BE	< 0.022	MG/L	EPA 200.7	5-May-1987
CA2	35.	MG/L	EPA 200.7	5-May-1987
CD	< 0.055	MG/L	EPA 200.7	5-May-1987
CO	< 0.11	MG/L	EPA 200.7	5-May-1987
CR	< 0.44	MG/L	EPA 200.7	5-May-1987
CU	< 0.22	MG/L	EPA 200.7	5-May-1987
FE	9.4	MG/L	EPA 200.7	5-May-1987
GA	< 3.3	MG/L	EPA 200.7	5-May-1987
LI	2.3	MG/L	EPA 200.7	5-May-1987
MG	190.	MG/L	EPA 200.7	5-May-1987
MN	1.0	MG/L	EPA 200.7	5-May-1987
MO	100.	MG/L	EPA 200.7	5-May-1987
NA2	12000.	MG/L	EPA 200.7	5-May-1987
NI	< 0.66	MG/L	EPA 200.7	5-May-1987
P	4.2	MG/L	EPA 200.7	5-May-1987
PB	< 2.2	MG/L	EPA 200.7	5-May-1987
PREP				30-Apr-1987
SB	< 2.2	MG/L	EPA 200.7	5-May-1987
SE	11.	MG/L	EPA 200.7	5-May-1987
SI	6.3	MG/L	EPA 200.7	5-May-1987
SN	< 0.55	MG/L	EPA 200.7	5-May-1987
SR	1.7	MG/L	EPA 200.7	5-May-1987
TI	< 0.22	MG/L	EPA 200.7	5-May-1987
U	10.2			1-May-1987
V	2.9	MG/L	EPA 200.7	5-May-1987
ZN	< 0.22	MG/L	EPA 200.7	5-May-1987
ZR	< 0.22	MG/L	EPA 200.7	5-May-1987

870406-040 HOMESTAKE H-2 WEST POND

AG	< 0.55	MG/L	EPA 200.7	5-May-1987
AL	< 2.2	MG/L	EPA 200.7	5-May-1987
AS	< 1.1	MG/L	EPA 200.7	5-May-1987
B	2.6	MG/L	EPA 200.7	5-May-1987
BA	< 0.22	MG/L	EPA 200.7	5-May-1987
BE	< 0.022	MG/L	EPA 200.7	5-May-1987
CA2	65.	MG/L	EPA 200.7	5-May-1987
CD	< 0.055	MG/L	EPA 200.7	5-May-1987
CO	< 0.11	MG/L	EPA 200.7	5-May-1987
CR	< 0.44	MG/L	EPA 200.7	5-May-1987
CU	< 0.22	MG/L	EPA 200.7	5-May-1987
FE	0.69	MG/L	EPA 200.7	5-May-1987
GA	< 3.3	MG/L	EPA 200.7	5-May-1987
LI	< 2.2	MG/L	EPA 200.7	5-May-1987

	PB				
	PREP				30-Apr-1987
	SB	< 2.2	MG/L	EPA 200.7	5-May-1987
	SE	11.	MG/L	EPA 200.7	5-May-1987
	SI	6.3	MG/L	EPA 200.7	5-May-1987
	SN	< 0.55	MG/L	EPA 200.7	5-May-1987
	SR	1.7	MG/L	EPA 200.7	5-May-1987
	TI	< 0.22	MG/L	EPA 200.7	5-May-1987
	U	10.2			1-May-1987
	V	2.9	MG/L	EPA 200.7	5-May-1987
	ZN	< 0.22	MG/L	EPA 200.7	5-May-1987
	ZR	< 0.22	MG/L	EPA 200.7	5-May-1987
870406-040 HOMESTAKE H-2 WEST POND	AG	< 0.55	MG/L	EPA 200.7	5-May-1987
	AL	< 2.2	MG/L	EPA 200.7	5-May-1987
	AS	< 1.1	MG/L	EPA 200.7	5-May-1987
	B	2.6	MG/L	EPA 200.7	5-May-1987
	BA	< 0.22	MG/L	EPA 200.7	5-May-1987
	BE	< 0.022	MG/L	EPA 200.7	5-May-1987
	CA2	65.	MG/L	EPA 200.7	5-May-1987
	CD	< 0.055	MG/L	EPA 200.7	5-May-1987
	CO	< 0.11	MG/L	EPA 200.7	5-May-1987
	CR	< 0.44	MG/L	EPA 200.7	5-May-1987
	CU	< 0.22	MG/L	EPA 200.7	5-May-1987
	FE	0.69	MG/L	EPA 200.7	5-May-1987
	GA	< 3.3	MG/L	EPA 200.7	5-May-1987
	LI	< 2.2	MG/L	EPA 200.7	5-May-1987

870406-040 HOMESTAKE H-2 WEST POND	MG	260.	MG/L	EPA 200.7	5-May-1987
	MN	0.13	MG/L	EPA 200.7	5-May-1987
	MO	73.	MG/L	EPA 200.7	5-May-1987
	NA2	7900.	MG/L	EPA 200.7	5-May-1987
	NI	< 0.66	MG/L	EPA 200.7	5-May-1987
	P	< 3.3	MG/L	EPA 200.7	5-May-1987
	PB	< 2.2	MG/L	EPA 200.7	5-May-1987
	PREP				30-Apr-1987
	SB	< 2.2	MG/L	EPA 200.7	5-May-1987
	SE	< 2.2	MG/L	EPA 200.7	5-May-1987
	SI	3.7	MG/L	EPA 200.7	5-May-1987
	SN	< 0.55	MG/L	EPA 200.7	5-May-1987
	SR	1.1	MG/L	EPA 200.7	5-May-1987
	TI	< 0.22	MG/L	EPA 200.7	5-May-1987
	U	24.2			1-May-1987
	V	< 0.1	MG/L	EPA 200.7	5-May-1987
	ZN	< 0.22	MG/L	EPA 200.7	5-May-1987
	ZR	< 0.22	MG/L	EPA 200.7	5-May-1987

870406-032 HOMESTAKE H-1 EAST POND					
	AG	< 0.30	MG/L	EPA 200.7	27-Apr-1987
	AL	2.7	MG/L	EPA 200.7	27-Apr-1987
	AS	< 0.60	MG/L	EPA 200.7	27-Apr-1987
	B	2.2	MG/L	EPA 200.7	27-Apr-1987
	BA	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	BE	< 0.012	MG/L	EPA 200.7	27-Apr-1987
	BR	< 50	MG/L		20-Apr-1987
	CA2	17.	MG/L	EPA 200.7	27-Apr-1987
	CD	< 0.030	MG/L	EPA 200.7	27-Apr-1987
	CL	1900	MG/L	SMEWW 429	20-Apr-1987
	CO	< 0.060	MG/L	EPA 200.7	27-Apr-1987
	CO3	2275	MG/L CACO3		9-Apr-1987
	CR	< 0.24	MG/L	EPA 200.7	27-Apr-1987
	CU	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	CYANIDE, TOTAL	< 0.002	MG/L	EPA 335.2	22-Apr-1987
	F	< 10	MG/L	SMEWW 429	20-Apr-1987
	FE	0.89	MG/L	EPA 200.7	27-Apr-1987
	GA	< 1.8	MG/L	EPA 200.7	27-Apr-1987
	HCO3	1175	MG/L CACO3		9-Apr-1987
	LI	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	MG	100.	MG/L	EPA 200.7	27-Apr-1987
	MN	0.32	MG/L	EPA 200.7	27-Apr-1987
	MO	58.	MG/L	EPA 200.7	27-Apr-1987
	NA2	6900.	MG/L	EPA 200.7	27-Apr-1987
	NH3	0.2	MG/L	EPA 350.3	10-Apr-1987
	NI	< 0.36	MG/L	EPA 200.7	27-Apr-1987
	NO2	< 50	MG/L		20-Apr-1987
	NO3	< 50	MG/L	SMEWW 429	20-Apr-1987
	P	< 1.8	MG/L	EPA 200.7	27-Apr-1987
	PB	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	PH	9.64		EPA 150.1	8-Apr-1987
	PO4	< 50	MG/L	SMEWW 429	20-Apr-1987
	SB	< 1.2	MG/L	EPA 200.7	27-Apr-1987

870406-032 HOMESTAKE H-1 EAST POND					
	SE	6.5	MG/L	EPA 200.7	27-Apr-1987
	SI	4.0	MG/L	EPA 200.7	27-Apr-1987
	SN	< 0.30	MG/L	EPA 200.7	27-Apr-1987
	SO4	12000	MG/L	SMEWW 429	20-Apr-1987
	SR	0.88	MG/L	EPA 200.7	27-Apr-1987
	SULFIDE	< 0.1	MG/L		7-Apr-1987
	TI	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	TOT. DISSOLVED SOLIDS	18160	MG/L	EPA 160.1	9-Apr-1987
	TOT. SUSP. SOLIDS	154	MG/L	EPA 160.2	9-Apr-1987
	TOTAL ORGANIC HALIDES	50	UG/L	EPA 9020	18-May-1987
	U	9.5	MG/L		13-Apr-1987
	V	1.4	MG/L	EPA 200.7	27-Apr-1987
	ZN	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	ZR	< 0.12	MG/L	EPA 200.7	27-Apr-1987
870406-033 HOMESTAKE H-2 WEST POND					
	AG	< 0.30	MG/L	EPA 200.7	27-Apr-1987
	AL	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	AS	< 0.60	MG/L	EPA 200.7	27-Apr-1987
	B	1.6	MG/L	EPA 200.7	27-Apr-1987
	BA	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	BE	< 0.012	MG/L	EPA 200.7	27-Apr-1987
	BR	< 50	MG/L		20-Apr-1987
	CA2	33	MG/L	EPA 200.7	27-Apr-1987
	CD	< 0.030	MG/L	EPA 200.7	27-Apr-1987
	CL	1500	MG/L	SMEWW 429	20-Apr-1987
	CO	< 0.060	MG/L	EPA 200.7	27-Apr-1987
	CO3	350	MG/L CACO3		9-Apr-1987
	CR	< 0.24	MG/L	EPA 200.7	27-Apr-1987
	CU	< 0.12	MG/L	EPA 200.7	27-Apr-1987

870406-032 HOMESTAKE H-1

EAST POND

SE	6.5	MG/L	EPA 200.7	27-Apr-1987
SI	4.0	MG/L	EPA 200.7	27-Apr-1987
SN	< 0.30	MG/L	EPA 200.7	27-Apr-1987
SO4	12000	MG/L	SMEWW 429	20-Apr-1987
SR	0.88	MG/L	EPA 200.7	27-Apr-1987
SULFIDE	< 0.1	MG/L		7-Apr-1987
TI	< 0.12	MG/L	EPA 200.7	27-Apr-1987
TOT. DISSOLVED SOLIDS	18160	MG/L	EPA 160.1	9-Apr-1987
TOT. SUSP. SOLIDS	154	MG/L	EPA 160.2	9-Apr-1987
TOTAL ORGANIC HALIDES	50	UG/L	EPA 9020	18-May-1987
U	9.5	MG/L		13-Apr-1987
V	1.4	MG/L	EPA 200.7	27-Apr-1987
ZN	< 0.12	MG/L	EPA 200.7	27-Apr-1987
ZR	< 0.12	MG/L	EPA 200.7	27-Apr-1987

870406-033 HOMESTAKE H-2

WEST POND

AG	< 0.30	MG/L	EPA 200.7	27-Apr-1987
AL	< 1.2	MG/L	EPA 200.7	27-Apr-1987
AS	< 0.60	MG/L	EPA 200.7	27-Apr-1987
B	1.6	MG/L	EPA 200.7	27-Apr-1987
BA	< 0.12	MG/L	EPA 200.7	27-Apr-1987
BE	< 0.012	MG/L	EPA 200.7	27-Apr-1987
BR	< 50	MG/L		20-Apr-1987
CA2	33.	MG/L	EPA 200.7	27-Apr-1987
CD	< 0.030	MG/L	EPA 200.7	27-Apr-1987
CL	1500	MG/L	SMEWW 429	20-Apr-1987
CO	< 0.060	MG/L	EPA 200.7	27-Apr-1987
CO3	350	MG/L CACO3		9-Apr-1987
CR	< 0.24	MG/L	EPA 200.7	27-Apr-1987
CU	< 0.12	MG/L	EPA 200.7	27-Apr-1987
CYANIDE, TOTAL	0.003	MG/L	EPA 335.2	22-Apr-1987
F	< 10	MG/L	SMEWW 429	20-Apr-1987
FE	0.39	MG/L	EPA 200.7	27-Apr-1987
GA	< 1.8	MG/L	EPA 200.7	27-Apr-1987
HCO3	706	MG/L CACO3		9-Apr-1987
LI	< 1.2	MG/L	EPA 200.7	27-Apr-1987
MG	130.	MG/L	EPA 200.7	27-Apr-1987
MN	0.075	MG/L	EPA 200.7	27-Apr-1987
MO	39.	MG/L	EPA 200.7	27-Apr-1987
NA2	4300.	MG/L	EPA 200.7	27-Apr-1987
NH3	0.2	MG/L	EPA 350.3	10-Apr-1987
NI	< 0.36	MG/L	EPA 200.7	27-Apr-1987
NO2	< 50	MG/L		20-Apr-1987
NO3	< 50	MG/L	SMEWW 429	20-Apr-1987
P	< 1.8	MG/L	EPA 200.7	27-Apr-1987
PB	< 1.2	MG/L	EPA 200.7	27-Apr-1987
PH	9.01		EPA 150.1	8-Apr-1987

870406-033 HOMESTAKE H-2

WEST POND

PO4	< 50	MG/L	SMEWW 429	20-Apr-1987
SB	< 1.2	MG/L	EPA 200.7	27-Apr-1987
SE	< 1.2	MG/L	EPA 200.7	27-Apr-1987
SI	5.2	MG/L	EPA 200.7	27-Apr-1987
SN	< 0.30	MG/L	EPA 200.7	27-Apr-1987
SO4	9100	MG/L	SMEWW 429	20-Apr-1987
SR	0.59	MG/L	EPA 200.7	27-Apr-1987
SULFIDE	< 0.1	MG/L		7-Apr-1987
TI	< 0.12	MG/L	EPA 200.7	27-Apr-1987
TOT. DISSOLVED SOLIDS	12735	MG/L	EPA 160.1	9-Apr-1987

	CU	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	CYANIDE, TOTAL	0.003	MG/L	EPA 335.3	22-Apr-1987
	F	< 10	MG/L	SMEWW 429	20-Apr-1987
	FE	0.39	MG/L	EPA 200.7	27-Apr-1987
	GA	< 1.8	MG/L	EPA 200.7	27-Apr-1987
	HCO3	706	MG/L CACO3		9-Apr-1987
	LI	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	MG	130.	MG/L	EPA 200.7	27-Apr-1987
	MN	0.075	MG/L	EPA 200.7	27-Apr-1987
	MO	.99	MG/L	EPA 200.7	27-Apr-1987
	NA2	4300.	MG/L	EPA 200.7	27-Apr-1987
	NH3	0.2	MG/L	EPA 350.3	10-Apr-1987
	NI	< 0.36	MG/L	EPA 200.7	27-Apr-1987
	NO2	< 50	MG/L		20-Apr-1987
	NO3	< 50	MG/L	SMEWW 429	20-Apr-1987
	P	< 1.8	MG/L	EPA 200.7	27-Apr-1987
	PB	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	PB	9.01		EPA 150.1	8-Apr-1987

870406-033 HOMESTAKE H-2

WEST POND

	PO4	< 50	MG/L	SMEWW 429	20-Apr-1987
	SB	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	SE	< 1.2	MG/L	EPA 200.7	27-Apr-1987
	SI	5.2	MG/L	EPA 200.7	27-Apr-1987
	SN	< 0.30	MG/L	EPA 200.7	27-Apr-1987
	SO4	9100	MG/L	SMEWW 429	20-Apr-1987
	SR	0.59	MG/L	EPA 200.7	27-Apr-1987
	SULFIDE	< 0.1	MG/L		7-Apr-1987
	TI	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	TOT. DISSOLVED SOLIDS	12735	MG/L	EPA 160.1	9-Apr-1987
	TOT. SUSP. SOLIDS	36	MG/L	EPA 160.2	9-Apr-1987
	TOTAL ORGANIC HALIDES	42	UG/L	EPA 9020	18-May-1987
	U	22.1	MG/L		13-Apr-1987
	V	0.13	MG/L	EPA 200.7	27-Apr-1987
	ZN	< 0.12	MG/L	EPA 200.7	27-Apr-1987
	ZR	< 0.12	MG/L	EPA 200.7	27-Apr-1987

Oak Ridge National Laboratory
Analytical Chemistry Division
Results of Analyses
Low Level Radiochemical Analysis

Customer Name: G.R. KONWINSKI
Request Number: LLL6717
Frequency:
Sample Matrix: WATER
Comments: RESULTS ARE IN BQ/L

Date Received: 7-Apr-1987 15:13
Charge Number: 33453837
Series: HOMESTAKE
Date of Report: 18-JUN-87

Approved By _____
Date CHECKED JUN 18 1987

Customer ID	Analy No.	Pb-210	Th-230	Total Radium
H-1 TOTAL EAST POND	870407-262	13 +/- 2	12 +/- 2	8.7 +/- .3
H-1 DISS.	870407-263	10 +/- 2	30 +/- 6	3.4 +/- .2

Oak Ridge National Laboratory
Analytical Chemistry Division
Results of Analyses
Low Level Radiochemical Analysis

Customer Name: G.R. KONWINSKI
Request Number: LLL6716
Frequency:
Sample Matrix: SOLUTIONS
Comments: RESULTS ARE IN BQ/L

Date Received: 7-Apr-1987 15:10
Charge Number: 33453837
Series: HOMESTAKE
Date of Report: 18-JUN-87

Approved By _____
Date CHECKED JUN 18 1987

Customer ID	Analy No.	Pb-210	Th-230	Total Radium
H-2 TOTAL WEST POND	870407-250	11 +/- 2	10 +/- 2	2.0 +/- .2
H-2 DISS.	870407-251	9 +/- 2	3.6 +/- 1.0	1.8 +/- .2

HOMESTAKE H-1 EAST POND	870406-056	DIS AS 0.78	DIS HG < 0.001	DIS SE 5.8	DIS TL < 0.05	TKN 8.2	TOC 56	TOT AS 0.79	TOT HG < 0.001	TOT SE 7.0
		TOT TL < 0.05								
HOMESTAKE H-2 WEST POND	870406-057	DIS AS 0.20	DIS HG < 0.001	DIS SE 0.71	DIS TL < 0.05	TKN 2.1	TOC 40	TOT AS 0.19	TOT HG < 0.001	TOT SE 0.72
		TOT TL < 0.05								

Semivolatile Organic Analysis Data

EPA SAMPLE NO.: HOMESTAKE H-1

Request Number: 91184

Procedure Number: EPA-~~624~~ 625 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONWINSKI Lab Sample ID: 870407-127

Sample wt/vol: 1000 ML Lab File ID: DM06A02A

Date Sampled: 6-Apr-1987 ~~Date Received~~ Logged onto Analis 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-May-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)	ug/L	Q
108-95-2	phenol		10	U
111-44-4	bis(2-chloroethyl)ether		10	U
95-57-8	2-chlorophenol		10	U
541-73-1	1,3-dichlorobenzene		10	U
106-46-7	1,4-dichlorobenzene		10	U
100-51-6	benzyl alcohol		10	U
95-50-1	1,2-dichlorobenzene		10	U
95-48-7	2-methylphenol		10	U
108-60-1	bis(2-chloroisopropyl)ether		10	U
106-44-5	4-methylphenol		10	U
621-64-7	n-nitroso-di-n-propylamine		10	U
67-72-1	hexachloroethane		10	U
98-95-3	nitrobenzene		10	U
78-59-1	isophorone		10	U
88-75-5	2-nitrophenol		10	U
105-67-9	2,4-dimethylphenol		10	U
65-85-0	benzoic acid		50	U
111-91-1	bis(2-chloroethoxy)methane		10	U
120-83-2	2,4-dichlorophenol		10	U
120-82-1	1,2,4-trichlorobenzene		10	U
91-20-3	naphthalene		10	U
106-47-8	4-chloroaniline		10	U
87-68-3	hexachlorobutadiene		10	U
59-50-7	4-chloro-3-methylphenol		10	U
91-57-6	2-methylnaphthalene		10	U
77-47-4	hexachlorocyclopentadiene		10	U
88-06-2	2,4,6-trichlorophenol		10	U
95-95-4	2,4,5-trichlorophenol		50	U
91-58-7	2-chloronaphthalene		10	U
88-74-4	2-nitroaniline		50	U
131-11-3	dimethylphthalate		10	U
208-96-8	acenaphthylene		10	U
606-20-2	2,6-dinitrotoluene		10	U

Semivolatile Organic Analysis Data

EPA SAMPLE NO.: HOMESTAKE H-1

Request Number: 91184

Procedure Number: EPA-~~624~~ 625 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONWINSKI Lab Sample ID: 870407-127

Sample wt/vol: 1000 ML Lab File ID: DM06A02A

Date Sampled: 6-Apr-1987 ~~Date Received~~ Logged onto Analis 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-May-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)	ug/L	Q
99-09-2	3-nitroaniline		50	U
83-32-9	acenaphthene		10	U
51-28-5	2,4-dinitrophenol		50	U
100-02-7	4-nitrophenol		50	U
132-64-9	dibenzofuran		10	U
121-14-2	2,4-dinitrotoluene		10	U
84-66-2	diethylphthalate		10	U
7005-72-3	4-chlorophenyl-phenylether		10	U
86-73-7	fluorene		10	U
100-01-6	4-nitroaniline		50	U
534-52-1	4,6-dinitro-2-methylphenol		50	U
86-30-6	n-nitrosodiphenylamine (1)		10	U
101-55-3	4-bromophenyl-phenylether		10	U
118-74-1	hexachlorobenzene		10	U
87-86-5	pentachlorophenol		50	U
85-01-8	phenanthrene		10	U
120-12-7	anthracene		10	U
84-74-2	di-n-butylphthalate		10	U
206-44-0	fluoranthene		10	U
129-00-0	pyrene		10	U
85-68-7	butylbenzylphthalate		10	U
91-94-1	3,3'-dichlorobenzidine		20	U
56-55-3	benzo(a)anthracene		10	U
218-01-9	chrysene		10	U
117-81-7	bis(2-ethylhexyl)phthalate		10	U
117-84-0	di-n-octylphthalate		10	U
205-99-2	benzo(b)fluoranthene		10	U
207-08-9	benzo(k)fluoranthene		10	U
50-32-8	benzo(a)pyrene		10	U
193-39-5	indeno(1,2,3-cd)pyrene		10	U
53-70-3	dibenz(a,h)anthracene		10	U
191-24-2	benzo(g,h,i)perylene		10	U

(1) - Cannot be separated from Diphenylamine

Semivolatile Organic Analysis Data

EPA SAMPLE NO.: HOMESTAKE H-2

Request Number: 91184

Procedure Number: EPA ~~624~~ 625 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONWINSKI Lab Sample ID: 870407-128

Sample wt/vol: 1000 ML Lab File ID: DM06A03A

Date Sampled: 6-Apr-1987 ~~Date Received~~ Logged on Analis 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-May-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)	ug/L	Q
108-95-2	phenol		10	U
111-44-4	bis(2-chloroethyl)ether		10	U
95-57-8	2-chlorophenol		10	U
541-73-1	1,3-dichlorobenzene		10	U
106-46-7	1,4-dichlorobenzene		10	U
100-51-6	benzyl alcohol		10	U
95-50-1	1,2-dichlorobenzene		10	U
95-48-7	2-methylphenol		10	U
108-60-1	bis(2-chloroisopropyl)ether		10	U
106-44-5	4-methylphenol		10	U
621-64-7	n-nitroso-di-n-propylamine		10	U
67-72-1	hexachloroethane		10	U
98-95-3	nitrobenzene		10	U
78-59-1	isophorone		10	U
88-75-5	2-nitrophenol		10	U
105-67-9	2,4-dimethylphenol		50	U
65-85-0	benzoic acid		10	U
111-91-1	bis(2-chloroethoxy)methane		10	U
120-83-2	2,4-dichlorophenol		10	U
120-82-1	1,2,4-trichlorobenzene		10	U
91-20-3	naphthalene		10	U
106-47-8	4-chloroaniline		10	U
87-68-3	hexachlorobutadiene		10	U
59-50-7	4-chloro-3-methylphenol		10	U
91-57-6	2-methylnaphthalene		10	U
77-47-4	hexachlorocyclopentadiene		10	U
88-06-2	2,4,6-trichlorophenol		50	U
95-95-4	2,4,5-trichlorophenol		10	U
91-58-7	2-chloronaphthalene		50	U
88-74-4	2-nitroaniline		10	U
131-11-3	dimethylphthalate		10	U
208-96-8	acenaphthylene		10	U
606-20-2	2,6-dinitrotoluene		10	U

4 undetected
6 means detected
b " "

Semivolatile Organic Analysis Data

EPA SAMPLE NO.: HOMESTAKE H-2

Request Number: 91184

Procedure Number: EPA ~~624~~ 625 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONWINSKI Lab Sample ID: 870407-128

Sample wt/vol: 1000 ML Lab File ID: DM06A03A

Date Sampled: 6-Apr-1987 ~~Date Received~~ Logged On to Analis 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-May-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)	ug/L	Q
99-09-2	3-nitroaniline		50	U
83-32-9	acenaphthene		10	U
51-28-5	2,4-dinitrophenol		50	U
100-02-7	4-nitrophenol		50	U
132-64-9	dibenzofuran		10	U
121-14-2	2,4-dinitrotoluene		10	U
84-66-2	diethylphthalate		10	U
7005-72-3	4-chlorophenyl-phenylether		10	U
86-73-7	fluorene		10	U
100-01-6	4-nitroaniline		50	U
534-52-1	4,6-dinitro-2-methylphenol		50	U
86-30-6	n-nitrosodiphenylamine (1)		10	U
101-55-3	4-bromophenyl-phenylether		10	U
118-74-1	hexachlorobenzene		10	U
87-86-5	pentachlorophenol		50	U
85-01-8	phenanthrene		10	U
120-12-7	anthracene		10	U
84-74-2	di-n-butylphthalate		10	U
206-44-0	fluoranthene		10	U
129-00-0	pyrene		10	U
85-68-7	butylbenzylphthalate		10	U
91-94-1	3,3'-dichlorobenzidine		20	U
56-55-3	benzo(a)anthracene		10	U
218-01-9	chrysene		10	U
117-81-7	bis(2-ethylhexyl)phthalate		10	U
117-84-0	di-n-octylphthalate		10	U
205-99-2	benzo(b)fluoranthene		10	U
207-08-9	benzo(k)fluoranthene		10	U
50-32-8	benzo(a)pyrene		10	U
193-39-5	indeno(1,2,3-cd)pyrene		10	U
53-70-3	dibenz(a,h)anthracene		10	U
191-24-2	benzo(g,h,i)perylene		10	U

(1) - Cannot be separated from Diphenylamine

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.: HOMESTAKE H-1 EAST POND

Request Number: 91184

Procedure Number: EPA-624 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONNINSKI Lab Sample ID: 870407-127

Sample wt/vol: 5 ML Lab File ID: 0406A06A

Logged on to Analis

Date Sampled: 6-Apr-1987 ~~Date Received~~ 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-Apr-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	chloromethane	10	U
74-83-9	bromomethane	10	U
75-01-4	vinyl chloride	10	U
75-00-3	chloroethane	10	U
75-09-2	methylene chloride	5	U
67-64-1	acetone	10	U
75-15-0	carbon disulfide	5	U
75-35-4	1,1-dichloroethene	5	U
75-34-3	1,1-dichloroethane	5	U
540-59-0	1,2-dichloroethene (total)	5	U
67-66-3	chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	carbon tetrachloride	5	U
108-05-4	vinyl acetate	10	U
75-27-4	bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-01-5	cis-1,3-dichloropropene	5	U
79-01-6	trichloroethene	5	U
124-48-1	dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	benzene	5	U
10061-02-06	trans-1,3-dichloropropene	5	U
75-25-2	bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	tetrachloroethene	5	U
79-34-5	1,1,2,2-tetrachloroethane	5	U
108-88-3	toluene	5	U
108-90-7	chlorobenzene	5	U
100-41-4	ethylbenzene	5	U
100-42-5	styrene	5	U
1330-20-7	xylene (total)	5	U

Approved By: D.K Holladay 5/29/87

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.: HOMESTAKE H-2 WEST POND

Request Number: 91184

Procedure Number: EPA-624 Matrix: LIQUID

Series: Frequency: Charge Number: 33453837

Customer Name: KONNINSKI Lab Sample ID: 870407-128

Sample wt/vol: 5 ML Lab File ID: 0406A07A

Logged Onto Analis

Date Sampled: 6-Apr-1987 ~~Date Received~~ 7-Apr-1987 10:28

% Moisture: not dec. dec: Date Analyzed: 6-Apr-1987

Material Description LIQUID Date of Report: 19-MAY-87

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	chloromethane	10	U
74-83-9	bromomethane	10	U
75-01-4	vinyl chloride	10	U
75-00-3	chloroethane	10	U
75-09-2	methylene chloride	5	U
67-64-1	acetone	10	U
75-15-0	carbon disulfide	5	U
75-35-4	1,1-dichloroethene	5	U
75-34-3	1,1-dichloroethane	5	U
540-59-0	1,2-dichloroethene (total)	5	U
67-66-3	chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	carbon tetrachloride	5	U
108-05-4	vinyl acetate	10	U
75-27-4	bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-01-5	cis-1,3-dichloropropene	5	U
79-01-6	trichloroethene	5	U
124-48-1	dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	benzene	5	U
10061-02-06	trans-1,3-dichloropropene	5	U
75-25-2	bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	tetrachloroethene	5	U
79-34-5	1,1,2,2-tetrachloroethane	5	U
108-88-3	toluene	5	U
108-90-7	chlorobenzene	5	U
100-41-4	ethylbenzene	5	U
100-42-5	styrene	5	U
1330-20-7	xylene (total)	5	U

Approved By: D.K. Holladay 5/29/87

ATACHMENT App2.2A-B
HMC Large Tailings Pond Water Analyses (Electronic Microsoft Excel File)
HMC Select Groundwater Analyses (Electronic Microsoft Excel File)