

TABLE 1
 Summary of Analytes Progression Through COPC Selection Process – Seepage-Impacted Groundwater
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

	Historical analytes	Remove minor historical analytes leaving 23 Performance Monitoring COPCs (July 2006 – April 2008)	Remove major ions, general chemistry analytes, and “group parameters”	Remove non-detected analytes in HSUs and add calculated activities of uranium isotopes if total uranium is detected	Remove non-radiologic compounds with UCL95 (EPC) below screening levels compare non-carcinogenic compounds to 0.1*RSL (= 0.1 HQ) and compare carcinogenic compounds directly to RSL (risk = 1E-06) COPCs for HHRA tapwater ingestion and dermal contact exposure pathways	Remove non-radiologic COPCs that have a Henry’s Law constant > 1E-05 atm-m3/mole and radiologic COPCs that do not include an inhalation exposure pathway in the EPA radionuclide PRG for tapwater COPCs for HHRA tapwater inhalation pathway
Southwest Alluvium	Al, As, Be, Cd, Co, Pb, Mn, Mo, Ni, Se, V, Cl, SO4, NO3 as N, U, Chloroform, TDS, Ra-226, Ra-228, Ra-Total, Th-230, Pb-210, Gross Alpha, Sb, Ba, Cr, Cu, Fe, Hg, Ag, Tl, Zn	Al, As, Be, Cd, Co, Pb, Mn, Mo, Ni, Se, V, Cl, SO4, NO3 as N, U, Chloroform, TDS, Ra-226, Ra-228, Ra-Total, Th-230, Pb-210, Gross Alpha	Al, As, Be, Cd, Co, Pb, Mn, Mo, Ni, Se, V, U, Chloroform, Ra-226, Ra-228, Th-230, Pb-210	Al, As, Co, Mn, Se, U, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230	As, Co, Mn, Se, U, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230	Chloroform, Ra-226
Zone 1				Al, As, Co, Mn, Ni, Se, V, U, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230	As, Co, Mn, Ni, V, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230	Chloroform, Ra-226
Zone 3				Al, As, Be, Cd, Co, Mn, Mo, Ni, Se, V, U, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230, Pb-210	Al, As, Be, Cd, Co, Mn, Mo, Ni, Se, V, U, U Isotopes, Chloroform, Ra-226, Ra-228, Th-230, Pb-210	Chloroform, Ra-226

TABLE 2
 Monitoring COPCs
 Impacted Water Quality, July 2006 - April 2008
 UNC Church Rock Mill and Tailings Site

Sampling and Analysis Plan Monitoring COPCs	
Aluminum	Chloride*
Arsenic	Sulfate*
Beryllium	Nitrate-Nitrogen*
Cadmium	Uranium
Cobalt	Chloroform
Lead	Total Dissolved Solids*
Manganese	Thorium-230
Molybdenum	Lead-210
Nickel	Gross Alpha*
Selenium	Radium (including Ra-226,
Vanadium	Ra-228, and total radium*)
Historical Monitoring Parameters - Trace Metals Plus Iron**	
Antimony	Mercury
Barium	Silver
Chromium	Thallium
Copper	Zinc
Iron	

* Common ion, general chemistry, and grouped parameters eliminated from consideration in the quantitative risk assessment calculations

** Previously dropped from the performance monitoring program. These parameters were eliminated from consideration in the quantitative risk assessment calculations

TABLE 3
Wells Having Samples Representative of
Impacted Water Quality, July 2006 - April 2008
UNC Church Rock Mill and Tailings Site

Southwest Alluvium	Zone 1	Zone 3
509 D	515 A*	504 B
624	604*	517
632	614*	613*
801	EPA 5	708
802	EPA 7	711
803		717
808		719
EPA 23		EPA 13
EPA 25		EPA 14
GW 1		NBL 1
GW 2		
GW 3		

Notes:

* indicates well not included in the HHRA due to its location within Section 2

TABLE 4
Comparison of Screening Values and NWWQCC Standards
UNC Church Rock Mill and Tailings Site
Church Rock, New Mexico

Exposure Point	CAS Number	Chemical (1)	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	New Mexico WQCC Standards	NM WQCC Rationale
SW Alluvium Tapwater	7429-90-5	Aluminum	0.3	0.107	1.6 (N)	5	I
	7440-38-2	Arsenic	0.01	0.00116	0.000045 (C)	0.1	HH
	7440-48-4	Cobalt	0.01	0.0121	0.00047 (N)	0.05	I
	7439-96-5	Manganese	5.4	0.414	0.032 (N)	0.2	O
	7782-49-2	Selenium	0.001	0.00516	0.0078 (N)	0.05	HH
	7440-61-1	Uranium	0.246	0.0459	0.0047 (N)	0.03	HH
	13966-29-5	Uranium-234	NA	NA	NA (C)	NA	NA
	15117-96-1	Uranium-235	NA	NA	NA (C)	NA	NA
	7440-61-1	Uranium-238	NA	NA	NA (C)	NA	NA
	67-66-3	Chloroform	0.0155	ND	0.00019 (C)	0.1	HH
	13982-63-3	Radium-226	1	0.798	NA (C)	30	HH (Ra-226 and Ra-228)
	15262-20-1	Radium-228	4.3	1.611	NA (C)	30	HH (Ra-226 and Ra-228)
14269-63-7	Thorium-230	1.6	0.509	NA (C)	NA	NA	
Zone 1 Tapwater	7429-90-5	Aluminum	1.3	0.117	1.6 (N)	5	I
	7440-38-2	Arsenic	0.003	0.00117	0.000045 (C)	0.1	HH
	7440-48-4	Cobalt	0.06	0.0112	0.00047 (N)	0.05	I
	7439-96-5	Manganese	2.96	2.519	0.032 (N)	0.2	O
	7440-02-0	Nickel	0.06	0.0602	0.030 (N)	0.2	I
	7782-49-2	Selenium	0.001	0.00107	0.0078 (N)	0.05	HH
	7440-62-2	Vanadium	0.2	ND	0.0078 (N)	NA	NA
	7440-61-1	Uranium	0.0022	0.0255	0.0047 (N)	0.03	HH
	13966-29-5	Uranium-234	NA	NA	NA (C)	NA	NA
	15117-96-1	Uranium-235	NA	NA	NA (C)	NA	NA
	7440-61-1	Uranium-238	NA	NA	NA (C)	NA	NA
	67-66-3	Chloroform	0.00076	NBC	0.00019 (C)	0.1	HH
	13982-63-3	Radium-226 (3)	1.8	1.314	NA (C)	30	HH (Ra-226 and Ra-228)
	15262-20-1	Radium-228 (3)	4	2.946	NA (C)	30	HH (Ra-226 and Ra-228)
14269-63-7	Thorium-230	0.7	0.403	NA (C)	NA	NA	
Zone 3 Tapwater	7429-90-5	Aluminum	163	0.231	1.6 (N)	5	I
	7440-38-2	Arsenic	2.5	0.175	0.000045 (C)	0.1	HH
	7440-41-7	Beryllium	0.09	ND	0.0016 (N)	NA	NA
	7440-43-9	Cadmium	0.015	0.0113	0.00069 (N)	0.01	HH
	7440-48-4	Cobalt	0.95	0.0877	0.00047 (N)	0.05	I
	7439-96-5	Manganese	23.7	3.436	0.032 (N)	0.2	O
	7439-98-7	Molybdenum	5	17.43	0.0078 (N)	1	I
	7440-02-0	Nickel	0.89	0.14	0.030 (N)	0.2	I
	7782-49-2	Selenium	0.01	0.00159	0.0078 (N)	0.05	HH
	7440-62-2	Vanadium	0.2	ND	0.0078 (N)	NA	NA
	7440-61-1	Uranium	0.138	0.107	0.0047 (N)	0.03	HH
	13966-29-5	Uranium-234	NA	NA	NA (C)	NA	NA
	15117-96-1	Uranium-235	NA	NA	NA (C)	NA	NA
	7440-61-1	Uranium-238	NA	NA	NA (C)	NA	NA
	67-66-3	Chloroform	0.00676	NBC	0.00019 (C)	0.1	HH
	13982-63-3	Radium-226	27.6	4.996	NA (C)	30	HH (Ra-226 and Ra-228)
	15262-20-1	Radium-228	56.1	4.509	NA (C)	30	HH (Ra-226 and Ra-228)
	14269-63-7	Thorium-230	1.3	1.426	NA (C)	NA	NA
14255-04-0	Lead-210	8.1	1.618	NA (C)	NA	NA	

Notes:

- (1) Uranium isotopes not analyzed. Isotope concentrations estimated from total uranium mass concentration (see Table 3.A.RME in Appendix A).
- (2) See Table 2.1 in Appendix A. Maximum concentration used for screening chemicals. No screening was conducted for radionuclides. All radionuclides detected are selected as COPCs.
- (3) Background values are UCL95 (i.e., estimate of mean) as reported in N.A. Water Systems (2008b).
- (4) COPCs were screened against the November 2011 USEPA Risk Screening Level Table
 - For non-carcinogens: screening value = 0.1 x RSL tapwater value
 - For carcinogens: screening value = RSL tapwater value
 - For radionuclides: No screening level was used, all detected radionuclides were included in risk calculations.

Definitions

- NA - Not applicable
- HH - Human Health
- I - Irrigation
- O - Other
- (N) - Non-carcinogen
- (C) - Carcinogen
- NBC - No Background Concentration
- ND - Not Detected

TABLE 5
 Summary of Uncertainties
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
1	Using an EPC (typically UCL95) to represent a receptor's exposure.	Overestimate of risk and hazard. The statistical process used to calculate the EPC is intended to minimize the chance that the average concentration is underestimated.	Low; 1 to 1.5 times overestimate of individual COPC risks and hazards (which are summed for total risks and hazards).
2	Exposure Point - A potential future receptor would be exposed only to tailings-impacted groundwater.	Conservative, overestimate of risk and hazard. Level of bias would depend on background risk and actual proportion of exposure to tailings-impacted groundwater. Less important in some areas of the Church Rock site because the risk and hazard associated with background groundwater is similar to that of impacted water in many locations.	Low to medium; 1 to 10 times overestimate of risk or hazard for individual COPCs.
3	Sampling bias and measurement errors related to the sample collection and analysis.	Overestimate or underestimate of the hazard or risk.	Low; 1.1 times overestimate or underestimate of risk or hazard of individual COPCs.
4	Retention of low frequency detection COPCs (i.e., COPCs detected < 10 percent of the time) including: Co in the SWA; V in Zones 1 and 3 (V has been detected only once in Zone 1 impacted water); and Pb-210 and Th-230 in Zone 3.	Relatively small overestimate.	Low; 1 to 1.5 times overestimate of total risk.
5	<u>Elimination of beryllium and lead from further consideration in the quantitative risk assessment where they were not detected.</u>	<u>Very small, or zero, underestimate of hazard. If the beryllium groundwater EPC were equal to the reporting limit (0.010 mg/L) the HQ would be less than one for both a child (HQ = 0.24) and an adult (HQ = 0.62). Lead was detected at low frequency in background in each of the hydrostratigraphic units. Therefore, if lead were present in impacted groundwater at concentrations at, or below, the reporting limit, it is likely that these concentrations would be similar to background and would not be retained as RCOPCs.</u>	<u>Low; Excess risk above background would be less than an HQ of 1</u>

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
6	Missing data – Uranium isotope concentrations estimated to be proportional to their natural abundance.	Assumption improved the radiological cancer risk estimate relative to excluding the isotopes. However, because isotope activities in groundwater may not be proportional to natural concentrations, the calculated radiological risk due to uranium could be overestimated by a small amount. For example, Rhodes et al. (2006) indicate that the activity ratio of U-234 to U-238 in groundwater increases with time due to the alpha particle recoil effect. A U-234 to U-238 ratio higher than one-to-one would result in a lower calculated risk because the water cancer slope factor used for U-238+D is approximately 1.2 times higher than slope factor for U-234.	Low; Depends on U-234 to U-238+D ratio. Likely less than 1.1 times overestimate of risk due to U isotopes.
7	Missing data related to the elimination (with EPA and NRC concurrence) of monitoring parameters (i.e., a set of trace metals plus iron) that were no longer considered relevant to the remedy implementation.	Small underestimate. Parameters were not included in the risk and hazard estimates because they had been dropped and were not analytes during representative monitoring period (July 2006 through April 2008 inclusive).	Low underestimate; 1.1 to 2 times underestimate of risk.
8	Assumption that future residents will live adjacent to the Site and use seepage-impacted groundwater from one of the three hydrostratigraphic units for drinking water.	Overestimate of risk. The background water quality in the hydrostratigraphic units of interest in the vicinity of the Site is poor due to high concentrations of sulfate, chloride, TDS, metals, and radionuclides, and is not considered suitable for use as a drinking water source. Furthermore, there is unlikely to be sufficient permeability available in Zone 1 for use as a potable water source.	High; No quantitative estimate. If there are no future residents at this location, there is no future human health risk.
9	Assumption that, other than the future use of impacted groundwater by future residents, land use would remain generally unchanged.	Should future land use include exposures additional to the residential exposure scenario, the current risk and hazard estimates could be underestimated.	Low to Medium; No quantitative estimate. No likely exposure scenarios have been developed.
10	A 30-year exposure duration.	Likely underestimate with respect to a local Navajo resident population because the Navajo resident population may be more likely to remain in one area than the general population (although it is also likely that there would be insufficient impacted water to use as a domestic supply for 30 years in Zones 1 and 3).	Low; 1 to 3 times underestimate of total risk for exposure to groundwater from a specific hydrostratigraphic unit.
11	A drinking water ingestion rate of two liters per day.	May underestimate with respect to a local population residing in a semi-arid environment.	Low; 1 to 3 times underestimate of ingestion risk for exposure to groundwater from a specific hydrostratigraphic unit.

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
12	350-day exposure.	May overestimate or underestimate, underestimate bounded at 365 days.	Minimal underestimate (1.04 times) to low overestimate (1.5 times) of total risk for exposure to groundwater from a specific hydrostratigraphic unit.
13	Use of the Foster and Chrostowski shower model and the Andelman volatilization factor.	Possible overestimate. 2000 census information posted on the Navajo Churchrock and Pinedale Chapters indicates that approximately 39 percent of the Chapter residents lack indoor plumbing and 38 percent lack kitchen facilities. Use of shower models as potential exposure to groundwater contaminants through the inhalation pathway may overestimate potential risk for these potential receptors.	Low; 1 to 2.5 times overestimate of inhalation risk associated with exposure to groundwater from a specific hydrostratigraphic unit.
14	Assumption that, in a domestic water supply, Ra-226 becomes sufficiently airborne and inhaled to justify the use of the Ra-226+D cancer slope factor instead of the slope factor for its gaseous decay product Rn-222+D, appears to be conservative.	Overestimate. The Ra-226+D cancer slope factor is approximately 650 times higher than the Rn-226+D cancer slope factor, and consequently, the calculated risks would be proportionally lower.	Medium to high; Up to 650 times overestimate of inhalation risk due to Ra-226.
15	Use of Andelman (1990) volatilization factor to calculate transfer of non-volatile Ra-226.	Overestimate for the transfer of Ra-226. Assumes that half of the contaminant is transferred from the water through all domestic uses. Lindsey and Ator (1996) indicate that well water radon concentrations equal to 10,000 pCi/L typically release approximately 1 pCi/L of radon to the air; this equals a transfer factor that is 20 percent of the Andelman factor.	Low to medium; Up to 5 times overestimate of inhalation risk due to Ra-226.
16	The uncertainty associated with the use of the Foster and Chrostowski Model for inhalation exposure to chloroform.	Overestimate or underestimate. Effect on total risk is low because the chloroform concentrations are low when compared to other COPCs, resulting in lower risk and hazard.	Low; No basis for quantitative estimate.
17	Hazard and risk associated with dermal exposure pathway.	Overestimate or underestimate – Uncertainty with respect the dermal exposure scenario for any of the hydrostratigraphic units represents a small proportion of the ingestion pathway (e.g., up to approximately 10 percent in the Southwest Alluvium).	Low; Up to 1.1 times underestimate or overestimate of ingestion risk or hazard for a specific hydrostratigraphic unit.
18	Toxicity criteria for non-radionuclides.	Uncertainty varies depending on the COPC. Toxicity criteria for non-radionuclides are intentionally designed to be protective and most likely overestimate risk. Could underestimate for some COPCs (e.g., multiple COPCs are present and for linear extrapolations of high concentration effects for some carcinogens <u>or where sensitive subpopulations are exposed.</u>	Low to medium; ±10 times risk for individual COPCs.

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
19	Toxicity criteria for radionuclides.	Uncertainty varies depending on the COPC. There is generally less uncertainty associated with carcinogenic risk from radionuclides than with non-radionuclides because of the method in which the toxicity numbers are typically developed.	Low; ±2 to ±5 times (risk for individual COPCs).
20	COPCs with special considerations – Manganese.	Likely overestimate. Manganese is a trace nutrient that has both a physiologically-required intake level (Adequate Intake) and an intake level that is considered toxic. A modifying factor of 3 was applied to the reference dose (RfD) for non-food sources.	Low to medium; 1 to 3 times overestimate of risk for Mn.
21	COPCs with special considerations – Uranium.	Likely overestimate for ingestion risk because RfD is based on soluble salts, which are more toxic than insoluble U salts. Groundwater samples may include insoluble salts because they are unfiltered. No RfD published for insoluble U salts.	Low to medium; Estimated to be 1 to 5 times overestimate for ingestion risk of uranium
22	COPCs with special considerations – Vanadium.	RfD for vanadium pentoxide adjusted based on molecular weight. Bias unknown.	No quantitative estimate.
23	Common ions - Nitrate.	Underestimate of total risk. Significant risk to infants below the age of six months who drink water containing nitrate in excess of the MCL. Nitrate toxicity causes methemoglobinemia and can be fatal to infants.	No quantitative estimate. Remedy must meet MCL as ARAR.
24	Common ions - Chloride.	No toxicity criteria available. Chloride UCL95 in each unit below SMCL (250 mg/l). Little or no bias or effect on uncertainty of risk and hazard estimate.	No quantitative estimate.
25	Common ions - Sulfate.	No toxicity criteria available. EPA SMCL of 250 mg/L based on taste. Sulfate present in background groundwater due to geochemical equilibrium with gypsum. Unknown bias on risk estimate. For example, ingestion of tailings-impacted water with high sulfate concentrations likely to cause gastrointestinal distress. Receptor would seek alternate water source – reducing risk associated with other COPCs.	No quantitative estimate. Remedy must meet ARARs.
26	Assumption of secular equilibrium and use of +D designated cancer slope factors (e.g., Ra-226+D).	There have been no site-specific determinations of secular equilibrium. Would tend to be an overestimate. Uncertainty associated with the use of these +D designations varies by COPC. Calculation of actual risk would require measurement of daughter activities in groundwater samples.	Low; Up to 1.03 to 1.44 times overestimate of risk due to individual radiologic parameters.

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
27	The risk characterization step of the HHRA process, including: (1) the significance of HQs greater than one (2) process of summing individual HQs for multiple COPCs and across multiple exposure pathways (3) HIs are calculated in this HHRA first using the assumption that all the hazards are additive, and secondly by toxic effect or target organ. These HI calculations are important uncertainties in the risk characterization.	The assumption that the risks are additive likely (but not always) would result in an overestimation of the hazard. There is conservatism built into most toxicity numbers (i.e., RfDs) through uncertainty factors and modifying factors. RfDs do not have equal accuracy or precision and are not based on the same severity of toxic effects. It is unknown whether COPC interactions are synergistic, antagonistic, or additive or whether the severity of effects used to develop the RfDs are comparable. These uncertainties may be reduced by summing the COPCs by toxic effect or target organ; however, the hazard is likely still overestimated due to conservatism in the RfD development and RfDs that are based on toxic effects that are difficult to categorize.	Low to medium; Likely overestimate. No meaningful quantitative estimate possible.
28	Background COPC concentrations higher than seepage-impacted waters. An example of this is the groundwater inhalation exposure pathway for the Southwest Alluvium, where radium-226 concentrations represent more than half the total risk, but where radium-226 concentrations in background water are three times higher than in seepage impacted water.	Overestimate of excess risk for individual COPC.	Low to high; Overestimate equal to 100% of risk or hazard attributed to individual COPCs; Overestimate on the order of 50% of total risk or hazard for some HSUs, depending on other COPCs present.
29	Background COPC concentrations lower than seepage-impacted waters. A hazard or risk driver is present at lower concentrations in background water than in seepage-impacted waters, but the risk associated with background water exceeds the EPA acceptable risk range (1E-04 to 1E-06) or an HI of 1. An example of this is the groundwater ingestion exposure pathway for Zone 3, where arsenic concentrations in impacted water are approximately 2.4 times the concentration in background water, but the non-radiological carcinogenic risk associated with both background and seepage-impacted water concentrations exceed the EPA acceptable range.	Overestimate of excess risk for individual COPCs.	Low to high; Overestimate estimated to be 5-50% of risk or hazard attributed to individual COPCs. Overestimate on the order of 50% of total risk or hazard for some HSUs, depending on other COPCs present.

	Uncertainty Type or Category	Likely Direction of Bias (i.e., overestimate or underestimate of risk) and Comments	Level of Bias Qualitative (Low, Medium High) and Estimated Multiplier
30	Different COPC distributions in seepage-impacted and background waters. In this case, the COPC distribution in background and seepage-impacted waters are different, but the risk or hazard associated with both waters exceed the applicable EPA acceptable range.	Risk due to tailings-related COPCs is not overestimated or underestimated due to the presence of different COPCs in background, but cleanup of impacted water may not be warranted if background risk exceeds EPA acceptable range as well.	Low to medium; No quantitative estimate possible.

TABLE 6
 Risk and Hazard Summary By Hydrostratigraphic Unit and Exposure Pathway
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

Hydrostratigraphic Unit	Exposure pathway	Total Non-carcinogenic Hazard Index (Child)	Chemical Carcinogenic Risk (Child/Adult)	Radionuclide Carcinogenic Risk (Child/Adult)	Total Carcinogenic Risk (Child/Adult)
Southwest Alluvium	Ingestion	12.9	5.9E-05	1.5E-04	2.1E-04
Southwest Alluvium	Dermal	1.3	4.7E-07	N/A	4.7E-07
Southwest Alluvium	Inhalation	0.0041	2.1E-06	<i>2.9E-04</i>	2.9E-04
Southwest Alluvium	Total	14.2	6.2E-05	4.4E-04	5.0E-04
Zone 1	Ingestion	20.1	3.3E-05	<i>5.3E-05</i>	8.6E-05
Zone 1	Dermal	0.96	2.1E-07	N/A	2.1E-07
Zone 1	Inhalation	0.0008	4.2E-07	<i>1.3E-03</i>	1.3E-03
Zone 1	Total	21.1	3.4E-05	1.4E-03	1.4E-03
Zone 3	Ingestion	229	9.2E-03	5.3E-04	9.7E-03
Zone 3	Dermal	6.9	5.3E-05	N/A	5.3E-05
Zone 3	Inhalation	0.004	2.0E-06	1.2E-02	1.2E-02
Zone 3	Total	236	9.3E-03	1.3E-02	2.2E-02

Notes:

N/A = Not applicable, radionuclides were not retained as COPCs under the dermal exposure pathway

Italics indicate that the hazard or risk shown for seepage-impacted groundwater is within background hazard or risk.

TABLE 7
Designation of Retained Chemicals of Potential Concern (RCOPCS)
UNC Church Rock Mill and Tailings Site
Church Rock, New Mexico

Hydrostratigraphic Unit	COPCs Retained in "Table 10s"	Non-carcinogen or Carcinogen	Retained as RCOPC	RCOPC Retention Rationale
Southwest Alluvium	Arsenic	Carcinogen	No	Similar to background concentrations; below MCL
Southwest Alluvium	Cobalt	Non-carcinogen	No	One detected result in impacted water; background concentrations higher than impacted water concentrations
Southwest Alluvium	Manganese	Non-carcinogen	Yes	HI = 8.7 (Child)
Southwest Alluvium	Uranium	Non-carcinogen	Yes	HI = 2.7 (Child)
Southwest Alluvium	Chloroform	Carcinogen	Yes	Risk = 1.7E-06 – Ingestion and dermal Risk = 2.1E-06 – Inhalation
Southwest Alluvium	Uranium isotopes	Carcinogen	Yes	Risk > 1E-04
Southwest Alluvium	Radium-226	Carcinogen	No	Background concentrations higher than impacted
Southwest Alluvium	Radium-228	Carcinogen	No	Background concentrations higher than impacted
Zone 1	Cobalt	Non-carcinogen	Yes	HI = 11.9 (Child)
Zone 1	Manganese	Non-carcinogen	No	Background concentrations higher than impacted
Zone 1	Vanadium	Non-carcinogen	No	Hazard based on only one historical detection in seepage impacted water
Zone 1	Arsenic	Carcinogen	No	Similar to background concentrations; below MCL
Zone 1	Radium-226	Carcinogen	No	Background concentrations higher than impacted water concentrations
Zone 1	Radium-228	Carcinogen	No	Background concentrations higher than impacted water concentrations
Zone 1	Thorium-230	Carcinogen	No	Risk = 1.1E-06, within background radiological risk
Zone 3	Aluminum	Non-carcinogen	Yes	HI = 2.5 (Child)
Zone 3	Arsenic	Carcinogen and Non-carcinogen	Yes	HI = 88.4 (Child) Risk 9.3E-03
Zone 3	Beryllium	Non-carcinogen	Yes	HI = 1.3 (Child)
Zone 3	Cadmium	Non-carcinogen	No	Background concentrations higher than impacted water concentrations
Zone 3	Cobalt	Non-carcinogen	Yes	HI = 94.2 (Child)
Zone 3	Manganese	Non-carcinogen	Yes	HI = 33.8 (Child)
Zone 3	Molybdenum	Non-carcinogen	No	Background concentrations higher than impacted water concentrations
Zone 3	Nickel	Non-carcinogen	Yes	HI = 1.6 (Child)
Zone 3	Vanadium	Non-carcinogen	Yes	HI = 2.3 (Child)
Zone 3	Uranium	Non-carcinogen	No	Background concentrations higher than impacted water concentrations
Zone 3	Chloroform	Carcinogen	Yes	Risk = 1.6E-06 – Ingestion and dermal; Risk = 2.0E-06 – Inhalation
Zone 3	Uranium Isotopes	Carcinogens	No	Background concentrations higher than impacted water concentrations
Zone 3	Radium-226	Carcinogen	Yes	Risk = 8.5E-05 – Ingestion Risk 1.2E-02 – Inhalation
Zone 3	Radium-228	Carcinogen	Yes	Risk = 3.5E-04 – Ingestion
Zone 3	Lead-210	Carcinogen	Yes	Risk = 5.5E-05 – Ingestion

Note:

Gray highlighted rows indicate Retained Constituents of Potential Concern (RCOPCs)

TABLE 8
 Summary of HHRA Screening, HHRA Results, and ARAR Comparison for COPCs
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

Exposure Point	CAS Number	Chemical	Exposure Point Concentration (EPC) (4)	EPC Statistic	Units	Concentration Used for Screening (5)	Background Value (6)	Screening Toxicity Value (N/C) (7)	Potential ARAR/TBC Value (8)	Potential ARAR/TBC Source (8)	HHRA COPC Flag (Y/N)	Rationale for Selection or Deletion (9)	Risk-Based RCOPC?		ARAR-Based RCOPC?				
													Non-Carcinogen or Carcinogen	Risk or Hazard (From Appendix A)	Risk RCOPC Flag (Y/N)	Rationale for Selection or Deletion (9)	EPC Exceeds ARAR? (Y/N)	ARAR RCOPC Flag (Y/N)	Rationale for Selection or Deletion
SW Alluvium Tapwater	7429-90-5	Aluminum	0.167	Mean	mg/l	0.3	0.107	1.6 (N)	5	NMWQCC-I	N	BSL	Screened out from HHRA			No	No	EPC < ARAR	
	7440-38-2	Arsenic	0.00256	UCL95	mg/l	0.01	0.00116	0.000045 (C)	0.01	MCL	Y	ASL	Carcinogen	Risk = 5.8E-05 – Ingestion and dermal	No	Similar to background concentrations; below MCL	No	No	EPC < ARAR (MCL); Similar to background concentrations
												Non-Carcinogen	HI = 0.55 (Child)						
	7440-48-4	Cobalt	0.01	Max	mg/l	0.01	0.0121	0.00047 (N)	0.05	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 2.14 (Child)	No	One detected result in impacted water; background concentrations higher than impacted water concentrations	No	No	EPC < ARAR; One detected result in impacted water; background concentrations higher than impacted water concentrations
	7439-96-5	Manganese	2.8	UCL95	mg/l	5.4	0.414	0.032 (N)	0.2	NMWQCC-O	Y	ASL	Non-carcinogen	HI = 8.7 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7782-49-2	Selenium	0.001	Max	mg/l	0.001	0.00516	0.0078 (N)	0.05	MCL	N	BSL	Screened out from HHRA			No	No	Maximum detected concentration < ARAR	
	7440-61-1	Uranium	0.128	UCL95	mg/l	0.246	0.0459	0.011 (N)	0.03	MCL	Y	ASL	Non-carcinogen	HI = 2.7 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	13966-29-5	Uranium-234	4.37E+01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 5.8E-05	Yes	Uranium Isotopes Risk > 1E-04	NA	NA	NA
	15117-96-1	Uranium-235	1.99E+00	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 2.7E-06			NA	NA	NA
	7440-61-1	Uranium-238	4.27E+01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 7.0E-05			NA	NA	NA
	67-66-3	Chloroform	0.00338	UCL95	mg/l	0.0155	ND	0.00019 (C)	0.08	MCL (TTHM)	Y	ASL	Carcinogen	Risk = 1.7E-06 – Ingestion and dermal Risk = 2.1E-06 – Inhalation	Yes	Risk > 1E-06	No	No	EPC < ARAR
													Non-carcinogen	HI = 0.03					
	13982-63-3	Radium-226 (3)	0.267	UCL95	pCi/L	1	0.798	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 1.9E-06 Ingestion and Risk = 2.9E-04 Inhalation	No	Background concentrations higher than impacted	No	No	EPC < ARAR; Background concentrations higher than impacted
	15262-20-1	Radium-228 (3)	0.86	UCL95	pCi/L	4.3	1.611	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 1.7E-05	No	Background concentrations higher than impacted	No	No	EPC < ARAR; Background concentrations higher than impacted
	14269-63-7	Thorium-230	0.29	UCL95	pCi/L	1.6	0.509	NA (C)	5	NRC GPS	Y	DET	Carcinogen	Risk = 5.0E-07	No	Risk < 1E-06	No	No	EPC < ARAR
	16887-00-6	Cl	199.6	UCL95	mg/L	NA	83.72	NA	250	NMWQCC-O	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	No	No	EPC < ARAR
18785-72-3	SO4	2867	UCL95	mg/L	NA	2468	NA	2125	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR; background concentrations similar to impacted	
14797-55-8	NO3_as_N	94.42	UCL95	mg/L	NA	137.4	NA	190	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. Toxicity values limited to infant (0-3 mo) effects, MCL based on toxicity to infants.	No	No	EPC < ARAR; background concentrations higher than impacted	
NA	Lab_TDS	6250	UCL95	mg/L	NA	4745	NA	4800	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR	
7440-14-4	Rad_totl	0.828	UCL95	pCi/L	NA	1.621	NA	5	MCL	N	GGP	Individual isotopes are carcinogens	NA	No	Radium isotopes evaluated individually	No	No	EPC < ARAR; Background concentrations higher than impacted	
12587-46-1	Gross_Alpha	1.141	UCL95	pCi/L	NA	1.693	NA	15	MCL (gross alpha)	N	GGP	Individual alpha-emitters are carcinogens	NA	No	Gross alpha is screening parameter, no applicable toxicity value	No	No	EPC < ARAR; Background concentrations higher than impacted	

TABLE 8

Summary of HHRA Screening, HHRA Results, and ARAR Comparison for COPCs
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

Exposure Point	CAS Number	Chemical	Exposure Point Concentration (EPC) (4)	EPC Statistic	Units	Concentration Used for Screening (5)	Background Value (6)	Screening Toxicity Value (N/C) (7)	Potential ARAR/TBC Value (8)	Potential ARAR/TBC Source (8)	HHRA COPC Flag (Y/N)	Rationale for Selection or Deletion (9)	Risk-Based RCOPC?			ARAR-Based RCOPC?			
													Non-Carcinogen or Carcinogen	Risk or Hazard (From Appendix A)	Risk RCOPC Flag (Y/N)	Rationale for Selection or Deletion (9)	EPC Exceeds ARAR? (Y/N)	ARAR RCOPC Flag (Y/N)	Rationale for Selection or Deletion
Zone 1 Tapwater	7429-90-5	Aluminum	0.44	UCL95	mg/l	1.3	0.117	1.6 (N)	5	NMWQCC-I	N	BSL	Screened out from HHRA			No	No	EPC < ARAR	
	7440-38-2	Arsenic	0.00145	UCL95	mg/l	0.003	0.00117	0.000045 (C)	0.01	MCL	Y	ASL	Carcinogen	Risk = 3.3E-05 – Ingestion and dermal	No	Similar to background concentrations; below MCL	No	No	EPC < ARAR (MCL); Similar to background concentrations
	7440-48-4	Cobalt	0.0557	UCL95	mg/l	0.06	0.0112	0.00047 (N)	0.05	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 11.9 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7439-96-5	Manganese	1.95	UCL95	mg/l	2.96	2.519	0.032 (N)	0.2	NMWQCC-O	Y	ASL	Non-carcinogen	HI = 6.0	No	Background concentrations higher than impacted	Yes	No	Background concentrations higher than impacted
	7440-02-0	Nickel	0.0533	Mean	mg/l	0.06	0.0602	0.030 (N)	0.2	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 0.18 (Child)	No	Similar to background concentrations; few detects	No	No	EPC < ARAR; Similar to background concentrations
	7782-49-2	Selenium	0.001	Max	mg/l	0.001	0.00107	0.0078 (N)	0.05	MCL	N	BSL	Screened out from HHRA			No	No	Maximum detected concentration < ARAR	
	7440-62-2	Vanadium	0.2	Max	mg/l	0.2	ND	0.0078 (N)	0.1	NRC GPS	Y	ASL	Non-carcinogen	HI = 2.6	No	Hazard based on only one detection in seepage-impacted water dataset	Yes	No	Hazard based on only one detection in seepage-impacted water dataset
	7440-61-1	Uranium	0.00174	UCL95	mg/l	0.0022	0.0255	0.0047 (N)	0.03	MCL	N	BSL	Screened out from HHRA			No	No	EPC < ARAR; Background concentrations higher than impacted	
	13966-29-5	Uranium-234	5.94E-01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 7.9E-07	No	Total Uranium Isotopes Risk = 1.8E-06; Background concentrations higher than impacted	NA	NA	Total uranium EPC < ARAR; Background concentrations higher than impacted
	15117-96-1	Uranium-235	2.71E-02	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 3.7E-08			NA	NA	
	7440-61-1	Uranium-238	5.80E-01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 9.6E-07			NA	NA	
	67-66-3	Chloroform	0.00068	Mean	mg/l	0.00076	NBC	0.00019 (C)	0.08	MCL (TTHM)	Y	ASL	Carcinogen	Risk = 3.4E-07 – Ingestion and dermal Risk = 2.8E-08 – Inhalation	No	Risk < 1E-06 and HI < 1	No	No	EPC < ARAR
	13982-63-3	Radium-226 (3)	1.213	UCL95	pCi/L	1.8	1.314	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 8.8E-06 – Ingestion; Risk 1.3E-03 Inhalation	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	15262-20-1	Radium-228 (3)	2.087	UCL95	pCi/L	4	2.946	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 4.1E-05 – Ingestion	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	14269-63-7	Thorium-230	0.65	Mean	pCi/L	0.7	0.403	NA (C)	5	NRC GPS	Y	DET	Carcinogen	Risk = 1.1E-06	No	Risk near 1.0E-06, within background radiological risk	No	No	EPC < ARAR
	16887-00-6	Cl	214.3	UCL95	mg/L	NA	39.03	NA	250	NMWQCC-O	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	No	No	EPC < ARAR
	18785-72-3	SO4	4049	UCL95	mg/L	NA	2773	NA	2125	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR
	14797-55-8	NO3_as_N	152	UCL95	mg/L	NA	1.754	NA	190	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. Toxicity values limited to infant (0-3 mo) effects, MCL based on toxicity to infants.	No	No	EPC < ARAR
N/A	Lab_TDS	6843	UCL95	mg/L	NA	4319	NA	4800	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR	
7440-14-4	Rad_totl	2.8	UCL95	pCi/L	NA	3.841	NA	5	MCL	N	GGP	Individual isotopes are carcinogens	NA	No	Radium isotopes evaluated individually	No	No	EPC < ARAR; Background concentrations higher than impacted	
12587-46-1	Gross_Alpha	2.319	UCL95	pCi/L	NA	2.361	NA	15	MCL (gross alpha)	N	GGP	Individual alpha-emitters are carcinogens	NA	No	Gross alpha is screening parameter, no applicable toxicity value	No	No	EPC < ARAR; Background concentrations similar to impacted	

TABLE 8

Summary of HHRA Screening, HHRA Results, and ARAR Comparison for COPCs
 UNC Church Rock Mill and Tailings Site
 Church Rock, New Mexico

Exposure Point	CAS Number	Chemical	Exposure Point Concentration (EPC) (4)	EPC Statistic	Units	Concentration Used for Screening (5)	Background Value (6)	Screening Toxicity Value (N/C) (7)	Potential ARAR/TBC Value (8)	Potential ARAR/TBC Source (8)	HHRA COPC Flag (Y/N)	Rationale for Selection or Deletion (9)	Non-Carcinogen or Carcinogen	Risk or Hazard (From Appendix A)	Risk-Based RCOPC?		ARAR-Based RCOPC?		
															Risk RCOPC Flag (Y/N)	Rationale for Selection or Deletion (9)	EPC Exceeds ARAR? (Y/N)	ARAR RCOPC Flag (Y/N)	Rationale for Selection or Deletion
Zone 3 Tapwater	7429-90-5	Aluminum	39.15	UCL95	mg/l	163	0.231	1.6 (N)	5	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 2.5 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7440-38-2	Arsenic	0.412	UCL95	mg/l	2.5	0.175	0.00045 (C)	0.01	MCL	Y	ASL	Carcinogen	Risk 9.3E-03 Ingestion and dermal	Yes	Risk > 1E-06 and HI > 1	Yes	Yes	EPC > ARAR
	7440-41-7	Beryllium	0.0202	UCL95	mg/l	0.09	ND	0.0016 (N)	0.004	MCL	Y	ASL	Non-carcinogen	HI = 88.4 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7440-43-9	Cadmium	0.0075	UCL95	mg/l	0.015	0.0113	0.00069 (N)	0.005	MCL	Y	ASL	Non-carcinogen	HI = 1.3 (Child)	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	7440-48-4	Cobalt	0.439	UCL95	mg/l	0.95	0.0877	0.00047 (N)	0.05	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 94.2 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7439-96-5	Manganese	10.89	UCL95	mg/l	23.7	3.436	0.032 (N)	0.2	NMWQCC-O	Y	ASL	Non-carcinogen	HI = 33.8 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7439-98-7	Molybdenum	0.739	UCL95	mg/l	5	17.43	0.0078 (N)	1	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 9.5 (Child)	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	7440-02-0	Nickel	0.489	UCL95	mg/l	0.89	0.14	0.030 (N)	0.2	NMWQCC-I	Y	ASL	Non-carcinogen	HI = 1.6 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7782-49-2	Selenium	0.00433	Mean	mg/l	0.01	0.00159	0.0078 (N)	0.05	MCL	Y	ASL	Non-carcinogen	HI = 0.056 (Child)	No	HI < 0.1; similar to background concentrations; below MCL; few detects	No	No	EPC < ARAR; Maximum detected concentration < ARAR
	7440-62-2	Vanadium	0.18	Mean	mg/l	0.2	ND	0.0078 (N)	0.1	NRC GPS	Y	ASL	Non-carcinogen	HI = 2.3 (Child)	Yes	HI > 1	Yes	Yes	EPC > ARAR
	7440-61-1	Uranium	0.0431	UCL95	mg/l	0.138	0.107	0.0047 (N)	0.03	MCL	Y	ASL	Non-carcinogen	HI = 0.92 (Child)	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	13966-29-5	Uranium-234	1.47E+01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 2.0E-05 - Ingestion	No	Background concentrations higher than impacted water concentrations	No	No	Background concentrations higher than impacted water concentrations
	15117-96-1	Uranium-235	6.71E-01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 9.1E-07 - Ingestion					
	7440-61-1	Uranium-238	1.44E+01	NA	pCi/L	NA	NA	NA (C)	NA	NA	Y	DET	Carcinogen	Risk = 2.4E-05 - Ingestion					
	67-66-3	Chloroform	0.00326	UCL95	mg/l	0.00676	NBC	0.00019 (C)	0.08	MCL (TTHM)	Y	ASL	Carcinogen	Risk = 1.6E-06 - Ingestion and dermal; Risk = 2.0E-06 - Inhalation	Yes	Risk > 1E-06	No	No	EPC < ARAR
													Non-Carcinogen	HI = 0.026					
	13982-63-3	Radium-226	11.14	UCL95	pCi/L	27.6	4.996	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 8.5E-05 - Ingestion; Risk 1.2E-02 Inhalation	Yes	Risk > 1E-06	Yes	Yes	EPC > ARAR
	15262-20-1	Radium-228	17.84	UCL95	pCi/L	56.1	4.509	NA (C)	5	MCL (combined radium)	Y	DET	Carcinogen	Risk = 3.5E-04 - Ingestion	Yes	Risk = 3.5E-04 - Ingestion	Yes	Yes	EPC > ARAR
	14269-63-7	Thorium-230	0.259	UCL95	pCi/L	1.3	1.426	NA (C)	5	NRC GPS	Y	DET	Carcinogen	Risk = 4.5E-07 - Ingestion	No	Risk < 1E-06	No	No	EPC < ARAR
	14255-04-0	Lead-210	2.287	UCL95	pCi/L	8.1	1.618	NA (C)	1	NRC GPS	Y	DET	Carcinogen	Risk = 5.5E-05 - Ingestion	Yes	Risk > 1E-06	Yes	Yes	EPC > ARAR
16887-00-6	Cl	48.01	UCL95	mg/L	NA	32.65	NA	250	NMWQCC-O	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	No	No	EPC < ARAR	
18785-72-3	SO4	3717	UCL95	mg/L	NA	2674	NA	2125	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR	
14797-55-8	NO3_as_N	16.09	UCL95	mg/L	NA	15.61	NA	190	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. Toxicity values limited to infant (0-3 mo) effects, MCL based on toxicity to infants.	No	No	EPC < ARAR	
N/A	Lab_TDS	5441	UCL95	mg/L	NA	4239	NA	4800	NM BKGD	N	GGP	Non-carcinogen	NA	No	General chemistry parameter. No applicable toxicity value	Yes	Yes	EPC > ARAR	
7440-14-4	Rad_totl	29.14	UCL95	pCi/L	NA	10.660	NA	5	MCL	N	GGP	Individual isotopes are carcinogens	NA	No	Radium isotopes evaluated individually	Yes	Yes	EPC > ARAR and background concentrations	
12587-46-1	Gross_Alpha	14.25	UCL95	pCi/L	NA	8.217	NA	15	MCL (gross alpha)	N	GGP	Individual alpha-emitters are carcinogens	NA	No	Gross alpha is screening parameter, no applicable toxicity value	No	No	EPC < ARAR	

TABLE 8

Summary of HHRA Screening, HHRA Results, and ARAR Comparison for COPCs
UNC Church Rock Mill and Tailings Site
Church Rock, New Mexico

Notes:

- (1) Qualifier codes used for the "Minimum Concentration" and "Maximum Concentration":
D = the sample was diluted to facilitate analysis.
- (2) Uranium isotopes not analyzed. Isotope concentrations esimated from total uranium mass concentration (see Table 3.A.RME).
- (3) The EPC calculation or Radium-226 and Radium-228 count the raw below-detection-limit values from the 2nd Quarter 2008 as detections, because they were treated as such using ProUCL.
- (4) Bold-highlighted EPCs had insufficient detected results to calculate UCL95 values or UCL95 values were determined to be of questionable reliability (see Appendix B). Therefore, EPC based on alternate statistic (e.g., mean or maximum detected value).
- (5) Maximum concentration used for screening chemicals. No screening was conducted for radionuclides. All radionuclides detected are selected as COPCs.
- (6) Background values are estimates of the mean (UCL95) calculated in N.A. Water Systems (2008b).
- (7) All compounds were screened against the November 2011 USEPA Risk Screening Level Table (<http://www.epa.gov/region9/superfund/prg/>).
- For non-carcinogens: screening value = 0.1 x RSL tapwater value
- For carcinogens : screening value = RSL tapwater value
- (8) Potential ARAR value represents the lowest value if multiple potential ARARs exist, except for selenium, for which the MCL was used instead of the NRC LCS because the MCL is protective and has increased since the License Standard was established. Also, ARAR Source column entry defaults to MCL if multiple potential ARARs (of equal value) exist.

(9) HHRA COPC Flag Rationale Codes:

Selection Reason	Above Screening Level (ASL)
	Detected in seepage-impacted groundwater at Site (DET)
Deletion Reason	Below Screening Level (BSL)
	General chemistry or group parameter (GGP)

Yellow indicates significant change since last version, yellow highlighting to be removed for final

Definitions:

- NA = Not Applicable; NA value in EPC column indicates that there were insufficient data to make an estimate for this analyte.
- ND = Not Detected
- MCL = EPA Maximum Contaminant Level
- NRC GPS = NRC Groundwater Protection Standard**
- NMWQCC = New Mexico Water Quality Control Commission Groundwater Domestic Standard
- NMWQCC-I = New Mexico Water Quality Control Commission Groundwater Irrigation Standard
- NMWQCC-O = New Mexico Water Quality Control Commission Other Standard**
- NM BKGD = New Mexico Environment Department recommended background value (letter to EPA, 1/6/1998); EPA has not formally accepted these values.**
- C = Carcinogen
- N = Noncarcinogen
- TTHM = 0.080 mg/l is the MCL for total trihalomethanes, of which chloroform is a single compound.
- NBC = No background concentration - chloroform was not detected frequently enough in Zone 1 and Zone 3 background samples (less than 1%) to calculate background concentration
- ARAR = Applicable or Appropriate and Relevant Requirement
- RCOPC = Retained Constituent of Potential Concern