

**Table 6.1-3: Water Quality Parameter List**

Test Analyte/Parameter	Units	Analytical Method
<b>Physical Properties</b>		
pH ‡	pH units	A4500-H B
Total Dissolved Solids (TDS) +	mg/L	A2540 C
Conductivity	µmhos/cm	A2510 B
<b>Common Elements and Ions</b>		
Alkalinity (as CaCO <sub>3</sub> )	mg/L	A2320 B
Bicarbonate Alkalinity (as CaCO <sub>3</sub> )	mg/L	A2320 B (as HCO <sub>3</sub> )
Calcium	mg/L	E200.7
Carbonate Alkalinity (as CaCO <sub>3</sub> )	mg/L	A2320 B
Chloride, Cl	mg/L	A4500-Cl B; E300.0
Magnesium, Mg	mg/L	E200.7
Nitrate, NO <sub>3</sub> <sup>-</sup> (as Nitrogen)	mg/L	E300.0
Potassium, K	mg/L	E200.7
Sodium, Na	mg/L	E200.7
Sulfate, SO <sub>4</sub>	mg/L	A4500-SO4 E; E300.0
<b>Trace and Minor Elements<sup>1</sup></b>		
Arsenic, As	mg/L	E200.8
Barium, Ba	mg/L	E200.8
Boron, B	mg/L	E200.7
Cadmium, Cd	mg/L	E200.8
Chromium, Cr	mg/L	E200.8
Copper, Cu	mg/L	E200.8
Fluoride, F	mg/L	E300.0
Iron, Fe	mg/L	E200.7
Lead, Pb	mg/L	E200.8
Manganese, Mn	mg/L	E200.8
Mercury, Hg	mg/L	E200.8
Molybdenum, Mo	mg/L	E200.8
Nickel, Ni	mg/L	E200.8
Selenium, Se	mg/L	E200.8, A3114 B
Silver, Ag	mg/L	E200.8
Uranium, U	mg/L	E200.7, E200.8
Vanadium, V	mg/L	E200.7, E200.8
Zinc, Zn	mg/L	E200.8
<b>Radiological Parameters<sup>1,2</sup></b>		
Gross Alpha††	pCi/L	E900.0
Gross Beta	pCi/L	E900.0
Radium, Ra-226	pCi/L	E903.0

‡ Field and laboratory

+ Laboratory only

†† Excluding radon, radium, and uranium

<sup>1</sup> For alluvial compliance and interior well sampling, the concentrations of trace and minor elements and radiological parameters will be the dissolved portion, except mercury, which will be the total, unfiltered concentration in accordance with ARSD 74:54:01:04.

<sup>2</sup> The parameter list for alluvial compliance and interior wells also will include radon-222 and radium-228.

## 6.4 Soil

Prior to operation of the land application systems, two baseline soil samples will be collected from each quadrant of each center pivot (eight total samples per pivot). Samples will be collected from two depth intervals (0-18 inches and 18-36 inches) and analyzed for the parameters in Table 6.4-1.

During operation, a minimum of two soil samples will be collected each year from each land application pivot active during that year, one from 0-18 inches and one from 18-36 inches. Samples will be analyzed for the parameters in Table 6.4-1.

**Table 6.4-1: Soil Sampling Parameters**

Parameter	Units	Reporting Limit
Conductivity, paste extract	umhos/cm	0.01
pH, paste extract	s.u.	0.1
Sodium	mg/kg-dry	1
Sodium adsorption ratio (SAR)	unitless	0.1
Chloride, soluble	mg/kg-dry	1
Chloride	mg/kg-dry	10
Sulfate	mg/kg-dry	10
Arsenic	mg/kg-dry	0.6
Barium	mg/kg-dry	0.6
Boron	mg/kg-dry	0.1
Cadmium	mg/kg-dry	0.6
Chromium	mg/kg-dry	0.6
Lead	mg/kg-dry	0.6
Mercury	mg/kg-dry	1
Selenium	mg/kg-dry	0.6
Silver	mg/kg-dry	0.6
Vanadium	mg/kg-dry	0.6
Nitrate as N, KCl extract	mg/kg-dry	1
Uranium-natural	mg/kg-dry	0.5
Radium-226	pCi/g-dry	0.1
Thorium-230	pCi/g-dry	0.1
Lead-210	pCi/g-dry	0.1
Polonium-210	pCi/g-dry	0.1

## 6.5 Vegetation

Samples of the crops grown on three of the land application areas from each of the Dewey and Burdock sites will be collected at the end of each irrigation season during operations. If crops are not grown, samples of existing vegetation will be collected and analyzed. Samples will be analyzed for the parameters in Table 6.5-1.

dewater the catchment areas if the freeboard capacity limits are approached. The excess water will be conveyed to another catchment area with excess operating capacity, pumped to the storage ponds, or pumped to a land application pivot area. Powertech (USA) also will record daily precipitation totals and use this information along with the daily catchment area monitoring results to evaluate whether the catchment areas accumulate water during normal operations (i.e., dry conditions). If water accumulates in the catchment areas during dry conditions, Powertech (USA) will implement a dewatering program. The accumulated water will be conveyed to the storage ponds or pumped to a land application pivot area (primary or standby area).

### **8.3 Soil**

During land application, there could be potential impacts to the soil from the buildup of salts, changes in SAR, buildup of radionuclides, buildup of metals and metalloids, and decrease in soil fertility. Mitigation of each of these potential impacts is described below.

#### Salinity and EC

The expected land application water quality is described in Section 5.8. With an anticipated TDS concentration of 1,000 to 5,000 mg/L, the water will pose a low to moderate risk to the growth of moderately sensitive crops such as alfalfa. Soil salinity levels will be controlled by blending the land application water in the ponds and by leaching salts below the root zone during land application. Powertech (USA) will operate the land application systems to balance the downward migration of water, which has potential alluvial groundwater impacts, with the leaching that will be used to control salt buildup in the root zone.

The anticipated SAR levels are 2 to 6, which should pose a low risk to soil infiltration rates. Should soil SAR increase and pose a risk to soil infiltration, Powertech (USA) will use amendments as necessary such as sulfur or gypsum.

#### Radionuclides

Since Powertech (USA) will treat the land application water to meet the 10 CFR Part 20, Appendix B, Table 2, Column 2 standards for release of radionuclides to the environment, it is unlikely that radionuclides will build up to potentially harmful levels. This will be verified through operational soil monitoring and additional surveys during decommissioning. Powertech (USA) has evaluated potential uranium chemical toxicity through various exposure pathways and determined that these concentrations should not result in chemical toxicity effects. These

concentrations will be the trigger levels for operational monitoring, at which the contingency plan described below will be implemented

During decommissioning, Powertech (USA) will conduct land cleanup in accordance with 10 CFR Part 40, Appendix A, Criterion 6(6) and DENR requirements. This includes cleaning up surface soils to standards for radium-226 and natural uranium that will be established as conditions in the NRC license as protective of human health and the environment.

## 11.0 REPORTING

Powertech (USA) will establish and maintain records and prepare and submit reports in accordance with the requirements of SDCL 34A-2-44 and ARSD 74:54:02.

In accordance with ARSD 74:54:02:19, Powertech (USA) will verbally notify DENR upon commencement of operation of the land application system. Written notice of the start-up will follow within 30 days. DENR will also be notified of the discontinuance of land application and the reason for the stoppage within 10 days with written notice within 30 days. If stoppage is due to an upset condition, such as spill or leak, DENR will be notified immediately.

Per ARSD 74:54:02:20, Powertech (USA) will submit a written report to the DENR following each land application cycle. Prior to the end of each year, Powertech (USA) will prepare and submit a written report including the following information for each of the land application systems (Dewey and Burdock):

- 1) The total amount of land application solution applied
- 2) The total hydraulic loading rate per acre
- 3) The total metals loading rate per acre, including all of the trace and minor elements and radiological parameters in Table 6.1-3
- 4) All sampling data, including alluvial groundwater, Fall River Formation groundwater, streams and impoundments, domestic wells, land application discharge water, soil, vegetation, and livestock
- 5) An analysis of potential increasing trends in the concentration of all soil sampling parameters in Table 6.4-1 and proposed additional trigger values, if applicable
- 6) The results of daily catchment area monitoring to ensure that water does not accumulate in the land application areas during normal operations (i.e., dry conditions) and that freeboard capacity limits are not exceeded
- 7) Description of any catchment area dewatering activities
- 8) A general discussion of the success of the system

Powertech (USA) will notify DENR by phone of any out-of-compliance conditions, including groundwater sample results, soil or vegetation sampling results, or release of land application solutions outside of the ponds, center pivot areas, or catchment areas within 24 hours. This includes reporting within 24 hours any spill, leak, or accidental release which threatens waters of the State in accordance with ARSD 74:54:02:25. A written statement confirming the oral report will be submitted to DENR within 30 days.



Records of all sampling activities and laboratory analyses will be maintained as hard copy originals or stored electronically. All records will be stored in a manner to prevent loss from fire, flood, or other unforeseen events beyond the control of Powertech (USA). All records will be maintained both on-site and at an off-site location until Groundwater Discharge Permit termination, except postclosure monitoring reports, which will be maintained off-site until the postclosure monitoring is terminated.