

August 10, 2012

Matt Hicks  
Senior Hydrologist  
Groundwater Quality Program  
South Dakota Department of Environment & Natural Resources  
523 East Capitol Avenue  
Joe Foss Building  
Pierre, SD 57501-3182

**Re: Response to July 16 and 30 Technical Comments  
Dewey-Burdock Project Groundwater Discharge Plan Application**

Dear Mr. Hicks:

On behalf of Powertech (USA) Inc., this letter is provided in response to technical comments received July 16 and 30, 2012 for the above referenced application for a Groundwater Discharge Plan (GDP). For convenience, the comments are provided below along with the responses. Application replacement pages are enclosed along with an index of changes (two hard copies and one electronic copy on CD). Powertech (USA) Inc. will provide a separate comment response letter regarding your August 7, 2012 questions regarding Plate 3.6-10.

**Technical Comment 1:** On Table 6.1-3, what was the reason radon was excluded from the radiological parameters, and are the metals dissolved or total? (South Dakota's ground water standards are dissolved with the exception of mercury).

**Response:** Radon was inadvertently omitted from Table 6.1-3. An updated table is attached that includes radon and indicates that metal concentrations are dissolved with the exception of total mercury.

**Technical Comment 2:** On Table 6.4-1, nitrate is listed as a soil parameter to monitor. Is this related to possible fertilizer use, or are nitrates possible from part of the processing process (such as nitric acid)? Please also add sodium adsorption ratio (SAR) and sodium to the soils parameter list.

**Response:** Nitrate is proposed as a soil sampling parameter to assess nitrogen fertilizer needs. Nitric acid is not anticipated to be used at the Dewey-Burdock Project. An updated Table 6.4-1 is attached that includes SAR and sodium.

**Technical Comment 3:** Please provide more information about how Powertech (USA) will demonstrate that land application water will not accumulate in the catchment areas during dry conditions.

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**Response:** The following response provides a summary of commitments already contained within the draft GDP to prevent water from accumulating in the catchment areas during normal operations. It also commits to mitigation measures to prevent water from accumulating in the catchment areas during normal operations (i.e., dry conditions).

The purpose of the catchment areas is to capture runoff from precipitation events or snowmelt on the land application areas (p. 120a). The land application rate will be maintained at an agronomic rate that will prevent water from accumulating in the catchment areas during normal operations. The application rate will be adjusted as necessary including temporary shutdown if needed to prevent excessive ponding in the catchment areas (p. 120a). Powertech (USA) will monitor the catchment areas daily to ensure that there is not excessive ponding and that adequate capacity is available for containment of rainfall/runoff from the 100-year, 24-hour storm (p. 164). Each catchment area will be routinely monitored, including after significant precipitation events (p. 120c). If a catchment area fills above the normal operating level, which includes designated freeboard volume for the 100-year, 24-hour storm event, a dewatering program will be initiated (p. 120c). Potential groundwater quality impacts from catchment areas will be evaluated through the commitment to install suction lysimeters within each catchment area (p. 143) and sample the lysimeters prior to each irrigation season, during each irrigation season (for lysimeters installed beneath operational catchment areas only), and once after each irrigation season (p. 145).

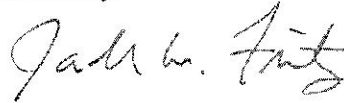
It is important to clarify that the term “normal operating level” is not meant to imply that the catchment areas will normally act as ponds filled to this level. As described on p. 120b, the normal operating level represents the excess capacity beyond the minimum required to contain the 100-year, 24-hour runoff event. If a catchment area fills above the normal operating level with runoff or snowmelt, a dewatering program will be initiated. The catchment areas will not be allowed to fill with land application solutions to the normal operating level. Following are additional commitments to ensure that the catchment areas do not accumulate water during normal operations (i.e., dry conditions). These commitments are provided in the enclosed replacement pages to the draft GDP.

Powertech (USA) 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). In the annual report following each land application cycle, Powertech (USA) will provide the results of daily catchment area monitoring and a description of any dewatering activities.

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Thank you for the prompt technical review. Please direct any questions regarding these comment responses to Richard Blubaugh at (303) 790-7528 or Jack Fritz at (307) 672-0761.

Sincerely,

A handwritten signature in black ink that reads "Jack Fritz". The signature is written in a cursive, flowing style.

Jack Fritz, P.E.  
WWC Project Manager

cc: Richard Blubaugh  
Mark Hollenbeck  
John Mays  
Ronald Burrows, U.S. NRC  
Valois Shea, U.S. EPA, Region 8  
Marian Atkins, BLM

Encl: Change Index  
Replacement Pages

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**Dewey-Burdock Project  
Groundwater Discharge Plan  
Revision Index**

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August 10, 2012 Response to July 16 and 30, 2012 Technical Comments

1	p. 142 (Table 6.1-3)	p. 142 (Table 6.1-3)	7/16 Technical Comment - Revised Table 6.1-3 to add radon and radium-228 and denote dissolved versus total trace and minor element concentrations for alluvial compliance and interior wells.
1	p. 146 (Table 6.4-1)	p. 146 (Table 6.4-1)	7/16 Technical Comment - Added sodium and sodium adsorption ratio (SAR) to soil sampling parameters.
1	p. 167, 175	p. 167-167a, 175-175a	7/30 Technical Comment - Added mitigation measures to prevent water from accumulating in the catchment areas during normal operations (i.e., dry conditions). Added daily catchment area monitoring results and description of dewatering activities to annual report.

**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-SO <sub>4</sub> 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.



**POWERTECH (USA) INC.**

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.